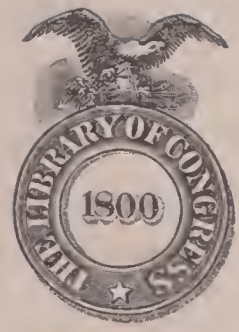

UNIVERSAL CYCLOPÆDIA AND ATLAS

A NEW EDITION UNDER DIRECTION OF

CHARLES KENDALL ADAMS, LL.D.

PRESIDENT OF THE UNIVERSITY OF WISCONSIN

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MAPS IN VOL. VII.

POLITICAL.

PHYSICAL.

CITY.

PLATES.

PECULIAR PHONETIC SYMBOLS

USED IN THE WRITING OR TRANSLITERATION OF THE DIFFERENT LANGUAGES.

ā, ē, etc.: long vowels; in the Scandinavian languages the accent (*á*, *é*, etc.) is used to denote length.

ą: a nasalized *a*; so used in the transliteration of the Iranian languages.

å: labialized guttural *a* in Swedish.

æ: open *a* of Eng. *hat*, used chiefly in O. Eng.

aí: used in Gothic to denote *e* (open), in distinction from *ái*, the true diphthong.

aú: used in Gothic to denote *o* (open), in distinction from *áu*, the true diphthong.

bh: in Sanskrit a voiced labial aspirate (cf. *ch*).

ƀ: voiced bilabial (or labio-dental?) spirant, used in discussions of Teutonic dialects.

ç: voiceless palatal sibilant, similar to Eng. *sh*, used especially in transliteration of Sanskrit.

ĕ: frequently used, e. g. in Slavonic languages, to denote the sound of Eng. *ch* in *cheek*.

c: voiceless palatal explosive, commonly used in transliteration of Sanskrit and the Iranian languages.

ch: as used in the transliteration of Sanskrit, a voiceless palatal aspirate, an aspirate being an explosive with excess of breath; as used in German grammar, the symbol for a voiceless palatal or guttural spirant.

dh: voiced dental aspirate (cf. *ch*) in Sanskrit.

ḍ: voiced cerebral explosive, so used in transliteration of Sanskrit.

ḍh: voiced cerebral aspirate (cf. *ch*) in Sanskrit.

đ: voiced dental (interdental) spirant, equivalent to Eng. *th* in *then*; so used in the Teutonic and Iranian languages and in phonetic writing.

ë: a short open *e*, used in Teutonic grammar, particularly in writing O. H. G.

ə: the short indefinite or "obscure" vowel of Eng. *gardener*; used in the reconstruction of Indo-Eur. forms, and in transliterating the Iranian languages.

gh: in Sanskrit a voiced guttural aspirate (cf. *ch*).

ǥ: voiced velar (back-guttural) explosive, used most frequently in Indo-Eur. reconstructions.

ɣ: voiced guttural (or palatal) spirant, equivalent to Mod. Greek γ, and used in transliteration of Iranian languages and O. Eng.

ḥ: a voiceless breathing, the Sanskrit *visarga*.

hᵛ: a labialized *h*, similar to *wh* in Eng. *what*; used in transliteration of Gothic and the Iranian languages.

ḫ: voiceless guttural (or palatal) spirant, equivalent to German *ch*, and used in transliteration of the Iranian languages.

i̯: the semi-vowel *y*, or consonant form of *i*; used in phonetic writing and reconstructions of Indo-Eur. forms.

j: in the transliteration of Sanskrit and the Iranian languages a voiced palatal explosive; in the Teutonic languages a semi-vowel (= *y*), for which in Indo-Eur. reconstructions *i* is generally used.

jh: in Sanskrit a voiced palatal aspirate (cf. *ch*).

kh: in Sanskrit a voiceless guttural aspirate (cf. *ch*).

ł: the guttural ("thick" or "deep") of the Slavonic and some of the Scandinavian languages.

l̥: vowel *l*; used in transliterating Sanskrit, in reconstructing Indo-Eur. forms, and in other phonetic writing.

m̥: nasal vowel; used in reconstruction of Indo-Eur. forms and in phonetic writing.

ṇ: in Sanskrit the cerebral nasal.

ñ: in Sanskrit the guttural nasal (see following).

ŋ: the guttural nasal, equivalent to Eng. *n* in *longer*; used in transliteration of Iranian languages.

ñ: palatal nasal, similar to *gn* in Fr. *regner*; used in transliterating Sanskrit and in phonetic writing.

ö: palatalized *o*; used in German and in phonetic writing.

ǫ: short open *o* in Scandinavian.

ø: short palatalized *o* (ö) in Scandinavian.

ph: in Sanskrit, voiceless labial aspirate (cf. *ch*).

ɋ: voiceless velar (back-guttural) explosive; used in reconstructions of Indo-Eur. forms and in other phonetic writing.

ṛ: vowel *r*; used in transliterating Sanskrit, in reconstructions of Indo-Eur. forms, and in other phonetic writing.

š: voiceless cerebral sibilant, equivalent to Eng. *sh*; used in transliterating the Iranian languages and in phonetic writing.

ṣ: voiceless cerebral spirant; used in transliterating Sanskrit.

th: in Sanskrit a voiceless dental aspirate (cf. *ch*).

ṭh: in Sanskrit a voiceless cerebral aspirate (cf. *ch*).

ṭ: in Sanskrit a voiceless cerebral explosive.

ţ: a form of dental spirant used in transliterating the Iranian languages (represented in Justi's transliteration by ṭ).

þ: voiceless dental (interdental) spirant, equivalent to Eng. *th* in *thin*; used in Teutonic dialects and in phonetic writing.

u̯: consonant form of *u*; used in phonetic writing.

ž: voiced cerebral sibilant, equivalent to *s* in Eng. *pleasure*, and to *j* in Fr. *jardin*; used in Iranian, Slavonic, and in phonetic writing.

ʒ: a symbol frequently used in the writing of O. H. G. to indicate a voiced dental sibilant (Eng. *z*), in distinction from *z* as sign of the affricata (*ts*).

EXPLANATION OF THE SIGNS AND ABBREVIATIONS USED IN THE ETYMOLOGIES.

>, yielding by descent, i. e. under the operation of phonetic law.
<, descended from.
=, borrowed without change from.
: , cognate with.
+, a sign joining the constituent elements of a compound.
*, a sign appended to a word the existence of which is *inferred.*

ablat.	ablative
accus.	accusative
adjec.	adjective
adv.	adverb
cf.	compare
conjunc.	conjunction
deriv. of	derivative of
dimin.	diminutive
fem.	feminine
genit.	genitive
imper.	imperative
impf.	imperfect
indic.	indicative
infin.	infinitive
masc.	masculine
nomin.	nominative
partic.	participle
perf.	perfect
plur.	plural
prep.	preposition
pres.	present
pron.	pronoun
sc.	scilicet, supply
sing.	singular
subst.	substantive
vocat.	vocative

Anglo-Fr.	Anglo-French
Arab.	Arabic
Avest.	Avestan
Dan.	Danish
Eng.	English
Fr.	French
Germ.	German
Goth.	Gothic
Gr.	Greek
Heb.	Hebrew
Icel.	Icelandic
Ital.	Italian
Lat.	Latin
Lith.	Lithuanian
Mediæv. Lat.	Mediæval Latin
Mod. Lat.	Modern Latin
M. Eng.	Middle English
M. H. Germ.	Middle High German
O. Bulg.	Old Bulgarian (= Church Slavonic)
O. Eng.	Old English (= Anglo-Saxon)
O. Fr.	Old French
O. Fris.	Old Frisian
O. H. Germ.	Old High German
O. N.	Old Norse
O. Sax.	Old Saxon
Pers.	Persian
Portug.	Portuguese
Prov.	Provençal
Sanskr.	Sanskrit
Sc.	Scotch
Span.	Spanish
Swed.	Swedish
Teuton.	Teutonic

KEY TO THE PRONUNCIATION.

aa..... as *a* in *father*, and in the second syllable of *armada*.

ăă..... same, but less prolonged, as in the initial syllable of *armada*, *Arditi*, etc.

a..... as final *a* in *armada*, *peninsula*, etc.

ă..... as *a* in *fat*, and *i* in French *fin*.

ay or ā.. as *ay* in *nay*, or as *a* in *fate*.

ăy or *ā*.. same, but less prolonged.

ā..... as *a* in *welfare*.

aw..... as *a* in *fall*, *all*.

ee..... as in *meet*, or as *i* in *machine*.

ĕe..... same, but less prolonged, as final *i* in *Arditi*.

e..... as in *men*, *pet*.

e..... obscure *e*, as in *Bigelow*, and final *e* in *Heine*.

ė..... as in *her*, and *eu* in French *-eur*.

i..... as in *it*, *sin*.

ī..... as in *five*, *swine*.

ī..... same, but less prolonged.

ō..... as in *mole*, *sober*.

ō..... same, but less prolonged, as in *sobriety*.

o..... as in *on*, *not*, *pot*.

oo..... as in *fool*, or as *u* in *rule*.

ŏŏ..... as in *book*, or as *u* in *put*, *pull*.

oi..... as in *noise*, and *oy* in *boy*, or as *eu* in German *Beust*.

ow..... as in *now*, and as *au* in German *haus*.

ö..... as in *Göthe*, and as *eu* in French *neuf*, *Chintreuil*

ŭ..... as in *but*, *hub*.

ŭ..... obscure *o*, as final *o* in *Compton*.

ü..... as in German *süd*, and as *u* in Freneh *Buzançais*, *vu*.

y or *l*.... see *l* or y.

yu..... as *u* in *mule*.

yŭ..... same, but less prolonged, as in *singular*.

ch..... as in German *ich*.

g..... as in *get*, *give* (never as in gist, congest).

hw..... as *wh* in *which*.

*k*h..... as *ch* in German *nacht*, *g* in German *tag*, *ch* in Scotch *loch*, and *j* in Spanish *Badajos*, etc.

ṅ..... nasal *n*, as in French *fin*, *Bourbon*, and nasal *m*, as in Freneh *nom*, Portuguese *Sam*.

ñ or n-y.. Spanish *ñ*, as in *cañon*, *piñon*, French and Italian *gn*, etc., as in *Boulogne*.

l or y.... Freneh *l*, liquid or mouillé, as (-i)ll- in French *Baudrillart*, and (*-i*)*l* in *Chintreuil*.

th..... as in *thin*.

th..... as in *though*, *them*, *mother*.

v..... as *w* in German *zwei*, and *b* in Spanish *Cordoba*.

sh..... as in *shine*.

*z*h..... as *s* in pleasure, and *j* in French *jour*.

All other letters are used with their ordinary English values.

NOTE.

The values of most of the signs used in the above Key are plainly shown by the examples given. But those of ö, ü, *c*h, *k*h, ñ, and *v*, whieh have no equivalents in English, can not be sufficiently indicated without a brief explanation, which is here given.

ö. The sound represented by this symbol is approximately that of -u- in *hurt* or -e- in *her*, but is materially different from either. It is properly pronounced with the tongue in the position it has when ā is uttered and with the lips in the position assumed in uttering ō.

ü. This vowel is produced with the lips rounded as in uttering oo and with the tongue in the position required in uttering ee, into which sound it is most naturally corrupted.

*c*h and *k*h. These are both rough breathings or spirants made with considerable force, *c*h being made between the flat of the tongue and the hard palate, and *k*h between the tongue and the soft palate. *c*h approaches in sound to English sh, but is less sibilant and is made further back in the mouth; *k*h is a guttural and has a hawking sound.

l or y. These are both used to represent the sound of French l mouillé, in (-i)ll- and (-i)l, whieh resembles English -y- in *lawyer*. Final *l*, that is, (-i)l, may be approximated by starting to pronounce lawyer and stopping abruptly with the -y-.

ñ or n-y. The consonants represented by ñ (Spanish ñ, French and Italian gn, etc.) are practically equivalent to English -ni- or -ny- in bunion, bunyon, onion, etc., and, exeept when final, are represented by n-y. Final ñ, as Freneh -gn(e), may be produced by omitting the sound of -on in the pronunciation of *onion*.

v. This may be pronounced by attempting to utter English v with the use of the lips alone.

See PREFACE (vol. i., p. xli.) and the article PRONUNCIATION OF FOREIGN NAMES.

THE
UNIVERSAL CYCLOPÆDIA.

: the twelfth letter of the English alphabet.

Form.—The present form is that of the Roman alphabet L. It was received from the Chalcidian Greek alphabet as ⅃. This earliest Greek form of the letter appears to have been preserved only within a limited circle of communities in Eastern Central Greece—viz., Bœotia, Attica, Eastern Locris, and Chalchis in Eubœa. Elsewhere, even in the other parts of Eubœa and in Western Locris, there appears the inverted form ∧ or Λ, which later, with the prevalence of the Ionic alphabet, became the standard Greek form. The letter was received from the Phœnicians in the form 6.

Name.—The English name *el* is the same as the Latin. The Greek name *lambda* is an adaptation of the Semitic name *lamed*, ox-goad.

Sound.—The sound most commonly denoted by *l* is a voiced dental (alveolar) liquid, characterized by a contact of the tongue-tip with the gums at the position for *t*, *d*, *n*, and a free passage of breath off both sides of the tongue. The normal *l* is doubtless bilateral, but many individuals pronounce it, by reason of some peculiarity in the conformation or condition of the teeth, as unilateral. After voiceless initial consonants *l* is commonly voiceless, as in *plead*, *cloud*, *slate*. The English *l* differs from the German and French, in that the back of the tongue is slightly more raised, giving a half-guttural quality to the sound and tending to guttural modification of a preceding vowel; cf. *call*, *ball*, *talk*, and sixteenth century spellings like *owld* (*old*) *howld* (*hold*). It may be used as a vowel—e. g. in *little* (pron. *litl*). Before *m*, *f* (*v*), *k*, it has been lost (chiefly since the seventeenth century), though retained in spelling; thus in *balm*, *calm*, *psalm*, *palm*, *salmon*, *half*, *calf*, *salve*, *chalk*, *walk*, *talk*, *folk*, *yolk*, also by reason probably of withdrawal of accent in the proclitics *would*, *should*. In *could* the *l* is merely graphic, after the analogy of *would*, *should*; cf. the older spelling *coude* (sixteenth century). In *colonel* the first *l* has the value of *r*. The old spelling *coronel* (seventeenth century), from Fr. *coronnel*, was displaced under the influence of Ital. *colonnello*, derivative of *colonna*, column.

Source.—The sound has come into English from the greatest variety of sources, but it has come in general without change, being a peculiarly permanent element. Thus it represents (1) a Teutonic and Indo-European *l* in many native words; as in *light* : Germ. *licht*, cf. Gr. λευκός, Lat. *lux*; *lief* : Germ. *lief*, cf. Lat. *lubet*; *blade* : Germ. *blatt*, cf. Lat. *folium*, Gr. φύλλον; *cold* : Germ. *kalt*, cf. Lat. *gelu*; *wolf* : Germ. *wolf*, cf. Gr. λύκος; *wheel* < O. Eng. *hwēol*, cf. Gr. κύκλος. (2) Teutonic *hl* < Indo-Europ. *kl*; as in *loud* < O. Eng. *hlūd* : Germ. *laut*, cf. Gr. κλυτός, Lat. *in-clutus*. (3) *ll* < Teutonic *ll* < Indo-Europ. *ln*; as in *full* : Germ. *voll* : Goth. *fulls*, cf. Lith. *pìlnas*, Lat. *plēnus*. (4) *ll* < Teutonic *lj*; as in *sill* < O. Eng. *syll* : Germ. *schwelle*, cf. Goth. *gasuljan*, to found. (5) Latin *l* in *tile* < O. Eng. *tigle*, from Lat. *tēgula*; mile < O. Eng. *mīl*, from Lat. *mīlia*. (6) Lat. *l* viâ Fr., as in *lien* from Fr. *lien* < Lat. *liga'men*; *place* from Fr. *place* < Lat. *pla'tea* for *plate'a* = Gr. πλατεῖα. (7) In loan-words of various sources, as Greek in *athlete* = ἀθλητής; *l* of the Arabic article *al* in *alchemy*, *alcohol*, etc.

Value as Symbol.—As a Roman numeral L = 50; in chemistry L = *lithium*; *l* or £ = *libra*, pound sterling; in astronomy *l* = longitude; in mathematics *l* = logarithm. Other abbreviations are *lb.* = pound; *l* = liter; L. C. = Lord Chamberlain; L. C. J. = Lord Chief Justice; L. D. S. = Licentiate of Dental Surgery; L. H. D. = *Litterarum Humanarum Doctor*, Doctor of Humanities; LL. B. = *Legum Baccalaureus*, Bachelor of Laws; LL. D. = *Legum Doctor*, Doctor of Laws; L. I. = Long Island; L. S. = *locus sigilli*, place of the seal; L. S. D. = *libræ*, *solidi*, *denarii*, pounds, shillings, and pence. BENJ. IDE WHEELER.

Laa'land, or **Lolland**: an island of Denmark, in the Baltic; separated from Falster by the stretch of water called Guldborgsund. Area, 444 sq. miles. It is low and flat, but fertile and well cultivated. Large crops of wheat are raised; fine forests of oak and beech abound. Pop. 70,000. The principal towns are Maribo and Naskov.

Laale, laa'le, PEDER: Danish grammarian; probably lived in the fifteenth century. Nothing is known of his life, and even his name is a matter of doubt. His one work is a collection of Latin verses with Danish proverbs as equivalents, first published as a Latin reader by Gotfreid von Ghemen (1506), later by C. Pedersen (Paris, 1515), and finally by K. Nyerup (Copenhagen, 1828). It is of great value as being the first collection of proverbs in Danish, and for the light it throws on the language of that period.

La Antigua: See DARIEN, and GUATEMALA LA ANTIGUA.

Labadie', JEAN, de: b. at Bourg-en-Guienne, near Bordeaux, Feb. 13, 1610, and educated at Bordeaux by the Jesuits, in whose order he became a distinguished professor. In 1639 he left the Jesuits, and began preaching peculiar doctrines respecting prayer and the direct influence of the Holy Spirit. In 1650 he became a Protestant pastor at Montauban, in 1657 at Orange, in 1659 at Geneva, and in 1666 pastor of a Walloon church at Middelburg, Holland. In 1669 he removed to Amsterdam, and formed a body of followers known as Labadists. Expelled from Holland in 1670 as a dangerous sectarian, he went to Erfurt, where the Princess Palatine Elizabeth protected him and became his disciple. He afterward went to Bremen, and finally to Altona, Holstein, where he died Feb. 13, 1674. His doctrines were a combination of mysticism with Calvinism; he held to illumination by the Holy Ghost as the means of salvation superseding the Bible, rejected infant baptism and observance of the Sabbath, and taught property communism. He left numerous writings, now extremely rare. See H. van Berkum, *De Labadie en de Labadisten* (Sneek, 1851).

Labarca, laä-baar'kaä, or **La Barca**: a town of Mexico, state of Jalisco; on the river Lerma, near the eastern extremity of the Lake of Chapala; 62 miles E. S. E. of Guadalajara (see map of Mexico, ref. 7–F); population (1889) about 10,000. It was the scene of conflicts between the revolutionists and royalists, Nov., 1810. H. H. S.

Labarum (Late Latin *labarum*, origin doubtful): originally the imperial Roman standard, consisting of a staff, from which was suspended by cords a cross-bar, to which was attached a purple flag bearing the portrait of the emperor or commander. The Emperor Constantine the Great, after his conversion, modified the insignia so as to make the labarum a Christian standard, replacing the portrait of the emperor by a cross and the Greek letters X P (= Ch r) em-

broidered in gold in the form of a monogram or a symbol of Christ, thus ☧ (= Chrisma). Another form is figured, in which the ☧ monogram is attached to the staff above the flag, and upon the latter are embroidered the Greek letters Α and Ω. The name labarum afterward was sometimes applied to these devices and symbols. This form of standard with varying Christian symbols is now used in ecclesiastical processions, etc., especially in the Roman Catholic Church, under its original name of labarum; and one of similar form with different devices, mottoes, etc., is a favorite standard for civil societies. By many persons the term banner is incorrectly restricted in its meaning to a standard of this form. See Flag, Banner, Standard, etc.

James Mercur.

Labat, lăă-baa′, Jean Baptiste: Dominican missionary and author; b. in Paris, France, 1663. He taught philosophy and mathematics at Nancy, and subsequently went to the West Indies, where he had charge of a parish in Martinique 1694–96, and traveled extensively. Returning to Europe in 1705, he spent several years in Italy on business of his order, and the rest of his life was passed in Paris. In 1724 he published his *Nouveau voyage aux îles de l'Amérique*, which was enlarged in two subsequent editions, and was translated into Dutch and German. It had a wide and deserved popularity; its descriptions of colonial life, of the Caribs and buccaneers, and of the plants, animals and other natural objects which he saw, are remarkably interesting and generally very accurate. He writes not only as a priest, but as a hunter and fisherman, and a lover of nature; and the book is hardly less interesting to-day than it was when first published. Labat also wrote, or rather edited, *Voyage du Chevalier des Marchais en Guinée, îles voisines et à Cayenne.* D. in Paris, Jan. 6, 1738. Herbert H. Smith.

Labbaraque's Disinfecting Liquor: See Hypochlorites.

Lab′danum, or **Lad′anum** [= Lat. *la′danum, ledanum* = Gr. λήδανον, resinous gum from a certain shrub]: name given to the resin of small evergreen shrubs of the order *Cistaceæ*, *Cistus creticus*, *laurifolius*, and *ladaniferous*, growing chiefly in the Levant. It is combed from the beards of goats and the fleece of sheep that browse upon the hills where these shrubs grow, and is also collected by drawing a rake over the plants. Leathern thongs are attached to the rake, and to these thongs the resin adheres. It is used as an incense and for fumigating; also sometimes in plasters. It was at one time valued as a stimulant and expectorant.

La Bédollière, laa-bā′dō′li-ār′, Émile Gigault, de: publicist and historian; b. at Amiens, France, May 24, 1812. He studied at the École des Chartes, and made his *début* in literature with his *Vie politique du marquis de La Fayette* (1833). This gave him a recognized position in French letters, and he began to publish numerous articles in the best liberal journals. Later he became a regular contributor to *Le Siècle*, and in 1869 he was one of the founders of *Le National*. He was a prolific writer, and we can mention only the titles of his more important works: *Beautés des victoires et des conquêtes des Français* (2d ed., 2 vols., 1847); *Histoire des mœurs et de la vie privée des Français* (3 vols., 1847); *Histoire de la guerre du Mexique* (3 parts, 1861–68); *Histoire de Paris* (1864); *Histoire complète de la guerre de l'Allemagne et d'Italie* (1866); *Histoire de la guerre de 1870–71* (1872). All these works are strongly liberal in tendency, but productions rather of a publicist and advocate than of a scientific historian. Perhaps the best known of all la Bédollière's books is the amusing skit *Histoire de la mère Michel et de son chat* (1851), which has been many times republished not only in France, but in other countries in Europe and in the U. S. D. in Paris, Apr. 23, 1883. A. R. Marsh.

Label [from O. Fr. *label, labeau*, flap, shred, cf. Fr. *lambeau*, probably < Lat. *labellum*, dimin. of *labium*, lip]: a *quasi* trade-mark. Like the latter, it implies proprietary rights which are defensible both at common law and by statute, but differs from it by including proper names, descriptive terms, etc., and excluding merely arbitrary symbols. Since the act of Congress approved June 18, 1874, labels have had a distinct status among proprietary marks. As officially stated, the scope of this act in this regard is as follows: "Sec. 3. That in the construction of this act the words 'engraving,' 'cut,' and 'print' shall be applied only to pictorial illustrations or works connected with the fine arts, and no prints or labels designed to be used for any other articles of manufacture shall be entered under the copyright law, but may be registered in the patent office. And the commissioner of patents is hereby charged with the supervision and control of the entry or registry of such prints or labels, in conformity with the regulations provided by law as to copyright of prints, except that there shall be paid for recording the title of a print or label, not a trade-mark, six dollars, which shall cover the expense of furnishing a copy of the record, under seal of the commissioner of patents, to the party entering the same.

"By the word 'print,' as used in the said act, is meant any device, picture, word or words, figure or figures (not a trade-mark), impressed or stamped directly upon the articles of manufacture, to denote the name of the manufacturer or place of manufacture, style of goods, or other matter. By the word 'label,' as therein used, is meant a slip or piece of paper, or other material, to be attached in any manner to manufactured articles, or to bottles, boxes, and packages containing them, and bearing an inscription (not a trade-mark), as, for example, the name of the manufacturer or the place of manufacture, the quality of goods, directions for use, etc. By the words 'articles of manufacture'—to which such print or label is applicable by said act—is meant all vendible commodities produced by hand, machinery, or art. But no such print or label can be registered unless it properly belongs to an article of commerce, and be as above defined; nor can the same be registered as such print or label when it amounts in law to a technical trade-mark."

It will be seen that the act in question excludes trade-marks *per se*, together with matter relating to the fine arts and *belles-lettres*. In addition to these, it also excludes designs or articles the form and configuration of which are intended for the decoration or artistic improvement (as distinguished from the mechanical or functional) of manufactured articles. The registry of labels in the patent office under this act makes infringements thereof cognizable in the Federal courts. In some of the States local laws provide for the punishment of infringers upon a label, and in such instances the courts of the State are the proper tribunals. Even where no such laws exist, an action under the common law may be maintained, the choice of courts resting with the lawful owner of the label. Pictures, engravings, etc., relating to the fine arts, and printed matter considered apart from a commercial product or article to which it is attached, are subjects for copyright, and no matter embraced within either of these divisions can be protected either under the act of Congress or by State or common law. A "design" being in the nature of things arbitrary, and distinct in configuration from any other, may be used as a trade-mark, provided that its use for this purpose is by its originator, patentee, or owner as a design; but as for trade purposes it may thus be brought within the scope of a trade-mark; it can hardly be properly registered as a label by the patent office, although some rulings of the latter imply the contrary. James A. Whitney.

Laber, Hadamar, von: a German poet who probably was born in Bavaria, and lived in the first half of the fourteenth century. His chief work is *Die Jagd*, an allegoric poem in which the chivalrous wooing is represented in the form of a chase, the heart being the hound, love the game, etc. Though of little poetic value, the poem was greatly admired at the time and frequently imitated by later writers. See *H. von Labers Jagd*, edited by I. A. Schmeller (Stuttgart, 1850); *H. von Labers Jagd*, edited by Karl Stegskal (Vienna, 1880). Julius Goebel.

Labe′rius, Decimus: a Roman knight; b. in 105 B. C.; d. in 43: famous as a writer of mimes which he raised to the rank of literature. Macrobius (*Saturnaliorum*, ii., 7) tells the story of his humiliation, how Cæsar compelled him to appear upon the stage in a contest with his younger rival Publilius Syrus, by whom he was defeated. Some forty-four titles of his mimes are preserved, and the fragments are given on pp. 279–302 of O. Ribbeek, *Fragmenta Comicorum* (Leipzig, 1873). M. Warren.

Labialization: a term used in phonetics to denote a modification in the articulation of a sound by the contraction or closure of the lips. In the case of vowels it is also called rounding. Thus the O. Eng. *ā* has suffered rounding in passing into Mod. Eng.; cf. O. Eng. *stān* > Mod. Eng. *stone*, O. Eng. *drāv* > Mod. Eng. *drove*. The Indo-European velar (back) gutturals ḳ, g, etc., suffer labialization in the western branches of the family under certain conditions; thus I.-E. *gi̯os*, alive > Gr. βίος, Lat. *vivus*, O. Ir. *biu*, cf. Eng. *quick*; I.-E. ḳo-, who > Gr. πόθεν, whence Lat. *quod*,

Eng. *what*. The connecting link between the velars and the labials is evidently the back position of the tongue characteristic of them both. BENJ. IDE WHEELER.

Labials [from Lat. *labium*, lip]: speech-sounds whose characteristic articulation is at the lips. The commonest labial consonants are the voiceless explosive *b*, the nasal *m*, the voiced spirant (or continuant) *w* in *wood*, *work*, and the voiceless spirant *w* in *twenty*, *quite*. As pronounced by many also the *wh* of *what*, *when* is merely the voiceless form of *w*. The sounds denoted by *f* and *v* differ from those just mentioned in that their articulation is between the lower lip and the upper teeth and not between both lips. They are therefore called labio-dentals, as distinguished from the bi-labials. See PHONETICS. BENJ. IDE WHEELER.

Labia'tæ: See MINT FAMILY.

Labiche, laa'beesh', EUGÈNE MARIN: playwright; b. in Paris, May 5, 1815; was educated in Collège Bourbon and studied law, but decided to devote himself to literature, and made his *début* with the collection of sketches *Le Clef des Champs* (1838). He attempted various branches of literature, but was best known as a playwright, having produced, generally in conjunction with another, over 100 comedies, farces, vaudevilles, etc. The best known of his plays are *La cuvette d'eau* (his first piece, 1837); *Le chapeau de paille d'Italie* (1851); *Le Voyage de M. Perrichon* (1860); *Les Petits Oiseaux* (1862); *Moi* (1864); *L'Homme qui manque le Coche* (1865); *Le Cachemire* (1870); *Doit-on le dire?* (1873); *La prix Martin* (with Augier, 1876); *La clef* (with Duru, 1877). A collection of his dramatic works appeared in 1879 with the title *Théâtre de Labiche* (10 vols.). He was elected to the French Academy in Nov., 1879. D. in Paris, Jan. 23, 1888. Revised by A. R. MARSH.

Labienus, TITUS: Roman soldier; tribune in 63 B. C., when Cicero was consul; accompanied Cæsar as his lieutenant to Gaul, and distinguished himself in 54 B. C. by his two victories over the Treviri, and in 52 in the campaign against Vercingetorix. Entering public life under the auspices of Cæsar, and serving him for many years, he nevertheless sided with Pompey when the civil war broke out, being mean and cruel to those of Cæsar's soldiers who fell into his hands at the battle of Dyrrhachium. After the defeat of Pharsalia he fled to Africa, and thence to Spain after the defeat at Thapsus. In Spain he fought against Cæsar at Munda, and by his mistakes the battle was lost. D. 45 B. C.
Revised by G. L. HENDRICKSON.

Labie'nus, Les Propos de: the title of a bitter satirical invective against the second French empire, and personally against Napoleon III., which appeared in Paris in 1865, immediately after the publication of the first volume of Napoleon's life of Julius Cæsar. Labienus is represented to be a soured, disgusted, and obstinate republican living under Augustus, against whose usurpation and tyranny he perpetually chafed. He is represented to have written a history of his country, of which he read passages in secret to his friends. His grandfather is said to have served under Julius up to the crossing of the Rubicon, and his father to have joined the Parthians rather than support the triumvirate. This was supposed to point to Victor Hugo, whose father was a general under the first republic; but as the general also served the empire the coincidence is not complete. The Duc d'Aumale wrote a life of the great Condé which was printed privately for his friends, but was seized and confiscated. This was a point of similarity with Labienus, who, however, by hypothesis, could not have been of royal extraction. The author probably did not mean to point definitely to any individual. The appearance of a volume of memoirs by Augustus is the occasion of a special outburst of the spleen of Labienus, with which the satire concludes. The author was M. A. Rocheard, an ex-professor in a provincial college. His name was on the title-page, and he was condemned to four or five years' imprisonment, but escaped by taking refuge in Brussels. Revised by A. G. CANFIELD.

Labiograph: See RECORDING APPARATUS, PSYCHOLOGICAL, in the Appendix.

Labium: See ENTOMOLOGY.

Lablache, laa'blaash', LUIGI: opera-singer; b. in Naples, Dec. 17, 1794; made his *début* as a basso in 1812 in his native city; achieved his first great success in Vienna in 1824, and sang from 1830 to 1857 in Paris, London, St. Petersburg, and Naples. D. in Naples, Jan. 23, 1858. His principal parts were Figaro, Leporello, Dulcamara, etc., and he appeared as Henry VIII. in *Anna Bolena*, and Giorgio in *I Puritani*.

La Boétie, laa-bō'ā'tee', ÉTIENNE, de: author; b. at Sarlat, France, Nov. 1, 1530; d. near Bordeaux, Aug. 18, 1563. He was a precocious student of classical letters, and before he was sixteen had translated a fragment of the *Economics* of Aristotle, the *Economics* of Xenophon (under the title *Mesnagerie*), and the *Règles de mariage* and *Consolation* of Plutarch. He was not much older when he wrote his most famous work, *Contre-Un*, or a *Discours sur la servitude volontaire*, a vigorous attack against tyranny, which, however, was not made public until 1575. He acquired a seat in the Parliament of Bordeaux in 1553. In 1557 began his warm friendship with Montaigne, who celebrated his talents and character (*Essais*, i., 25, 27, 28; ii., 17). A good edition of his works, with biographical notice, has been given by Paul Bonnefon, *Œuvres complètes d'Étienne de la Boétie* (Paris, 1892). A. G. CANFIELD.

La'bor [viâ O. Fr. from Lat. *labor*, labor, toil, work]: in the broadest sense of the term, work done by a human being or an animal. Human labor is at once the leading agency in the production of wealth and the most important element in the well-being of a community. Economic progress consists largely in the increased efficiency of the laborers in the production of those goods which the community needs. Up to a very low point the wants of a community may perhaps be supplied by nature. What labor there is may take the form of search for food, or of hunting and fishing. In this stage a given amount of land can support only a very small number of people, and the efforts and privations involved are large in proportion to the result attained. Such a state represents the lowest stage of industrial efficiency. An important step forward is made in the progress to the pastoral stage, where animals, instead of being hunted, are domesticated, so that more regular supplies of food are obtained. In this stage land can support a larger number of people than in that which preceded. A further advance is made in the change from the pastoral to the agricultural stage, the results of the work becoming larger in proportion to the land occupied and labor expended. With the regular supply of food due to the agricultural operations, there is the possibility for large accumulation of capital and for its use in manufacturing, by developments which at every stage increase the industrial efficiency of each member of the community.

With the substitution of pastoral and agricultural methods for hunting, the introduction of capital and of systematic labor begins. This labor is at first secured in almost all nations by the system of slavery; and on that account, in the beginning, the introduction of slavery marks an industrial advance. Captives are no longer killed, but preserved for useful purposes, and the labor of such captives makes further progress possible. (See SLAVERY and SOCIOLOGY.) As time goes on, slavery gives place to higher forms of labor organization; first to serfdom, then to the wage system, and in the future possibly to something better than the wage system. With each step in progress the stimulus of hope is substituted for that of fear. Slave labor is in many ways less advantageous than free labor. It requires large exertion for superintendence, because the laborer is anxious to do as little as he can. It is, as a rule, unintelligent, wasteful, and short sighted. Slave labor is, under certain conditions, much better than no labor at all, but it is far worse than almost any kind of free labor. As between different classes of free laborers the variations in efficiency are also enormous, partly on account of differences in the individual strength of the laborers, partly on account of the power of organization. The efficiency of the individual laborers depends partly upon food, partly upon general sanitary conditions, partly upon intelligence, and partly upon the ambition of the laborers as a class. In the countries where the laborers are deficient in these respects, though wages by the day may appear to be low, the efficiency is, as a rule, even lower, and the piece prices for work done may often be extremely high. The country whose laborers are well fed usually gets an amount of work done which renders the apparent waste of food a matter of true economy in the long run, just as a steam-engine which burns twice as much coal as another may sometimes do four times as much work. "In comparing the cost of constructing railways in India and Great Britain, it was found that though the Indian laborer received but 10 cents a day and the British laborer 75 cents, the sub-contracts in the two countries were let at the same price per cubic yard." See WAGES.

Of the means of organizing labor to secure increased effi-

eieney, the first is what is known as division of labor, by which each individual workman attends to one line of proeesses and one only. In the rudest communities there is almost no division of labor, the farmer and his family producing most of what is necessary for their wants, and resorting only occasionally to the serviees of the blacksmith, the mason, the earpenter, or a few other tradespeople. With the development of commerce oeeupations become speeialized, and with each new invention the speeialization is earried further, so that a laborer confines himself not merely to a single trade but to a single part of that trade. Where such division of labor is earried far it inereases production in a number of ways. It shortens apprentieeship, each man no longer learning a whole trade, but only eertain parts of it. It develops dexterity, repetition of the same task enabling the operations to become automatic: whereas if a man had to pass frou one operation to another, the waste of effort in sueh change would be far more serious than the mere loss of time. It is also thought to faeilitate invention, though this is doubtful, and to allow better utilization of the labor power of the eommunity by not restrieting trades to those who have the strength necessary for mastering their heavier parts.

While the division of labor enables different people to work effieiently side by side, the system of mastership in industry gives effieient direetion to the whole. In the Middle Ages trades were managed on a demoeratie prineiple by associations of workmen, just as town meetings were managed by an assoeiation of all the eitizens side by side. As industries became more and more complieated, the work of government had to be delegated to special hands, and it did in faet fall more and more into the hands of those who advaneed the capital and took the risks. As a result of this ehange the division of labor at first was earried much further than would otherwise have been the case; competition was introdueed as an active foree in business (see POLITICAL ECONOMY); and the work of different parts of the industrial organization was kept within due proportions. On the other hand, the development of the system of division of labor and of mastership in industry has been attended with some evils. The danger of misdireeted production has beeome greater than ever before. When people worked for orders or produeed for the home market, there was no possibility of doing too mueh. The demand was clear and visible. When a few faetories produee for the whole eountry or for the world, the danger of a disproportion between supply and demand becomes enormous. If a mistake has been made, large numbers of laborers are thrown out of employment, and a general industrial depression may follow. (See COMMERCIAL CRISES.) The socialists make this a severe ground of attaek against the present system, and hope for the substitution of some other in its plaee, but the majority of experiments of this kind have proved worse than useless. (See CO-OPERATION and SOCIALISM.) For actual rates paid to laborers in different eountries, see WAGES. For certain broader deductions, see POLITICAL ECONOMY. See also FACTORIES AND FACTORY SYSTEM, TRADES-UNIONS, and STRIKES AND LOCKOUTS. Compare J. E. Thorold Rogers's *Six Centuries of Work and Wages*; W. S. Jevons's *The State in Relation to Labor*.

ARTHUR T. HADLEY.

Lab'oratory [from Mediæv. Lat. *laborato'rium*, laboratory, liter., workshop, deriv. of Lat. *labora're*, work, labor]: a room or building devoted (1) to experimental researeh, or (2) to instruetion in the experimental details of any branch of seienee, of teehnies, or of engineering. There were laboratories for alehemy and astrology throughout the Middle Ages, and some of these were important establishments in their day, being maintained by prinees or sometimes at public expense. Kopp, in his history of chemistry (*Geschichte der Chemie*, vol. ii., p. 18), refers to a magnifieent laboratory planned by Libavius, professor at Jena 1588–91, and afterward director of gymnasium at Rothenburg and Coburg (about 1595). This was intended for the pursuit of chemistry as distinet from alchemy. It was to be a magnifieent establishment with gardens, eloisters, baths, and wine-eellars, in addition to the equipment for the proeesses familiar to the chemist of that day.

The following eentury saw the beginnings of the modern laboratory system. A few rich amateurs, sueh as Boyle in Oxford, possessed private laboratories for investigation; the University of Altorf opened the first academic laboratory for instruction (1683), and Charles XI. founded the Stockholm public laboratory for metallurgy (1683). During this period, however, nearly all researches were performed in rooms intended for the ordinary purposes of domestic or commereial life. Thus Newton made his diseovery of dispersion of light at his lodgings in Cambridge, admitting a ray of sunlight to the darkened room through a hole bored in the window-shutter. For more than 100 years much the same eonditions existed. The laboratory of the master chemist of his day, Berzelius, for example, was the kitchen, where cooking and chemistry went on together.

The nineteenth century has seen very rapid development in the building of laboratories. This modern movement, of whieh the laboratory system of the present day is the outeome, whieh substituted for the private laboratories previously existing those open to the student body and equipped both for instruction and research, was started by Baron von Liebig, who indueed the authorities to build a chemieal laboratory for the University of Giessen, and was tireless in his efforts to obtain the introduction of laboratory instruction throughout Germany. Sinee this epoch the methods of teaehing seience have gradually been revolutionized, and the laboratory has become a most important part of the university. Division and snbdivision of the fields of researeh have taken place, and each new branch has been furnished with its special laboratory.

The first university laboratories often consisted of a single room, frequently a mere anteroom to the leeture-hall. Now laboratories devoted to the broader fields of science usually oeeupy an entire building or group of buildings. To indicate the extent to whieh the establishment of speeial laboratories has gone, the following list of those under the control of the University of Berlin in 1892 is given. See *Minerva, Jahrbuch der Gelehrten Welt* (1892–93, p. 80).

LABORATORIES CONNECTED WITH THE UNIVERSITY OF BERLIN (1892).

First Anatomical Laboratory.		Seeond Chemieal Laboratory.	
Second	"	Teehnieological	"
Pathological	"	Physical	"
Physiological	"	Palæontological	"
Pharmaeological	"	Petrographic	"
Hygienie	"	Zoölogieal	"
Dental	"	Botanieal	"
First Chemical	"	Observatory.	

Many of these are, indeed, institutes employing many instructors and comprising within their walls a group of distinet and separately equipped speeial laboratories. The list does not inelude engineering subjeets whieh are pursued in Germany in polyteehnic sehools. The other German universities make relatively as remarkable a showing as the above, while at Paris the Sorbonne presents a still more amazing aggregation of special laboratories, viz.:

LABORATORIES IN THE ÉCOLE PRATIQUE DES HAUTES ÉTUDES EN SORBONNE (PARIS).

Two physical laboratories.
Three laboratories for general chemistry.
Two laboratories for mineralogieal chemistry.
The laboratory for organic chemistry.
Two mineralogieal laboratories.
Three botanical laboratories.
The laboratory of medicine.
The laboratory of biological physics.
Three laboratories of physiology.
The laboratory of pathologieal physiology.
The laboratory of zoölogieal histology.
The laboratory of histology.
The laboratory of zoölogy.
The laboratory of anatomieal zoölogy.
The laboratory of anthropology.
The laboratory of the natural history of inorganie bodies.
The laboratory of ophthalmology.
The laboratory of teratology.
The laboratory of organography and vegetable physiology.
The laboratory of physiologieal psyehology.
The laboratory of geology.

In addition there are nine affiliated laboratories situated in various parts of France. It should be noted, however, that the Sorbonne gathers under one administration three distinet faenlties—the Faculté des Seiences, of the University of Paris, that of the Collège de Franee, and that of the École Normale Supérieure. In England the laboratory systems of the great universities are still backward. Both at Cambridge and Oxford, for example, it is found possible to

accommodate experimental research and laboratory instruction for the entire university, comprising (at the former seat) zoölogy, botany, anatomy, mineralogy, chemistry, and physics, under a single roof. In the various colleges and universities organized during the latter half of the nineteenth century in various parts of Great Britain more ample provision, relatively, has been provided for laboratory instruction.

In the U. S., where German influence has been strong, considerable has been done, although the outlays for laboratory equipment nowhere approach those made for such purposes on the continent of Europe. There is nothing to compare with the laboratories of Zurich, where 2,000,000 francs have been expended for a chemical laboratory, and more than 3,000,000 francs for a laboratory of physics and electrotechnics, while sums commensurate with these have been spent for individual laboratories in Strassburg, Charlottenburg, Liège, and elsewhere.

In technical education the specialization of laboratory practice is not as yet so completely developed as in pure science, but the tendency shows itself here also, and modern schools of engineering are beginning to offer laboratory instruction in a large number of applied sciences. One such school in the U. S., the College of Civil Engineering of Cornell University, for example, had in 1893 the following special laboratories—viz., an hydraulic laboratory, a laboratory for the study of cements, a bridge laboratory, a gravimetric laboratory, a geodetic laboratory, a magnetic laboratory, a bacteriological laboratory, and a photographic laboratory. In the other branches of engineering in the same institution the opportunities for laboratory practice are, of course, correspondingly developed. See ENGINEERING, EXPERIMENTAL.

E. L. NICHOLS.

Labor Day: in the U. S., a legal holiday for workingmen first celebrated (by a few States) in 1887. It falls (with a few exceptions) on the first Monday in September. Meetings for the discussion of labor questions are held and usually there are parades. It is set apart by law (1897) in about three fourths of the States. In Europe generally May 1 is celebrated as a labor festival, and in London, Paris, and other cities demonstrations in favor of reforms are made by trades-unions, and similar organizations. In some countries disturbances caused by Socialists on this day have led the governments to forbid celebration.

Laborde, laă'bōrd', ALEXANDRE LOUIS JOSEPH, Count de: statesman and savant; b. in Paris, Sept. 15, 1774; served in the Austrian army in the first campaign against the French republic; returned to France after the peace of Campo Formia; filled several important offices under Napoleon; in 1822 was elected a deputy, and opposed the invasion of Spain; took part with great energy in the revolution of 1830; was made a brigadier-general and aide-de-camp to Louis Philippe. D. in Paris, Oct. 24, 1842. His *Voyage pittoresque et historique en Espagne* (4 vols. fol., 1807–18; 2d ed. 1823, 900 engravings) is remarkable for learning and accuracy, and unique in elegance. He also wrote *Itinéraire déscriptif de l'Espagne* (5 vols., 1809–27) and *Les monuments de la France classés chronotogiquement* (2 vols., 1815–36, 259 plates).

Labori, FERNAND G. G.: See the Appendix.

Labouchere, HENRY: editor and politician; b. in London in 1831; was educated at Eton; in the diplomatic service in 1854–64; entered Parliament, 1865, as Liberal member for Windsor, and has usually been in Parliament, since 1880 as member for Northampton. He is an extreme Radical. During the siege of Paris he wrote a series of letters to *The Daily News* which attracted much attention, and were published in a volume, *Diary of a Besieged Resident in Paris* (1871). He is proprietor and editor of the London *Truth*, and is part owner of *The Daily News*.

C. H. THURBER.

Laboulaye', ÉDOUARD RENÉ LEFEBVRE: publicist; b. in Paris, France, Jan. 18, 1811; studied law while following a mechanical trade, and astonished the literary world in 1839 by publishing a learned *History of Landed Property in Europe from the Time of Constantine to the Present*, on the title-page of which the author announced himself to be a type-founder. The book was crowned by the Academy of Inscriptions. In 1842, after being admitted to practice before the royal tribunal at Paris, he published an *Essay on the Life and Doctrines of Savigny*, in which he showed the importance of the principles of the historical school, and in the following year *Researches on the Civil and Potitical Condition of Women from the Times of the Romans to the Present*. In 1845 he wrote an *Essay on the Roman Criminal Legislation respecting the Responsibilities of Magistrates*, which also won the crown of the Academy of Inscriptions, and procured for its author an election as one of the members of that body. In 1849 he became Professor of Comparative Legislation at the Collège de France, and distinguished himself by the clearness with which he expounded the principles of legal science. He also began from this time to take a prominent part in politics as an ardent republican, and during the eighteen years' existence of the Second Empire there was in France no more able, active, and vigilant worker in the committees and public meetings of the liberal opposition than Laboulaye, but he failed in all his efforts to secure an election to the Corps Législatif under the empire. His attention was attracted to the institutions of the U. S. as affording some useful models for introduction in France, and he devoted much time for several years to their careful study. He published a valuable *Political History of the United States from the First Attempts at Cotonization to the Adoption of the Federal Constitution*, of which vol. i. appeared in 1855, and vol. iii. and last in 1866. In 1862 he rendered a vast service to the U. S. by an exposition of the causes of the American civil war in the work entitled *The United States and France*. In 1863 he published perhaps the most popular of his works, *Paris in America*, an amusing study of American characteristics. In 1865 he wrote the *Programme of the Liberal Party*, and edited in 1866–67 the *Memoirs and Correspondence of Franklin*. He ceased his opposition to the empire in the face of the war with Germany, and for this was hissed by the students in the Collège de France and forced for a time to suspend his lectures. He was elected to the National Assembly in July, 1871, was made chairman of the committee on the higher education, and in 1874 secretary of the committee of thirty on the (republican) constitution, in which capacity he maintained (1875) a prolonged battle with the monarchists of every type. In 1875 he was made a life senator, and in 1873, 1876, and 1879 was administrator of the Collège de France. In 1877 he resumed his lectures on comparative legislation. D. May 25, 1883.

Revised by F. M. COLBY.

Labourdonnais, laă'boor'dō'nā', BERTRAND FRANÇOIS MAHÉ, de: soldier; b. at St.-Malo, France, Feb. 11, 1699; entered the navy early, and became a captain in 1723. Having served for some time in the Portuguese navy he returned to France in 1733, and was made governor in 1734 of Isle of France (Mauritius) and Bourbon, colonies which prospered much under his rule through the introduction of cotton, sugar, and indigo culture, and the building of fortifications, canals, aqueducts, hospitals, and ship-yards. His administration has become celebrated through Saint-Pierre's romance *Paul et Virginie*. During the war between England and France he was very successful in his undertakings against the English in the East Indies. In 1746 he bombarded and took Madras, and levied a war contribution of 9,000,000 francs; but the French governor-general, Dupleix, became jealous, and discharged him. He was accused by Dupleix of sacrificing the interests of the company, and on his return to Paris was kept in the Bastile for three years. In 1751 a commission declared him innocent of all the charges brought against him by Dupleix. D. Sept. 9, 1753. His widow received a pension. He left a volume of *Mémoires* (1850), and his grandson of the same name wrote a *Life* in 1827. In 1859 a statue was erected to him in the Isle of Bourbon, now Réunion.

Labrador: the peninsular area which lies between the Gulf of St. Lawrence, Hudson's Bay and Straits, and the North Atlantic. Its greatest length is 1,100 miles, its greatest breadth 600 miles, and its area about 420,000 sq. miles. It extends from 49° to 63° N. lat., and lies between the 55th and 79th meridians. It is bounded on the E. by the Atlantic, on the N. and W. by Hudson's Bay and Straits, and on the S. W. by the Bersiamits, Mistassini, and Rupert's rivers. The eastern or Atlantic coast is under the jurisdiction of Newfoundland; the remainder is annexed to the Dominion of Canada. A line due N. and S. from Blanc Sablon to Cape Chudleigh constitutes the boundary between the two jurisdictions.

Physical Geography.—Although the coasts of Labrador have been visited by fishermen since the time of Cortereal, little is known about the interior. The eastern or Atlantic coast presents throughout its whole extent a lofty precipitous front to the ocean, with an elevated plateau behind formed of rugged hills and low mountain chains. The

highest land lies along the seacoast, its elevation increasing as it extends northward. The Mealy Mountains rise to a height of 1,482 feet. Mt. Misery, between Cape Harrison and Hopedale, is 2,170 feet high. Some 70 miles S. of Cape Chudleigh the highest summit is 6,000 feet above the sea-level; but the elevation then diminishes to the cape, where it is 1,500 feet. The scenery of this northern portion is said to rival that of the coast of Norway and of Greenland, the mountains being about as high as in those regions. Not much is known of the geology of the peninsula. It is ascertained, however, that the Laurentian formation constitutes the great framework of the country, and that Lower Silurian beds, principally Potsdam, rest on the Laurentian at various points along the coast. There are large deposits of iron ore; copper has been found in several places, and gold in small quantities. Labradorite, a beautiful feldspar, is found in great masses, several mountain ranges being largely composed of it. The lakes of Labrador are almost innumerable, the rivers forming but an imperfect system of drainage. It is remarkable, however, that many of the lakes "are so shallow that for miles there is hardly water enough to float a half-loaded canoe." The lakes lying on the table-land are deep, those in the lowlands shallow for the most part. While the whole interior appears to be covered with bowlders, the relics of an ice age, the river valleys and the lake basins are clothed with a luxuriant forest growth, the trees including the larch, spruce, birch, poplar, willow, and mountain ash.

The most important of the numerous fiords on the Atlantic coast is Hamilton Inlet, or Esquimaux Bay, which is 30 miles wide at its mouth and extends 150 miles from the sea. The chief river of Labrador, the Ashwanapi, Grand, or Hamilton, empties into this inlet. In 1891 an exploring party from the U. S. ascended this stream for 250 miles, and rediscovered Grand Falls, one of the most remarkable waterfalls in the world. Although the volume of water does not compare with that of Niagara, the height of the fall is 316 feet, or more than twice as great. The cañon below the falls is worn through the gneissic granite, is 25 miles in length, and in places its walls are 400 feet high. The Hamilton also receives the Nasquapee, or Northwest river, and the Kenamou. Other rivers are the Moisie, Mingan, and St. Augustine, falling into the Gulf of St. Lawrence, and Rupert's river and East Main into Hudson's Bay.

Climate.—Although Labrador is detached from Aretic lands and much of it lies between the same parallels of latitude as Britain, the climate is rigorous in the extreme. The snow lies from September till June. In winter the whole coast is blockaded by ice-fields drifting from the various outlets of the Aretic Ocean, while in summer the glittering icebergs, stranded or floating, impart a stern beauty to the storm-beaten shores. In winter 30° below zero is common, but, owing to the dryness of the air and the absence of high winds, such a temperature is not so uncomfortably felt as is a much higher one in other regions. The winter has continued dry frosty weather, and is bracing and healthful. Traveling is performed by sledges drawn by dogs, sometimes at the rate of 100 miles a day. The summer climate of the interior is said to be delightful. The interior is rich in fur-bearing animals, such as the black bear, wolf, wolverine, lynx, or mountain-cat, red, white, blue, and silver foxes, otter, beaver, marten, musquash, mink. The common wild fowl are geese, black ducks, shell-birds, divers, loons, plover, and, near the coast, curlew. Mosquitoes and black flies abound. Wherever the forest has been burned berry-bearing plants, such as the whortle and cranberry, are abundant and of excellent quality.

Fisheries.—If it were not for its sea-wealth, Labrador would be seldom visited by civilized man. Its fisheries, however, are of immense and steadily increasing value, and along the Atlantic coast are now almost entirely carried on by Newfoundland fishermen. Their usual practice is to proceed to Labrador about the end of June and remain till the first or second week of October. Many of them are accompanied by their wives and children, who aid in handling the fish. They live on shore in rude temporary huts. The value of Labrador to Newfoundland may be estimated from the fact that over a fourth of the entire fish export of the island is caught on the Labrador coast. The value of direct exports in 1890, considered an unprofitable year, was $749,746. In favorable years the aggregate value of fish taken by Canadian and U. S. vessels and by the Esquimaux is fully $4,000,000. About a fourth of the whole catch is sent to Newfoundland for shipment, while the fishermen from Canada and the U. S. carry away about one-ninth of the entire quantity.

Inhabitants.—The permanent inhabitants are the Esquimaux, the Indians of the interior, and the white residents on the shores. The Esquimaux have their proper home on Northern Labrador, from Cape Webeck to Cape Chudleigh, are scattered along 500 miles of coast, and number about 1,500. The Moravian missionaries have been among them for more than a century, and nearly all of them are under Christian training. The mission stations are Hopedale, Nain, Okkak, Hebron, Zoar, and Rama. The Indian tribes of the interior are the Montagnais and Nasquapees, who speak dialects of the Cree language. The latter are still heathens, but the Montagnais are all nominally Roman Catholics, having been converted by Jesuit missionaries. They are slowly disappearing. They sustain themselves by hunting, and visit the coast at certain seasons to exchange the products of the chase for clothing and other necessaries. The white inhabitants of the Atlantic coast are in widely scattered settlements S. of Cape Harrison. They live by fishing for salmon and cod in summer and by trapping fur-bearing animals in winter. According to the census of 1884 they numbered 2,845. Of these 1,974 belonged to the Church of England, 566 were Roman Catholics, and 305 were Methodists. The Christianized Esquimaux numbered 1,366, making the population of the Newfoundland portion of Labrador 4,211. The total population is distributed as follows: On the St. Lawrence coast from Port Neuf to Blanc Sablon, 4,411; on the Atlantic coast—white population, 2,845; Esquimaux (Christianized), 1,366; Indians of the interior, 4,000; total, 12,622.

History.—Originally the whole of Labrador was attached to Canada, but in 1763 increased importance was given to the governorship of Newfoundland by annexing to it the Atlantic coast of Labrador. This arrangement was afterward altered, but in 1809 finally restored. The Hudson's Bay Company had for a lengthened period the exclusive right of trading with the Indians of that part of Labrador which had rivers flowing into the inlet from which the company took its name, and which is designated East Main. In 1870, however, the company surrendered all its rights, and these were transferred to the Dominion of Canada.

According to the Northern Sagas, Biorn and Eric the Red discovered Labrador about the year 1000, and named it Helluland—the land of slate, or naked rocks. Its modern discoverer was John Cabot, in 1497, the year in which he discovered Newfoundland. A few years after the Basques, who were among the most daring of early maritime adventurers, were employed in fishing on the gulf coast of Labrador. According to tradition, a Basque whaler, la Bradore, penetrated to Bradore Bay and gave his name to that locality, and afterward the whole region received the name of its first visitor. After the Basques came the Bretons, and then the French and the British. Another and more probable account is that the name Labrador is of Portuguese origin, and means a "laborer." Cortereal in 1500 carried home some of the aborigines (probably Red Indians), who seemed so well adapted for labor that King Emanuel thought he had obtained a new slave-coast whence slave-laborers might be exported to the Portuguese colonies. Hence he named it Labrador, or "laborers' land." See LABRADOR in the Appendix. M. HARVEY.

Labradorite (also called *Labrador spar* and *opalescent feldspar*): a soda-lime feldspar, of grayish hue, with brilliant reflections of color on cleavage surfaces, or, when polished, chiefly blue, green, or bronze. It occurs largely in Labrador, also in the Adirondack Mountains; and though not much used, makes an elegant ornamental stone. In Russia columns and walls of churches are paneled with it.

Labrouste, laa-broost', HENRI PIERRE FRANÇOIS: architect; b. May 11, 1801. He built the new library of Sainte-Geneviève, Paris, and was employed upon the buildings of the national library, where he restored the old Mazarin Palace, fitted it to the uses of the library, and erected other buildings to complete the structure. He was the designer of many private buildings, and was especially known as a teacher, having a well-known and influential *atelier* in Paris. He was an officer of the Legion of Honor, and a member of the Institute. D. June 24, 1875.

Labrum: See ENTOMOLOGY.

La Bruyère, laa-brü'yār', JEAN, de: author; b. in Paris, Aug. 16, 1645; d. at Versailles, May 11, 1696. He was educated in the law, admitted to the bar in 1665; in 1673 pur-

chased a treasury office in the district of Caen, but continued to live in Paris. In 1684, through Bossuet's influence, it is supposed, he entered the house of the great Condé as tutor of his grandson, the Duc de Bourbon. He remained until his death attached to the house of Condé, with a pension of 1,000 crowns a year. He was admitted to the Academy in 1693. His great work first appeared anonymously in 1688 under the title *Les Caractères de Théophraste, traduits du grec, avec les caractères ou les mœurs de ce siècle*, and had an instant success, running through three editions within the year. The original portion of the work, comprising at first only 418 paragraphs, but after the third edition enlarged with each successive one during the author's lifetime, till in the ninth (1696) it contained 1,119 paragraphs, consists of essentially satiric pictures of human morals. Though rarely intended as portraits, they are often so accurately copied from life that real persons were thought to be discovered behind them, and keys were published to reveal the allusions. The style is wrought with great concern for brilliancy and epigrammatic effect, sometimes at the expense of clearness. The work ranks among the masterpieces of French literature, and has been often republished, the most important editions being those of Coste (Amsterdam, 1731), Walckenaer (Paris, 1845), Destailleur (Paris, 1861), and best, and with full biographical notice, that of Servois (in the collection of Grands Écrivains de la France, Paris, 1865–82). La Bruyère left unfinished *Dialogues sur le quiétisme*, published in 1699. Cf. Édouard Fournier, *La Comédie de J. de la Bruyère* (Paris, 1866, 2 vols.). A. G. Canfield.

Labuan': an island of the Malay Archipelago, 6 miles N. N. W. of Borneo. Area, 31 sq. miles; pop. (1891) 5,853, of whom 21 were of British parentage. The island was ceded to Great Britain in 1846 by the Sultan of Brunai (Borneo). Its chief importance is derived from its central position with regard to Borneo, Annam, the French colony of Cambodia, and the Spanish colonies of the Philippines. There are two ports, a good supply of water, and abundant mines of coal, for conveying which there is a railway 5 miles long. Chief city, Victoria (pop. 1,500). Sago, camphor, bird's nests, pearls, and coal are the chief exports. In 1894, 14.957 tons of coal were exported. There are 3 sago-factories.

Labyrinth, Egyptian [*labyrinth* is from Lat. *labyrin'thus* = Gr. λαβύρινθος, labyrinth, maze]: one of the Seven Wonders of the world, now represented by an immense mass of ruins near the entrance to the Fayum. Brugsch thinks that the meaning of the Egyptian name was "temple at the mouth of the lake." It was constructed by Amenemha III. of the twelfth dynasty, probably in the shape of a horseshoe, containing an area of 8,800 sq. yards, and an inner court covering 60 acres. Herodotus (ii., 148) says that it contained twelve courts, six facing N. and six S., with 3,000 rooms, half above and half beneath the ground, and was more extensive than all the buildings of the Greeks. Strabo also visited the structure, and has left a brief description (xvii., i., 37). The only present remains are stone chips forming a layer 6 feet in thickness, covering a space larger than any Egyptian temple. For centuries it was used as a quarry for building materials, and the ruins of the houses of the workmen are still seen. Charles R. Gillett.

Labyrin'thodon [Mod. Lat., from Gr. λαβύρινθος, a labyrinth + ὀδούς, ὀδόντος, a tooth]: the typical genus of an extinct order of reptiles, or, more properly, amphibians, the Labyrinthodontia, which appeared in the Carboniferous period, but attained their greatest development in the Triassic, soon after which they seem to have finally disappeared. They are regarded as belonging with the amphibians, but possess characters allying them with the ganoid fishes on the one hand and with true reptiles on the other. The head is defended by a casque of sculptured bony plates, usually hard and polished. There are two occipital condyles. The vomer is divided and supports teeth. The bodies of the vertebræ, as well as the neural arches, are ossified, except in some of the earlier forms, and the former are biconcave. The ribs, when present, are short. There are usually large palatine openings. The body is covered with plates or scales. The structure of the teeth is peculiarly complicated, and suggested the name for the order. They form, as Prof. Owen has said, "the most beautiful and complicated modification of dental structure hitherto known."

Labyrinthodon (*Mastodonsaurus jaegeri*) has a skull upward of 3 feet long and nearly 2 feet broad, and is from the Triassic formation of Würtemberg, in Germany. Several other species are found in the same formation of Warwickshire, England. The genus *Metopias* has the skull broad and obtuse, orbits small and distant, and is from the Keuper. *Zygosaurus*, from the Permian beds at Orenburg, has the orbits large and approximate. *Dasyceps bucklandii*, from the Permian of Kenilworth, England, has the cranium 10 inches long. In North America, *Baphetes planiceps*, from the Pictou coal, Nova Scotia, has the head broad, the muzzle obtuse, the orbits large. *Amphibamus grandiceps* had an elongated tail like a salamander, large orbits, and numerous teeth. The skull is about three-fourths of an inch across. It is from the coal-measures of Illinois. *Raniceps lyelli*, from Ohio, is named from the similarity of its head to that of a frog. About twenty genera of labyrinthodons have been described from the Carboniferous strata of Great Britain and Germany, and many more from North America. The Triassic species were mostly of large size, and their remains occur in India, South Africa, and Australia, as well as Europe and America. Later than the Triassic very few are known, but *Rhinosaurus* is from the Jurassic of Russia. O. C. Marsh.

Lac [: Fr. *lacque* : Germ. *lack*, from Pers. *lak*, or Hind. *lākh*, lac, sealing-wax < Sanskr. *lākṣā*, the lac-insect], or **Gum-lac**: a resinous substance produced by the puncture by the female insect of *Coccus lacca* or *C. ficus* upon branches of several plants, as the *Ficus religiosa* (the botree or religious tree of the Hindus), the *Rhamnus jujuba*, the *Croton lacciferum* (or bihar-tree), and the *Butea frondosa* (or the butea-tree), which grow in Siam, Assam, Pegu, Bengal, and Malabar. The female insect is of the size of a louse—red, round, flat, and wingless. The male is twice as large as the female, and has four wings. Soon after the twig is punctured it becomes incrusted with a mammillated resinous substance, red, hard, and nearly transparent. It serves the double purpose of protecting the eggs and of supplying food for the young maggots in a more advanced state. The mothers are held by the adhesive fluids which exude from the punctures, and contribute their substance to the mass. The characteristic constituents of the incrustation are the lac-resin, derived from the tree, and the lac-dye, analogous to that of the cochineal, *Coccus cacti*, contained in the insects. The most valuable product is obtained by breaking off the twigs before the brood escapes, and drying them in the sun.

Stick-lac.—These dried twigs are called stick-lac, and from them the other products are prepared. That from Siam is the best, the incrustation being often a quarter of an inch thick, all around the twig; that of Assam ranks next. It is insoluble in water, to which it, however, imparts its red coloring-matter. It is partially soluble in alcohol, coloring it red; is insoluble in fatty and essential oils.

Seed-lac is the resinous concretion separated from the twigs, coarsely pounded, and washed with water, by which much of the coloring-matter is removed. When it is desired to secure the lac-dye also, hot water is used, to which a little soda is often added.

Lump-lac is simply seed-lac melted into lumps.

Shell-lac is prepared from seed-lac by placing it in bags of cotton, about 4 feet long and 6 inches in circumference, and warming it over a charcoal fire. When the resin begins to melt the bag is twisted, and the clear resin is allowed to flow over the smooth stems of the banyan-tree or planks of fig-wood, when it cools in thin layers or scales.

Lac-resin is very valuable, much harder than colophony, and easily soluble in alcohol. It may be obtained pure by treating shell-lac with cold alcohol, and filtering the solution in order to separate a yellow-gray pulverulent matter. When the alcohol is again distilled off, a brown, translucent, hard, and brittle resin, of specific gravity 1·139, remains. It melts into a viscid mass with heat, and diffuses an aromatic odor. Anhydrous alcohol dissolves it in all proportions. Dilute hydrochloric and acetic acids dissolve shell-lac readily; nitric acid slowly; strong sulphuric acid not at all. Like most other resins, it has a strong affinity for bases, with which it forms definite compounds. It dissolves in aqueous potash, soda, carbonate of soda, etc. It deprives the caustic alkalies of their alkaline taste. The solution in caustic potash is of a dark-red color, and dries into a brilliant, transparent, reddish-brown mass, which may be redissolved in both water and alcohol. Borax renders five times its weight of shell-lac soluble on boiling with water. This solution is equal for many purposes to spirit varnish, and is an excellent vehicle for water-colors, as when once dried water has no effect upon it. India ink rubbed

up with this liquid forms a most valuable *label-ink* for the laboratory, as it is not affected by acid vapors. Sal-ammoniac is also a solvent for shell-lac, and the solution has been suggested as a substitute for the alcoholic solution.

Bleached Shell-lac.—By passing chlorine in excess through the dark-colored alkaline solution the lac-resin is precipitated in a colorless state. When this precipitate is washed and dried, it forms with alcohol an excellent pale-yellow varnish, especially with the addition of a little turpentine and mastic. By exposure in thin shreds to the sun's rays or in a finely divided state to chlorine-water, or by reducing it to a fine powder, suspending in water, and passing hydrochloric acid vapor into the menstruum, the dark-colored varieties are bleached. When this is done the resin loses many of those qualities that so admirably recommend it for some kinds of varnishes, but it answers well for making sealing-wax.

Uses of Shell-lac.—In India lac is fashioned into rings, beads, and other trinkets. It is the material of which the best modern sealing-wax is made. Turpentine is added to promote fusibility and prevent brittleness. Earthy matters are added to increase weight and to prevent too rapid fusion. For red and other light-colored sealing-wax very pale or even bleached shell-lac is used, while for black and dark colors the darker-colored shell-lac is equally suitable. The following are common proportions, the first being the best, Venice turpentine being used in it:

INGREDIENTS.	1	2	3	4
Shell-lac	500	300	340	330
Turpentine	125	400	370	330
Chalk or magnesia	...	140	110	...
Gypsum or zinc-white	...	95	...	...
Sulphate of baryta	...	...	60	160
Vermilion	375	65	120	165
Oil of turpentine	...	...	...	15
Totals	1,000	1,000	1,000	1,000

The materials are melted together in an iron pan, with constant stirring. The cool but still soft mass is rolled on a slab and shaped into sticks, or the fluid mass is poured into brass molds. The various colors are imparted by cobalt blue, chrome yellow, bone-black, etc. Perfumed sealing-wax contains gum benzoin, storax, or balsam of Peru. Inferior sealing-wax is colored red with oxide of iron instead of vermilion, or it is made of common rosin with gypsum or chalk. New Zealand resin, from the *Xanthorrhœa hastilis*, is often used in place of shell-lac. Mediæval sealing-wax was a mixture of bees-wax with turpentine and coloring-matter. Shell-lac is used for the preparation of varnishes and for japanning, the ordinary shell-lac varnish being a simple alcoholic solution. It is used for stiffening hat bodies and many other purposes. Its solution in sal-ammoniac and water has been suggested as capable of numerous applications. It is made by placing 3 parts white shell-lac, 1 part sal-ammoniac, and 6 to 8 parts water in a close vessel for twelve hours, then boiling with constant stirring till the shell-lac is dissolved. The solution may be used as a stiffener, waterproofer, or vehicle for pigments and dyes, as paint or varnish.

Lac-dye and *lac-lake* are the secondary or by-products of the purification of stick-lac. "It is said to be prepared by precipitating the aqueous solution of the coloring-matter with milk of lime, collecting the precipitate on filters, pressing and molding it into the form of small square cakes, which are then dried." Revised by IRA REMSEN.

Lac [from Hind. *lak*, *lākh* < Sanskr. *laksha*, one hundred thousand]: the sum of 100,000 rupees, worth about $37,500. The term is used in East Indian commerce. One hundred lacs make one *crore* of rupees.

La Caille, laa-kaa*l'*, NICOLAS LOUIS, de: astronomer; b. at Rumigny, Champagne, France, Mar. 15, 1713; studied mathematics and astronomy; took part in the survey of the French coast between Nantes and Bayonne, and in the measurement of the arc of the meridian, and was appointed Professor of Astronomy at the Collège de Mazarin at Paris in 1741. In 1750 he went to the Cape of Good Hope, and made observations to determine the parallax of the moon and form an extended catalogue of the southern stars. His works comprise *Astronomiæ Fundamenta* (1758), *Tabulæ Solares* (1758), *Observations sur 515 étoiles du zodiaque* (1763), several elementary handbooks, and essays on navigation. D. in Paris, Mar. 21, 1762. Revised by S. NEWCOMB.

La Calprenède, laa-kaăl'pre-nād', GAUTIER DE COSTES, Chevalier de: b. 1609 or 1610 at Cahors, France; d. 1663. He studied at Toulouse until 1632, then became an officer of the guards at Paris, acquired favor at court as a story-teller, and in 1650 was made king's chamberlain. He wrote ten dramas, but won his chief reputation by his novels, *Cassandre* (10 vols., 1642–45); *Cléopâtre* (12 vols., 1647); and *Pharamond* (1658–70; left unfinished in seven volumes, Vaumorière completed it in five more). Though historical in the names of their personages, and to a degree in their matter, their ideas and atmosphere are those of the French court. A. G. CANFIELD.

Lac'cadives (corruption of Sansk. *laksha-dvīpa*, literally, a lac (100,000) of islands, a hundred thousand islands; *dvīpa*, island): a numerous group of small islands in the Indian Ocean (Arabian Sea), consisting of twenty clusters, 100 miles from the Malabar coast. Area, 744 sq. miles. They are of coral formation, the largest being only 7 miles in length, and most of them are mere barren rocks. Because of the dangers of surrounding reefs the Laccadives are little frequented by navigators. The natives are called Moplays, are Mohammedans of Arabian descent, and live in stone huts. The only commerce is in cocoa-fiber and betel-nuts. The southern islands pay tribute to Cananore in the Presidency of Madras. They were discovered by Vasco de Gama in 1499; the northern belong to South Kanasa. Pop. (1891) 14,410.

Laccolite [from Gr. λάκκος, cistern + λίθος, stone]: a thick, lenticular body of intrusive igneous rock. When molten rock rises through the earth's crust, it may reach the surface and flow out, or it may stop at some lower level, open for itself a chamber by lifting the overlying rocks, and there congeal, forming a laccolite. The rock of laccolites, having cooled slowly and under great pressure, is composed, like granite, of crystals visible to the eye, and is compact. It resists well the forces of erosion, so that in a region undergoing rapid degradation laccolites are apt to constitute mountains. Of this character are the Henry, La Sal, Navajo, Abajo, Spanish, and Elk Mountains of the U. S. See *Geology of the Henry Mountains*, by G. K. Gilbert, and *Laccolitic Mountain Groups of Colorado, Utah, and Arizona*, by Whitman Cross, *Fourteenth Annual Report U. S. Geological Survey*. G. K. GILBERT.

Lace [M. Eng. *las*, from O. Fr. *laz* > Mod. Fr. *lacs*: Ital. *laccio*: Span. *lazo* < Lat. *laqueus*, noose, knot]: an ornamental openwork of thread, twisted, plaited, or woven into patterns. Itself comparatively modern, lace is derived from two most ancient kinds of work, netting and embroidery, the former of which was used by the Egyptians to ornament the borders of some festival garments; indeed, the network of blue beads found on mummies may, as it was made with the needle, be regarded as a sort of lace. The Greeks and Romans bordered their robes with embroidery, called, when of superior quality, *opus Phrygianum*, from the skill with which it was executed by Phrygian workers. Among early Christians it was customary for women to wear veils during public worship, and writers of the second century complained that too often those coverings ministered rather to vanity than to modesty, being frequently of netting interwoven with gold or silver, through which the face was visible. Anglo-Saxon embroidery, *opus Anglicanum*, was esteemed even in Rome; the cope and maniple of St. Cuthbert, found in his coffin, and still preserved at Durham, are good specimens of this work.

Lace may be divided into two principal classes—point and pillow lace, the former being of much the greater antiquity. We can not decide when point was first made, so very gradually was it evolved from netting and embroidery, with which it is often confounded in old records. The Italians probably derived it from Byzantium, since its earliest development may be traced to Venice, Genoa, and other towns engaged in commerce with the Greek empire. The oldest point is of two kinds—*lacis*, or *point compté* (counted stitch), and cut-work (*point coupé*). Lacis usually consisted of netted squares, made in the ordinary way on a mesh, then joined with the needle, and darned or embroidered in a pattern, like the modern guipure d'art; or designs cut out of linen were laid on the netting and secured to it by embroidery. The open ground, again, was sometimes formed by drawing threads in a piece of linen and fastening them with the needle where they crossed each other. For cut-work, threads were stretched netwise across a piece of linen, called *quintin* from the place of its manufacture, and a pattern was made by sewing round with buttonhole stitch those parts of the linen intended to remain, and cutting the rest away. By degrees, skillful workers arrived at

1. Round Point.
2. Valenciennes.
3. Venetian Point.
4. Duchess.
5. Irish.
6. Raised Venetian Point.

LACES.

making the thick part entirely with the needle, using variations of two stitches (Figs. 1 and 2), similar to those in modern point. The name "cut-work," though inappropriate, was long retained, and as late as 1640 was applied to Italian lace by John Taylor, the Water Poet, in his *Prayse of the Needle*. Embroidery, lacis, and cut-work were often combined in one piece, squares of darned netting alternating with squares of cut and embroidered linen; and this work, which was used chiefly for large articles, such as coverlets and altar-cloths, was sometimes white or unbleached, sometimes varied with gold, silver, or colored threads. The earliest pattern-books extant date from the sixteenth century, and are extremely rare. The best known is that of Vinciolo, a Venetian (about 1612), who gave new designs, besides republishing many from older books. Among these are *Le Livre nouveau des Patrons de Lingerie* (Berlin, 1525); *Knitting and Lace Patterns*, Hans Sibmacher (1597, reprinted at Vienna 1866), having a curious frontispiece representing a workroom where an aged woman is directing several young pupils; *La Pratique de l'Aiguille industrieuse*, Mignerak (1605). The designs in these and contemporary works on the same subject are either geometrical or attempts at depicting sacred, historical, or allegorical scenes. Sibmacher gives St. George and the Dragon to be worked in lacis; Mignerak shows how the seasons, the elements, the death of Lucretia, etc., may be more or less adequately represented with the needle. In the South Kensington Museum, London, a large piece of lacis in many compartments contains in each a Bible picture wrought on a netted ground. As pattern-books were expensive and easily damaged, it was usual for ladies, in the times when needle-industry ranked as a cardinal female virtue, to preserve designs and stitches by working lace-samplers or sam-cloths, which are kept as heirlooms in many families.

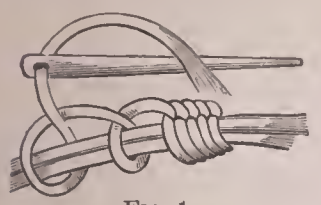


Fig. 1.

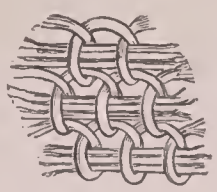


Fig. 2.

In the sixteenth century lace became a very general ornament of the dress of both men and women, and it is frequently mentioned in royal edicts and accounts: "8 peces of yolowe (yellow) lace were bought for Henry VIII. at a cost of 5*s.* 4*d.*" A sumptuary law of Queen Mary forbade the wearing of "white woorkes, alias cut-woorkes, made beyond the seas." Stubbes, in his denunciation of "ruffes," declares them to be "clogged with gold, silver, or silk lace of stately price, wrought all over with needle-work, speckled and sparkled here and there with the sonne, the moone, the starres, and many other antiquities straunge to beholde." For those much-reviled yet long-triumphant articles of dress, pillow-lace, being lighter than point, was a favorite edging. This work, usually supposed to have been invented by Barbara Uttmann, wife of a master miner of St. Annaberg, in Saxony, is by Joseph Séguin pronounced of Italian origin. "From Italy," says he, "a knowledge of the art passed into France, whence it was acquired by the lace-makers of Flanders." Be that as it may, Belgium is now the special home of this beautiful fabric. The lace-pillow is a round or oval board forming the base of a hard cushion; the worker places it upon her knees, lays on it a strip of parchment pricked with holes which indicate a lace-pattern, and sticks a pin through each hole so that its point enters the pillow. The thread for making the lace is wound on bobbins, small pieces of wood, bone, or ivory about the circumference of an ordinary lead-pencil, having round their upper ends a groove or neck to receive the thread; by the twisting and crossing of these the lace is formed. The ground or mesh is made by plaiting (Fig. 3) or twisting

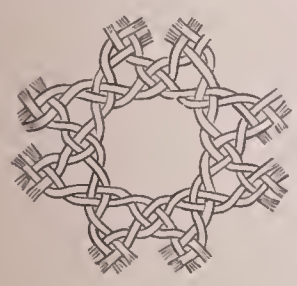


Fig. 3.

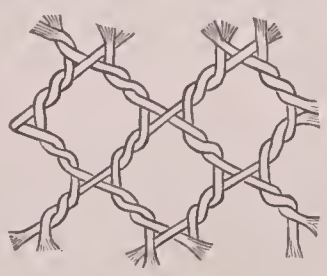


Fig. 4.

the threads (Fig. 4); the pattern, technically called gimp, by weaving or clothing (Fig. 5. These figures, as also 1 and 2, represent the stitches considerably magnified). A large number of bobbins is needed, as many as 1,200 being sometimes employed on one cushion. Those not immediately in use hang over the front of the cushion, each by its own thread, which is so looped as not to become unwound. The leading lines of the pattern are sometimes marked by pins with colored heads, and the gimp threads are wound upon colored bobbins. Early pillow-lace, like contemporary point, was of stiff design, and may be compared to the more formal of modern crochet edgings. Toward the close of the sixteenth century lace of all kinds changed from the geometrical to the flowing style, as may be seen by comparison of Holbein's pictures with those of Vandyke. And every year it was more generally and profusely worn. At Queen Elizabeth's death 3,000 lace-trimmed habits were found in her wardrobe. Charles I. wore hunting-dresses adorned with rich point. In France, and all countries where French fashion-laws were obeyed, lace during the seventeenth and eighteenth centuries was used lavishly for nearly all articles of dress. The falling collars and cravats which succeeded ruffs were either made of lace or deeply bordered with it. Ladies wore lace head-dresses, lace flounces, ruffles of lace at the elbow, aprons frilled with or composed entirely of lace. Gentleman had lace cuffs or ruffles (called *pleureuses*, weepers) which fell over the hand, and thus, it was said, facilitated cheating at cards; they wore lace-trimmed garters, deep frills of lace at the knee, lace roses in shoes, even quillings of lace to fill up the wide boot-tops that were fashionable about 1662. Infants' robes, caps, and cradle-furniture were made of rich lace, and it was used for curtains, for coverlets, even for bathing wrappers. Great sums were spent upon lace, and as it was nearly all brought from Italy, Venice and Genoa were enriched with the fortunes of French nobles. For this reason its importation was, between 1620 and 1660, forbidden by many edicts, which, however had little effect except to inspire numerous satires: of these, *La Révolte des Passements* (The Rebellion of the Laces) is specially valuable, since it names every kind of lace known at the time. Soon after the edict of 1660 the minister Colbert, resolved that France should have a lace-manufacture of its own, sent to Italy for workers, and established them near Alençon, where they instructed a number of French girls in the art of making point. Alençon lace, which, though derived from that of Venice, differed considerably from it, was by Louis XIV. called *point de France*, and being patronized by that monarch, soon became indispensable to all his courtiers. In 1665 a company was organized with the monopoly of its sale for ten years, during which time the shareholders received over and over again the amount of their original investments. The manufacture of point de France, though affected, like every kind of French industry, by the Revocation of the Edict of Nantes, flourished until the Revolution, when nearly all demand for lace ceased, and many Alençon workers, having ministered to aristocratic luxury, shared the fate of their high-born patrons. It was revived by Napoleon I., and there exist here and there fragments of a suite of bed-furniture powdered with the imperial bees, which was made for him at immense cost. Venice point is no longer worked, except by skillful reproducers of old lace. The raised kind was especially beautiful, and had the appearance of carving or bas-relief, the outlines of the patterns being worked over thick rolls of cotton. The flowers were filled in with delicate lace-stitches (technically called *modes*) and connected by brides, or bars, of exquisite lightness varied by little stars and picots, or pearl loops. A similar lace was made in Spanish convents and devoted to church purposes, such as altar-furniture, vestments, and the dresses of images. In the island of Cephalonia much Italian point of geometrical design has been found in tombs and sold under the name of Greek lace. Point d'Alençon, the most costly and complicated of needle-laces, is made in small segments and by twelve different workers, each of whom has her special province. The pattern is printed off on pieces of green parchment about 10 inches long, each segment numbered in its order; the pattern is then pricked upon the parchment, which is stitched to a piece of coarse linen folded double. The outline of the pattern is traced out by two threads fixed by small stitches passed with another needle and thread through the parchment and its linen lining. The ground is next worked in fine *réseau* (net) backward and forward at right angles to the border; the

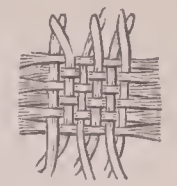


Fig. 5.

flowers are worked in, and the various modes or fillings are introduced. The threads which unite lace, parchment, and linen are next cut by passing a razor between the folds of the linen, and the many segments are joined by an invisible stitch called assemblage. Point d'Alençon is the only lace in which horsehair is introduced along the edge to give firmness to the cordonnet. The horsehair has the disadvantage of being apt to shrink in washing, and thus impair the beauty of the point. Until the Revolution there was made at Argentan a point resembling that of Alençon, but with heavier flowers and a bride ground of large hexagonal meshes worked over with buttonhole stitch. The art of making this lace, which was very strong and effective, is entirely lost. Pillow-lace is either worked in one piece on the cushion, in which case it can not be of any great width, or is made in separate flowers, afterward connected by brides or applied on net. Of the latter kind are Brussels, Honiton, and guipure de Bruges. The best Brussels lace is made of wonderfully fine thread, the flax for which is grown in Brabant and steeped at Courtrai, the Lys water being very clear. This thread is spun in cellars, since contact with dry air causes it to break; a ray of light is thrown on it, but the spinner is guided chiefly by touch, and stops her wheel when she feels the slightest unevenness. The number of expert spinners being small, and their work tedious and unhealthful, real Brussels thread is very expensive, costing from 20,000 to 50,000 francs per pound. Machine-made thread is therefore generally used, but it has never attained the fineness of that spun by hand. The most costly Brussels lace has a fine needle-made ground, called point à l'aiguille, rarely used except for royal trousseaux; the pillow-made ground, though much less expensive and durable, is also of great value, and is commonly replaced by fine machine net made at Brussels for the purpose. The flowers are sometimes worked with the needle, but more frequently on the pillow; a fine cordonnet marks the outlines of the pattern, which is formed in a variety of beautiful modes. A piece of Brussels lace passes through seven different hands, each worker having her own department, and knowing nothing of the intended effect, which is decided by the head of the establishment. Lace-making is taught in schools, of which there are over 900 throughout Belgium, many being attached to convents. Brussels flowers coming soiled from the lace-makers' hands are often prepared for sale by means of white lead; this process, besides being injurious to health, renders the lace liable to turn black on exposure to heat or sea-air, in which case it can never be cleaned. Honiton, the most valuable English lace, is made along the Devonshire seacoast. The flowers, generally from nature, are of fine woven or cloth-stitch, a thicker thread marking the outlines. They are either applied on net or connected by brides, which, like the pattern, are worked on the pillow; needle-stitches are occasionally introduced. Guipure de Bruges, sometimes called duchesse lace, resembles Honiton, its sprigs being united by brides.

Of the many laces made in one piece on the pillow, Valenciennes is the most esteemed. Before the French Revolution it was worked chiefly at Valenciennes, and was called, on account of its durability, everlasting. It was made in cellars, the damp air of which favored the use of extremely fine thread, and was ruinous to the sight, many women becoming blind before thirty. At present it is manufactured only at Bailleul, in France, and in several Belgian towns, Ypres furnishing the widest kinds, which cost sometimes as much as £80 per meter. It is a very even lace, one-sized thread forming both ground and pattern, and, as it bears washing remarkably well, is a suitable trimming for white garments. Somewhat resembling Valenciennes, it is also used for trimming white articles, but its ground is lighter, and the flowers are outlined by a flat shiny thread which looks like embroidery. Pillow-lace, less expensive than Valenciennes, is made at Lille and Arras, and large quantities are manufactured in Normandy, Lorraine, and Auvergne. Coarse pillow-edgings, used chiefly by peasant-women for their costume head-dresses, are manufactured in Holland, Sweden, Denmark, and some parts of Germany; more delicate kinds are also made in those countries, but not in very great quantities. In England Bedfordshire, Buckinghamshire, and Northamptonshire were formerly celebrated for edgings resembling those of Lille, and called baby lace from being used chiefly for infants' caps, but various causes having lessened the demand for this fine lace, the workers now generally make Maltese or Cluny guipure. The term *guipure*, now used for any rich lace, was anciently applied only to a kind made of *cartisane* (thin strips of parchment or vellum), round which gold, silver, or silk thread was twisted. It was worked either with a needle or on a pillow, the pattern being outlined with cartisane and filled in with stitches, and was very perishable, as the vellum was affected by damp. Thread guipures, resembling the modern Cluny, Maltese, and Russian, were made in Italy and Flanders. Some specimens of Russian lace, now in the South Kensington Museum, are remarkable for bold and correct design.

Blonde lace, both black and white, is either worked entirely on the pillow, like Chantilly, or has pillow flowers applied on silk net. Black Chantilly lace is now made chiefly at Bayeux. Grammont, in Belgium, produces black lace, and large quantities are manufactured in Spain, particularly at Almagro, where 12,000 workers are employed. White blonde mantillas are worn by Spanish ladies at bull-fights. Irish lace comprises crochet guipure, very fine tatting, Carrickmacross, a kind of cut-work, and embroidery upon machine net, called Limerick lace. The last-named variety is suitable for large articles, such as veils and flounces. Worsted, mohair, and yak laces, used of late years for dress-trimming, are made chiefly at Le Puy. Greek and Italian peasants work aloe-fibers into a lace which, though pretty, has the disadvantage of not washing; sometimes, however, it is dyed black, and thus rendered more useful. A natural lace is furnished by the *Lagetta lintearia*, a lofty West Indian tree with white flowers and large smooth leaves; its inner bark may, after maceration in water, be separated into fine layers resembling net. Gold and silver laces, employed for uniforms and court dress, are made either of very fine wire, or silk covered with a fine flat thread of gold, silver, or silver gilt. Machinery is now generally used in the manufacture, which is carried on in London, Belgium, Italy, and France.

The first machine-net, made at Nottingham about 1760 upon the ordinary stocking-frame, was a looped fabric, woven with a single thread, and resembling an open knitting both in appearance and liability to ravel. Improvements in its manufacture were introduced by Hammond, Robert Frost, Flint, and others, but the object of inventors—an imitation of the firm three and six sided meshes of pillow-work—was not attained until 1809, when Heathcot, after long watching a woman at her pillow, and carefully unraveling some pieces of pillow-lace, found out how to make twist bobbinet. (See Nets.) Lace patterns are worked in bobbinet either in a frame by hand, like Limerick lace, or by an adaptation of the Jacquard apparatus to the net-machine. When the machine-worked pattern consists of separate sprigs, stars, or dots, the thick pattern thread (called gimp) is carried from one to the other, and afterward cut away. Net torn in the working is confided to lace-menders, who exactly replace the damaged meshes. Nottingham is the chief seat of the English machine-lace trade.

English machine-net was formerly smuggled into France, but the French now excel in the finer kinds, and show special taste in their patterns. Their principal lace-making towns are Calais, Cambray, Lyons, St.-Omer, Lille, St.-Quentin, and Caen. Embroidery on machine-net is done in Paris. Every kind of pillow-lace is imitated by machinery, and so accurately as to deceive a superficial or ignorant observer. In this, as in all work, that done by hand even though faulty, has a character which no machine can supply; and the very evenness and flatness of imitation lace make it of little value from an artistic point of view. J. Séguin's work, already cited, contains fifty beautiful photographs of old and modern hand-made lace. See F. Bury Palisser, *History of Lace* (London, 1865, 8vo); Mrs. Hailstone, *Designs for Lace-making* (1870, fol.); V. Touche, *The Handbook of Point Lace* (1871); Madame Goubaud, *Guipure d'Art* (1870).

Lacebark-tree: popular name of the *Lagetta lintearia*, a large tree of the family *Thymelæaceæ*, growing in the West Indies. Its white inner bark, after maceration in fresh water, is stretched out into a material curiously resembling coarse lace.

Lacedæmon: See Laconia and Sparta.

Lacépède, lăă′sā′ped′, Bernard Germain Étienne de la Ville-sur-Illon, Count de; b. at Agen, France, Dec. 26, 1756; early showed great fondness for music and for physics and natural science; went to Paris in 1776 under the patronage of Buffon and the musician Gluck; became sub-demonstrator in the Royal Cabinet 1785; member of the Institute and Professor of Herpetology at the Museum of Natural History 1796; president of the senate 1801; was grand chan-

cellor of the Legion of Honor 1803–14; re-entered the chamber of peers in 1819; died at Épinay, Oct. 6, 1825. His earlier works on science and music are unimportant; his best works are *Histoire naturelle des quadrupèdes ovipares et des serpents* (1788); *Histoire naturelle des reptiles* (1789); *Histoire naturelle des poissons* (1798–1803); *Histoire naturelle des cétacés* (1804); *Histoire naturelle de l'Homme* (printed after his death, 1827), etc.

Lacer'tidæ [Mod. Lat.; liter., those belonging to the lizard family; Lat. *lacer'ta*, lizard + Gr. patronymic ending *-ίδαι*, plur. of *-ίδης*, descended from]: a family of the order *Lacertilia* containing the typical lizards and those resembling them, and quite rich in species; most of them are inhabitants of the Old World, and the representatives of the family in America are aberrant. The sand-lizard (*Lacerta agilis*), the green lizard (*Lacerta viridis*), and the common lizard of England (*Zootoca vivipara*) are examples.

Lacertilia, lăs-ẽr-til'i-a [Mod. Lat., from Lat. *lacer'ta*, lizard]: an order or sub-order of reptiles containing the true lizards. The alisphenoid and orbitosphenoid are imperfectly ossified, leaving the brain-case open. The quadrate articulates with the cranium. There is a clavicle and interclavicle, and generally four well-developed limbs. The vertebræ are usually concave in front, rarely bi-concave. The transverse processes of the vertebræ are short and the ribs single-headed. There are never more than two sacral or nine cervical vertebræ. F. A. Lucas.

Lachaise, lăă'shāz', François d'Aix: ecclesiastic; confessor of Henry IV. and of Louis XIII.; b. at the Château d'Aix, France, Aug. 25, 1624. He was grandnephew of the celebrated Father Coton, and therefore rapidly rose to be provincial—that is, a high functionary of the Jesuit order. In 1675 he became confessor of Louis XIV., tolerated the many mistresses of this king, was concerned in the Revocation of the Edict of Nantes, in the persecution of Protestantism, and of Fénelon and other liberal prelates of the Gallican Church. Louis XIV. built for Father Lachaise a splendid mansion in one of the eastern suburbs of Paris. In 1804 the grounds were chosen for the largest cemetery of Paris, which is known as the Cimetière du Père Lachaise. He wrote in Latin a book on philosophy, *Peripateticæ quadruplicis philosophiæ placita rationalis, naturalis, supernaturalis et moralis*, and some academical essays. D. Jan. 20, 1709.

Lachambeaudie', lăă'shaăn'bō'dee', Pierre: b. at Sarlat, Dordogne, France, Dec. 17, 1807; would have not been much known but for his revolutionary tendencies, and if his fables had not reflected some of the socialistic ideas current in 1830 and 1848. Lachambeaudie only received a primary instruction; he joined the Saint-Simonians, and, through their chief, M. Enfantin, he was able to publish his *Fables populaires* in 1839. Though very liberal in their teachings, their morality was so appropriate and so genuine that they received the annual prize of the French Academy. In 1848, during the Revolution, and at the time of the *coup d'état* of Dec., 1851, Lachambeaudie associated with Esquiros, Blanqui, and other ultra radicals. In June, 1848, after the insurrection, he was released through the efforts of Béranger; and in 1851 was saved from transportation to Cayenne by the Duke of Persigny, who had been his friend and co-writer for a poetical review published in 1829 in the department of Loire. D. July 8, 1872, at Brunoy. Lachambeaudie was, for the French generation under Louis Philippe, the republic of 1848, and the empire, what Béranger had been for Frenchmen under the Restoration.
Revised by A. G. Canfield.

Lachapelle, Marie Louise: accoucheuse; b. in Paris, Jan. 1, 1769; the daughter of a physician named Dugès. Her mother was a midwife at Châtelat, and on account of her excellent qualifications was in 1775 placed at the head of the obstetrical service of the Paris Hôtel Dieu. It was there, under the excellent tutelage of her mother, that she acquired her profound knowledge of obstetrics. In 1792 she married Dr. Lachapelle, surgeon to the St. Louis hospital, but continued her services at the Hôtel Dieu, becoming adjunct midwife on the death of her mother in 1795. The wretched condition of the Hôtel Dieu, and the contiguity of obstetrical cases to other diseases, caused her to urge the establishment of a special hospital—La Maternité. Here she exhibited her remarkable intelligence in the organization of the service of which Baudelocque was the professor and she the practical instructor. She recorded her observations and they were published by her nephew, A. Dugès, under the title *Pratique des accouchements*. D. Oct. 4, 1821.

Lachaume, Aimé: See the Appendix.

Laches, lăsh'ez [from O. Fr. *lachesse*, laxity, deriv. of *lache* > Fr. *lâche*, prob. < Lat. *laxus*, slack]: in law, such negligence, remissness, or unreasonable delay in enforcing or attempting to enforce a legal or equitable right or claim as will operate to prevent a party from obtaining relief which is within the discretion of the court. The time within which a party may ask for relief in any matter from a court of law is in most matters definitely fixed by statute, so that the chief occasions for the application of the doctrine of laches arise in cases of application for equitable relief which are not affected by express statutes of limitations (see Limitations, Statute of); and in cases in admiralty courts, where it is not so usual to say that there has been laches as to say that the claim is stale. What shall be deemed to be negligence or unreasonable delay is not determined by any precise and definite rule, but according to the circumstances of each particular case; and the tendency of the courts now is to grant or refuse the desired relief according as to whether or not there has been such negligence or delay that to grant the relief would work greater injustice than to refuse it. (*Boswell* vs. *Coaks*, Law Reports, 27 Chancery Division 424, 456.) It is a rule of equity not to encourage stale demands or give relief to parties who sleep upon their rights. A claim must be asserted with reasonable diligence, in order that the interests of other parties may not be unduly prejudiced, but it has been held that "it is only when the complainant has slept over his wrongs so long that if relief be given to him great and serious wrong will be done to the defendant, that laches constitute a complete defense." (*Daggers* vs. *Van Dyck*, 37 N. J. Eq. 130, 137.) Such injury may be caused in various ways, as by a change in the situation of the parties, difficulty of procuring the necessary evidence after a long interval has elapsed, etc. In the case of legal titles and legal demands, however, courts of equity usually act in obedience to the statute of limitations, in conformity with the practice of courts of law. In some States, also, there are special statutes of limitations applying to equitable causes of action. Where this is not the case, and the demand is strictly of an equitable character, the statute of limitations applying to legal actions is not an absolute bar in equity as at law, though it is followed in analogous cases. Where the analogies of the law do not apply, a court of equity is governed by its own inherent doctrine of discountenancing stale demands. A long delay which would ordinarily be deemed laches may be excused when the adverse party is in no way prejudiced by the delay; when a party is in ignorance of his rights, without any fault or remissness on his part; when a transaction is involved in obscurity, so that information in regard to it can not be obtained; when he was under duress or undue influence which prevented him from asserting his rights; when his delay is induced by the acts of the other party; or when he labors under legal disability, as insanity, coverture, infancy, and the like. Poverty or pecuniary embarrassment, however, is not a sufficient excuse for delay. See Kerr *On Fraud and Mistake* (London, 1883); Story, *Equity Jurisprudence*.
F. Sturges Allen.

Lachesis, lăk'ẽe-sis [= Lat. = Gr. *Λάχεσις*, one of the fates, liter., lot, destiny, obtaining by lot, deriv. of *λαχεῖν*, obtain by lot, fall by lot]: the *Craspedocephalus lachesis*, or *Lachesis mutus*, one of the most venomous serpents of tropical America, called bushmaster, curucucu, and couanacouchi. It attains a length of more than 6 feet, and has a rudimentary rattle consisting of ten or twelve rows of spiral scales, slightly hooked at their summits. It frequents the underbrush near water, and is much dreaded on account of the deadly nature of its venom. Revised by F. A. Lucas.

Lachine, lăă-sheen' [Fr. for China, so named by the early explorers, who hoped to reach China by passing up the St. Lawrence]: a village of Jacques Cartier County, Quebec, Canada, on Montreal island (see map of Quebec, ref. 5–B). A ship-canal extends from Lachine to Montreal harbor. (See Lachine Canal.) It is on the Grand Trunk Railway, 9 miles distant from Montreal, and connected by a bridge with Caughnawaga, across the river. (See Bridges, *Continuous Bridges*). It is a thriving place. Pop. (1891) 3,761.

Lachine Canal: an important navigation canal 8½ miles in length, extending from the harbor of Montreal to the village of Lachine on Lake St. Louis. It surmounts the St. Louis or Lachine Rapids. Its construction was urged as a

necessity as early as 1791, and in 1815 a grant by the legislature of £25,000 was obtained in aid of the project. In 1819 the grant of 1815 was repealed, and an act passed incorporating a joint-stock company for carrying out the design; but it proved abortive. In May, 1821, a bill was passed repealing its incorporation, and authorizing the construction of it by Government in the month of July following. In 1825 the canal was opened for the passage of vessels. Its dimensions as then constructed were 28 feet in width at bottom and 48 feet at the water-line, with 4½ feet depth of water. It had seven locks, 100 feet long and 20 wide, built substantially of stone. The cost of that canal up to Mar., 1826, was $438,404.15, of which the British Government contributed $50,000 and the province the remainder. This canal being found insufficient, in 1866 plans and estimates were made for a new line with locks 200 feet by 45, and 9 feet depth of water. This line was constructed with five locks, the locks built subsequently to 1875 being made 270 by 45 feet and 14 feet in depth on the miter sill. The total expenditure on this canal, up to June 30, 1890, was $10,464,900. The total lift of the five locks is 44¾ feet. The navigation of the Lachine Canal is open in general for 210 to 220 days during the year, and may be safely counted upon from the last week in April to the last week in November. Revised by M. MERRIMAN.

Lachish, lā'kish [from Heb. *Lakhish*, liter., impregnable; cf. mod. name *Um-Lakis*]: a city in Southern Palestine, among the mountains separating the territory of Judah from the *Shephelah*, or plain of the Philistines. It was an almost impregnable hill-fortress, as its name probably signified, but was taken and partially destroyed by Joshua (Josh. x. 31–35), and fortified by Rehoboam (2 Chr. x. 32–35). It resisted for a long time the assaults of the Assyrian army under Sennacherib (2 Kgs. xviii. 14, 17, xix. 8; Is. xxxvi. 2), and the biblical accounts afford no indication that it was taken; but among the cuneiform inscriptions discovered by Layard at Kouyunjik several were carved on large slabs representing the siege and capture of *Lakhisha*, giving a ground plan of the fortress, and a picture of a procession of Jewish captives from the same place appearing before Sennacherib. The inscription is: "Sennacherib, the mighty king, king of the country of Assyria, sitting on the throne of judgment before the city of Lachish: I give permission for its slaughter." (Layard, *Nineveh and Babylon, ad loco.*) Lachish was afterward taken by Nebuchadnezzar at the downfall of the kingdom of Judah. Its ruins have been identified by Raumer, van de Velde, and Thomson with the modern village *Um-Lakis*, on a round knoll covered with heaps of stones, on the left of the road between Gaza and Hebron. Other geographers, however, identify it with the adjoining *Tel el-Hasy*, where a cuneiform letter to the Egyptian governor of Lachish has been discovered.

Lachlan, laa*kh*'lan: a river of East Australia. It rises in New South Wales, joins the Murrumbidgee in 34° 30′ S. lat. and 144° 10′ E. lon., and after a course of 400 miles enters the Murray.

Lachmann, laa*kh*'maăn, KARL KONRAD FRIEDRICH WILHELM: classical and Teutonic philologist; b. at Brunswick, Germany, Mar. 4, 1793; studied at Leipzig and Göttingen; entered the army as a volunteer and took part in the Waterloo campaign; became professor extraordinarius at Königsberg in 1818, at Berlin in 1825, professor ordinarius in 1828, member of the Academy of Sciences in 1830. D. in Berlin, Mar. 13, 1851. Lachmann is the founder of textual criticism as a science. The restoration of a literary work, according to Lachmann, calls for a twofold activity. We must first determine the original form of the work. Second, we must ascertain what is known of the life and personality of the author, and interpret his thoughts and examine into the conditions which helped to shape them. The first of these tasks belong to textual criticism, the second to hermeneutics. The former, again, consists of three parts: the recensio furnishes a picture of MS. tradition; the emendatio concerns itself with correction where the text is faulty; the so-called higher criticism finally deals with the origin and authenticity of the work itself. The recensio is independent of exegesis, but the emendatio and higher criticism must everywhere go hand in hand with hermeneutical interpretation. These principles were put into practice in his epoch-making editions of the *New Testament* (1842), Propertius (published at the early age of twenty-three), and in his immortal masterpiece, the text and commentary of Lucretius (2 vols., 1871, 4th ed.). As specimens of the application of the higher criticism we have his *Betrachtungen zur Ilias* (1847), and *On the Primitive Form of the Poem of the Nibelungen Noth*, in which the famous, but now practically abandoned, theory is advanced with great learning and ingenuity that these epics are made up of a number of early lays which were subsequently combined (*Liedertheorie*). Lachmann was no less distinguished in the field of Teutonic philology. His *Ueber althochdeutsche Betonung und Verskunst* (1831) laid the foundation for all later investigations on the subject of German versification. Of his numerous works not already cited may be mentioned his editions of Catullus and Tibullus (1829); Gaius's *Institutiones* (1849); Babrius and Avianus (1845); Lucilius (edited after Lachmann's death by J. Vahlen, 1876); Wolfram von Eschenbach (1833); Walter von der Vogelweide (5th ed. 1875); Hartmann's *Iwein* (4th ed. 1877); Lessing's complete works (13 vols., 1838–40); translations of Shakspeare's sonnets and *Macbeth*; *Kleine Schriften* (2 vols., ed. by K. Müllenhoff and Joh. Vahlen, 1876). See M. Hertz, *Karl Lachmann* (Berlin, 1851, pp. x., 255, xliii.); *Biogr. Jahrbücher* (1853, pp. 88 ff.); *Lachmanns Briefe an M. Haupt* (ed. by Vahlen, 1893). ALFRED GUDEMAN.

Lachrymal (lăk'ri-mal) **Gland**, or **Tear-gland**: the organ in man and other animals which produces tears. In man it is of the shape and size of an almond, and is found above the outer angle of the eye. Its secretion is discharged by some seven ducts into the space between the eyeball and the lid. At the inner angle of the eye are two apertures through which the supply of lachrymal secretion is taken up by the lachrymal canals, passed into the lachrymal sac, and thence through the nasal duct into the nose.

Lach'rymatory [from Mediæv. Lat. *lacrimato'rium*, liter., neut. of *lacrimato'rius*, pertaining to tears, deriv. of *lacrima*, tear]: a popular name for the supposed tear-bottles of the ancients, small glass or earthern vessels found in ancient Greek and Roman tombs. That they ever really contained the tears of mourning friends is unlikely.

Lachute, laă-shoot': a village of County Argenteuil, Quebec; 44 miles W. of Montreal; on the Montreal and Ottawa branch of the Canadian Pacific Railway; on the North river, 8 miles from its union with the Ottawa. It has extensive water-power. Pop. 1,751, few French-Canadians.

Lackawan'na, or **Lackawannock**: a small river in Pennsylvania; rises in Susquehanna County, near the northeast corner of the State, flows S. W. through Luzerne County, and enters the Susquehanna river at Pittston. Its lower course for 30 miles passes through the largest and most abundant anthracite coal-basin in America, to which it gives name, though it is sometimes called the Wyoming basin. The chief emporium of this basin is Scranton, formerly called Lackawanna. A large portion of the anthracite coal used in New York city and in the New England States is furnished by this coal-field, which has an area of 198 sq. miles, and a thickness of from 5 to 14 feet at a depth varying from 100 to 400 feet beneath the surface.

Laclède, laă'kled', PIERRE LIGUESTE: the founder of St. Louis, Mo.; b. in Bion, France, in 1724; became in 1762 a resident of New Orleans, when he established the Louisiana Fur Company under a charter from the director-general of the colony, giving it the exclusive right of trading with the Indians on the Missouri. The pioneers under his direction made the first settlement on the site of St. Louis, Feb. 15, 1764, erecting a house and four stores, and named the place in honor of Louis XV., then King of France. D. on the Mississippi, near the mouth of the Arkansas, June 20, 1778.

Lacmus: See LITMUS.

La'con: city; capital of Marshall co., Ill. (for location of county, see map of Illinois, ref. 4–E); on the Illinois river, and the Chi. and Alton Railroad; 130 miles S. W. of Chicago. It is connected with Sparland, Ill., by a pontoon bridge; ships large quantities of grain; and has waterworks, electric lights, 2 woolen-mills, 2 canning-factories, shawl-mill, and 2 weekly newspapers. Pop. (1880) 1,814; (1890) 1,649; (1900) 1,601.

EDITOR OF "MARSHALL COUNTY DEMOCRAT."

La Condamine, laa-kōn'daă'meen', CHARLES MARIE, de: scientist; b. in Paris, France, Jan. 28, 1701; educated at the University of Paris, and after serving for a short time in the army (1719–20), devoted himself to scientific studies. With other explorers he visited the Mediterranean coasts of Africa and Asia, the Troad, Cyprus, Jerusalem, and Constantinople. In 1735 the Academy of Sciences chose La Conda-

mine, Godin, and Bouguer to execute the measurement of an are of the meridian, the plain of Quito being seleeted for the purpose. This celebrated measurement was performed with great care, and occupied several years; by it the size and figure of the earth were determined with great exactness, and a basis was furnished for the modern metrieal system. Though La Condamine, as a scientist, was inferior to Bouguer, he was practieally the most useful of the party. After the conclusion of the survey he made important observations on the magnetic influenee of mountains, ete. In the summer of 1744 he deseended the Amazon to Pará and returned to Europe. Subsequently he traveled in Italy, but most of his life was spent in Paris, where he devoted himself to various seientific researehes, and espeeially to the question of inoeulation for smallpox. His most important publieations are *Relation abrégée d'un voyage fait dans l'intérieur de l'Amérique Méridionale* (Paris, 1745); *La Figure de la Terre déterminée* (1749); *Journal d'un voyage fait par ordre du roi* (1751). D. in Paris, Feb. 4, 1774. HERBERT H. SMITH.

Laco'nia, or **Lacedæ'mon**: the southernmost division of the ancient Peloponnesus; bounded W. by Messenia, N. by Arcadia and Argolis, E. and S. by the Argolian Gulf, the Myrtoan Sea, the Laeonian and Messenian Gulfs. To the S. it ended in the promontories of Tænarum and Malea, the present Capes Matapan and Malio. To the Laeonian Gulf flowed the Eurotas, on whose banks was the eapital of Laconia, SPARTA (*q. v.*). Revised by J. R. S. STERRETT.

Laconia: town; capital of Belknap co., N. H. (for loeation of county, see map of New Hampshire, ref. 8–F); on the Winnipiseogee river, and the Coneord and Montreal Railroad; 28 miles N. of Concord, 102 miles N. of Boston. It is situated between Lakes Winnipiseogee and Winnisquam; has three weekly newspapers, and is prineipally engaged in the manufacture of hosiery and ears. Pop. (1880) 3,790; (1890) 6,143; (1900) 8,042. EDITOR OF "HERALD."

Lacordaire, lăă'kōr'dăr', JEAN BAPTISTE HENRI: preacher and orator; b. Mar. 12, 1802, at Reeey-sur-Ouree, in the department of Côte-d'Or, Franee; studied law at Dijon, and went in 1821 to Paris, where a brilliant career seemed to open for him as an advoeate. Suddenly he entered the seminary of St. Sulpiee; was ordained a priest in 1827; beeame preacher at the Collège de Henri IV. in 1830; and founded the journal *L'Avenir* in eonneetion with Lamennais and Montalembert. His standpoint was that the will of the people in civil affairs, and the teaching of the pope in religion, is supreme. To maintain this position he drew on his extensive acquaintance with history, literature, and philosophy. He was the leader in the reaetion that took place against the skepticism of Voltaire. His funeral orations excel any of the kind in his day, especially his oration on O'Connell, which is remarkable for point and elearness. Summoned before the civil court for the radical tone of his writings, he was aequitted, but when the pope in 1832 denounced his ideas, he immediately retracted and submitted. In 1835 he began his celebrated *conférences* in Notre Dame, drawing immense audiences, and in 1842 entered the Dominiean order. In 1848 he was elected member of the Constituent Assembly, but feeling that his real field of usefulness was the pulpit, he retired, and, after 1853, being ordered to leave Paris on aeeount of one of his ultramontane-radieal sermons, he lived in retirement at Sorèze, where he died Nov. 22, 1861. Besides his *Conférences de Notre-Dame de Paris* (4 vols., 1844–51), he wrote *Vie de Saint-Dominique* (1840; new ed. 1858); *Lettres à un Jeune Homme* (1858); *Discours sur le Droit et le Devoir de la Propriété* (1858), etc. Revised by JOHN J. KEANE.

Lacordaire, JEAN THÉODORE: naturalist; brother of Jean Baptiste Henri Lacordaire; b. at Reeey-sur-Ource, Feb. 1, 1801. He studied law at Dijon, subsequently devoting himself to science, and from 1825 to 1832 made four journeys to South America especially to collect and study insects. From 1832 to 1835 he was one of the editors of *Le Temps*; in the latter year he was chosen Professor of Zoölogy, and in 1838 of Comparative Anatomy in the University of Liège, Belgium, a position which he oeeupied until his death. He was the author of numerous important papers on the Coleoptera, ineluding a monograph of the Chrysomelidæ; various artieles on South America, principally in the *Revue des Deux Mondes*, and an *Introduction à l'Entomologie* (2 vols., 1834–37); but his great work is the *Genera des Coléoptères* (in the *Nouvelles Suites à Buffon*), the first volume published in 1854, and ten volumes at the time of his death; it was eoncluded by Chapuis. In this monumental book over 8,000 genera are carefully described, and it placed Lacordaire at the head of the students of the Coleoptera. D. at Liège, July 18, 1870. HERBERT H. SMITH.

La Cosa, JUAN, de: See COSA.

Lacoste, lăă'kōst', Sir ALEXANDRE, D. C. L.: jurist; b. in Boucherville, Quebec, Canada, Jan. 12, 1842; was edueated at St. Hyacinthe College and Laval University; was admitted to the bar in 1863, and beeame queen's eounsel in 1877. He was a legislative councilor for the Provinee of Quebec 1882–84; Senator of the Dominion 1884–89, and in the latter year was Speaker of that body; was appointed ehief justiee of the Provinee of Quebec in 1891, privy eouneilor of Canada in 1892, and was knighted in 1893. He has been Professor of Law in Laval University. NEIL MACDONALD.

Lac'quer [from Fr. *lacre*, from Span. *lacre*, sealing-wax, deriv. of *laca*, gum lae. See LAC]: properly a varnish made of lae, but by extension and much more commonly a varnish of some Oriental kind, the sap of a tree, into the eomposition of whieh lae may not enter at all. These varnishes, when mixed with other suitable ingredients and applied in sueeessive coats to seasoned wood-ware, impart to it a highly polished lustrous surfaee. Several kinds of so-called lacquer-ware are made in India by painting patterns upon tin-foil or other leaf-metal laid upon wood, and then varnishing the whole; this is ealled Kashmir or Haidarabad lacquer, and in this the transparent finishing-eoat may or may not be made from real lac. A similar effect is produeed by some Persian painted wares, the ground of whieh is generally PAPIER-MÂCHÉ (*q. v.*). These are often much more delicate and artistie than the Indian wares, and the painted figures and groups are often good in a deeorative way, although the highest qualities of Persian art are not seen in them. In some parts of India boxes and toys are made by covering a wooden eore with a solid eoat of what may be ealled sealing-wax; this is sometimes put on in a viseous eondition, in long ropes wound around the wooden body, and the whole surfaee is rubbed down and varnished many times. The eolors are in the solid substanee of the laequer, the resulting effect being a marbling or sprinkle rather than a pattern. In these Indian wares real lae is used to a great extent.

The Chinese and Japanese laequer-wares are very mueh more important, and in them there is no lac at all. Of all the Eastern varieties of laequer-ware the best known in Europe during the eighteenth and early nineteenth centuries was the Chinese ware with blaek ground painted with figures in gold. Of this ware tea-poys, tables, baekgammon-boards, and even large cabinets with many drawers and cupboards have been exported from China in great numbers to Holland, Great Britain, and Franee; many old houses contain fine speeimens, and the importation still continues at the close of the nineteenth eentury, though very fine pieees are somewhat rare. Another Chinese variety is that which is ealled coral lacquer, and in Japan Tsui-koko, and a blaek laequer of the same sort ealled in Japan Tsui-shu, both of whieh are called also earved lacquer, Peking lacquer, and Soo-chow laequer, which last is perhaps a mispronunciation of Tsui-shu rather than the name of the Chinese city. These wares are made by covering the wooden ground to the depth of perhaps an eighth of an ineh with the laequer and then by pressing or earving, or both, producing relief-patterns of great eomplexity in black, dark red, brown, green, or even all these eolors combined in one design. In both these Chinese wares lac is wholly absent, and the primary material is the same as in Japanese laequer-ware, which is described below.

The lacquer used by the Chinese and Japanese is ehiefly obtained from the small tree *Rhus vernicifera*, of the same genus as the American poison-ivy and poison-sumaeh, by making ineisions in the bark. The best time for collecting the sap is in the rainy season in summer. The incisions are usually five in number, the sap whieh exudes from the lowest gash being removed first. The best laequer is obtained when the tree is about fourteen years old. That obtained from old trees is called by the Japanese *suki* or transparent laequer. The bright black laequer is made by mixing a protoxide of iron with the carefully prepared natural lacquer, and in similar ways some few colors are got, but the most important varieties are the gold laequer and aventurine lacquer, whieh are made by mixing gold powder or bronze powder, more or less fine and in greater or less quantity, with the prepared sap. There is an opaque white lacquer very rarely seen, apparently of the same charaeter as the carved lacquer mentioned above; blue, yellow and rose

color do not seem to be made, the only green is of a dusky and grayish tint, and there are several grays and browns. Nearly all the fine pieces, however, are of one of the following sorts: (1) Polished black lacquer, upon which there are figures, landscapes, patterns, etc., painted in gold lacquer in very slight relief, and sometimes diversified by diminutive square bits of gold-foil, laid either on the black ground, on the gold pattern, or on both. A variant of this has a brown or greenish-brown ground, very slightly mottled or clouded, and so dark as almost to pass for black except in contrast with the intense lustrous tone of the true black lacquer. (2) Sprinkled or aventurine lacquer, the ground being sometimes of a uniform sprinkle of gold and sometimes in clouds or clusters, the gold specks being much more numerous, in rounded spots of perhaps an inch in diameter, than in the spaces between; the patterns applied in gold and in relief exactly as in black lacquer, except that they are apt to be in higher relief. One beauty of this lacquer is in the translucent appearance of the ground, into which one seems to look for a certain depth down among the sprinkled gold. A variant is made with silver powder. This sometimes has a greenish tinge; the gold powder also is of many tints, reddish, greenish, etc., so that the gold and silver sprinkles approach one another in appearance. (3) Gold lacquer, which is nothing more than the sprinkled lacquer made with so fine and dense a sprinkle as to resemble a dull metallic surface. Some exceptionally fine pieces look, indeed, like solid gold slightly dimmed by wear and use; these are exquisite in delicate beauty. The raised ornament on all these is put on as in the black lacquer. (4) Smooth-polished lacquer, in which the pattern, which may be very elaborate, with flowers and figures, looks as if stained on the brownish ground, the whole surface, ground and pattern, being polished together to a mirror-like surface. (5) *Mokume*, or wood-grain lacquer, in which the whole ground is covered with veins arranged like those of wood, and varied by different densities and different colors of gold sprinkle. (6) Opaque red-ground lacquer, the patterns of which are generally in relief of gold. (7) Pearl-sprinkled lacquer, the finely dusted mother-of-pearl mixed with a black ground; not very common among highly finished old lacquers. The pattern on this is generally an inlay of mother-of-pearl in thin veneer. (8) Marbled lacquer and branched or sprigged lacquer (Tsugaru-nuri and Wakasa-nuri); these also have rarely come to the West in fine wares; very cheap and slightly made boxes and trays are what we generally see in either variety. (9) Transparent lacquer; a mere varnish but exquisitely hard and brilliant, laid over a surface of richly grained wood or the like, which shows through it.

Many of these varieties of lacquer are enriched by means of inlaying with ivory or bronze carved in relief, as in the faces and hands of lacquered figures, or in whole figures, with mother-of-pearl, black horn delicately carved, coral, and even small bits of fine stones; moreover, gold-leaf and silver-leaf are often laid down in pieces larger than the little squares named above, and cut to shapes to suit the patterns, and little flat objects of pottery or porcelain are also let into the black ground, especially in the splendid wares said to be by Korin, an artist of the seventeenth century, and his followers. Carved black and red lacquer like that of China is also made in Japan.

The most elaborate preparations were made, in old work, in the way of seasoning and preparing the wood and the lacquer; the process of applying the lacquer and adorning it was also a most protracted one, for no coat might be laid until all below was perfectly dry, and the drying had to be so very slow and gradual that special boxes or cabinets were made for the purpose, the walls of which were thoroughly wet at the beginning of the drying process. It appears to be chiefly in these respects, and in the natural changes in character of design, that the modern lacquer differs from the ancient, for much of the modern is admirable in workmanship and in delicacy, so far as external appearance goes, and the designs are often very beautiful, though with a tendency to over-elaboration and crowding of the surface.

See J. J. Quin's paper on *The Lacquer Industry of Japan* in the *Transactions* of the Asiatic Society of Japan, vol. ix., pt. i. (Yokohama, 1881); J. J. Rein's *Industries of Japan* (London and New York, 1889); and Chamberlain's *Things Japanese* (London, 1891). RUSSELL STURGIS.

Lacretelle, lăă'kre-tel', JEAN CHARLES DOMINIQUE: historian; b. at Metz, France, Sept. 3, 1766; studied at the College of Nancy; was admitted to the bar at the age of eighteen; wrote at Nancy a tragedy and several academic essays; went to Paris in 1787; assisted his brother Pierre in writing for the *Encyclopédie Méthodique*; became an editor of the *Journal des Débats*, for which he reported the sessions of the National Assembly; became in 1790 secretary to the Duc de Rochefoucauld-Liancourt, with whom he was associated in the project of favoring the king's escape; made himself popular as an advocate of the constitution at the Club dês Feuillants; wrote the most extensively circulated account of the execution of Louis XVI.; was associated with André Chênier in editing the *Journal de Paris*; exerted himself in speeches and with the pen to save the Girondins from the popular wrath; was accused of being a royalist, arrested after a long residence at Épinay, and kept in prison two years (1797–99); became professor of history in Paris 1809, imperial censor 1810, was admitted to the Academy in 1811, and ennobled by Louis XVIII. in 1822. He remained professor of history for thirty-six years, and wrote eight valuable histories, covering all the period from the outbreak of the Revolution to 1846, and several earlier periods. D. at Mâcon, Mar. 26, 1855.

Lacretelle, PIERRE LOUIS: juridical and political writer; b. at Metz, France, in 1751; practiced law, first at Nancy, and then, from 1778, in Paris, where he lived in intimate connection with Malesherbes and La Harpe. During the Revolution he took part, though with great moderation and cautiousness, in all the principal political movements, but after 1804 lived in retirement. Under the Restoration he belonged to the opposition, and his *Mercure de France* and *Minerve Français*, published in connection with Ségur and Benjamin Constant, were successively suppressed. D. Sept. 5, 1824. Besides a number of juridical and political works, he wrote *Portraits et Tableaux*, *Études sur la Révolution Française*, and *Mes Soirées à Malesherbes*, which are of great interest to the student of the history of that period.

Lacroix, lăă'krwăă', PAUL: scholar; b. in Paris, Feb. 27, 1806; was educated at the Collège Bourbon, and wrote, under the pseudonym of *Le bibliophile Jacob*, a vast number of romances and works of curious learning about the books, the history, manners, and customs of the Middle Ages; distinguished himself by his efforts to improve the Bibliothèque du Roi; was appointed in 1855 conservator of the Arsenal Library, and edited from 1854 the *Revue Universelle des Arts*. His best works are *Dissertations* (3 vols., 1838–47); *Histoire de la ville de Soissons* (with Martin, 2 vols., 1837); *Costumes historiques de la France* (10 vols., 1852); *Le moyen âge et la renaissance* (5 vols., 1847–52); *Les Arts au moyen âge et à l'époque de la renaissance* (1868); *Mœurs, usages et costumes au moyen âge*, etc., with 441 plates (1871); and *La vie militaire et la vie religieuse au moyen âge* (1872). Several of these have been translated into English. D. in Paris, Oct. 16, 1884.—His wife, APOLLINE BIFFE, has written some popular novels; and his brother JULES (b. in Paris, May 7, 1809; d. 1887) had success as a writer of dramas and as a translator, imitator, and critic of Shakspeare. His *Œdipus Rex*, a translation from Sophocles, was successfully produced on the stage in 1858, and received in 1862 from the French Academy a grand prix of 10,000 francs.

Revised by A. R. MARSH.

Lacroix, SILVESTRE FRANÇOIS: mathematician; b. in Paris in 1765; became Professor of Mathematics at the Marine School of Rochefort in 1782; held subsequently the same position at the École Normale, the École Polytechnique, Sorbonne, and Collège de France, and died in Paris, May 25, 1843. His best-known work is *Traité du Calcul différentiel et intégral*, in 3 vols. 4to.

Lacrosse [= Canad. Fr. *la crosse*, liter., the hockey-stick; *la*, the + *crosse*, crook, crutch, lacrosse stick]: a game the origin of which is unknown further than that it is the development of a game called bagataway, which the early French settlers of Canada found among the Indian tribes. The game had no rules, and consisted in an attempt of a varying number of players to throw or carry a ball with the aid of racquets, not unlike small hand-nets, through an opposing mass of players. Running and dodging were the features of the game, whose object seems to have been the training of warriors for the warpath by cultivating agility and endurance. The men of a whole village not infrequently participated in the game, which sometimes lasted half a day. The French gave the game its present name, and it was not until about 1840 that it was first played by white people. About 1860 the game became popular in Canada, and

in 1867 Dr. W. George Beers, a member of the Montreal Lacrosse Club, formulated the rules which, with slight changes, are in use. There are now five lacrosse associations in Canada. The strongest in the quality of its players is the National League of Canada, composed of the Ottawas, Torontos, Montreals, Shamrocks of Montreal, and the Cornwalls.

The game soon became known outside of Canada, and through the efforts of J. R. Flannery, of the New York Athletic Club, it was introduced into the larger cities of the eastern and middle portion of the U. S., where the more prominent athletic clubs now have teams. Lacrosse has also had a prominent place among intercollegiate sports at Harvard, Cornell, Princeton, University of Pennsylvania, Lehigh University, and Stevens Institute, and between some of these colleges a lacrosse league has been formed. The game is steadily growing in popularity in the colleges. Australia has a good representation of players, the city of Sydney alone supporting six senior teams. The game was introduced into Great Britain by visiting Canadian teams, and annual championship matches are played between teams from England and Ireland.

The game is played upon a level field having such boundaries as the players may agree upon. The object of the game is to carry or throw the ball with the crosse or stick,

The crosse.

as it is more commonly called, between the opponents' goal-posts. These posts are two for each side, each pair 6 feet high and 6 feet apart, with 125 yards between the goals. Each goal is surrounded on the front and sides by lines called the crease, drawn 6 feet outside the posts. The players are twelve in number, and when in position for play extend nearly across the field from goal to goal at intervals of 10 yards from each other. The goal-keeper, whose position is within the lines of the crease, is the only player who may catch or throw the ball with his hands. No player except the goal-keeper may come within the lines of the crease except when the ball is there. The game requires two umpires and a referee. The position of the umpires is behind the goals, and their duty is to determine whether or not a goal has been made by the players. The referee has general control of the game, decides on fouls and claims, and administers the rules. He may not reverse the decision of an umpire, but he may remove him.

The picturesque dress of the players, the quick changing of the play from one part of the field to another, its simple rules, the graceful action of the runners, all combine to make it interesting to spectators. Thus far lacrosse is played only by amateurs. E. Hitchcock, Jr.

La Crosse: city (Indian trading-post 1841, town 1851, city 1856); capital of La Crosse co., Wis. (for location, see map of Wisconsin, ref. 6–B); at the confluence of the La Crosse and Black rivers with the Mississippi; on the Burl., the Chi. and N. W., the Chi., Mil. and St. P., and the Green Bay, W. and St. Paul railways; 196 miles W. of Milwaukee. For many years its principal industry was the lumber business, but it is now engaged in general manufactures and has a large wholesale trade with adjoining States. The census returns of 1890 showed that 198 manufacturing establishments (representing 52 industries) reported. These had a combined capital of $10,101,232, employed 4,155 persons, paid $1,662,230 for wages and $5,972,895 for materials, and had products valued at $9,172,426. The manufactures included sawed lumber, sash, doors, and blinds, boots and shoes, machinery, tanned leather, carriages, flour, woolen and knit goods, beer and ale, and cigars. The city has about 50 churches, 6 public halls, 3 opera-houses, public library with over 15,000 volumes, electric lights, electric street-railway, a national bank with capital of $200,000, 3 State banks with combined capital of $275,000, and 4 daily and 8 weekly newspapers. Pop. (1880) 14,505; (1890) 25,221; (1900) 28,895. R. Calvert.

Lactan'tius, Firmianus: also styled in MSS. Lucius Cæcilius, or Cælius; one of the Christian Fathers; b. about the middle of the third century, either at Firmum, Italy, or in Africa; studied rhetoric under Arnobius at Sicca in Proconsular Africa; became a distinguished orator, and one of the most learned men of his time. At the invitation of the Emperor Diocletian he settled at Nicomedia as professor of Latin eloquence (301), became a Christian, and, having been a witness of the persecutions of the times, wrote his works in defense of the new religion. He was called by the Emperor Constantine to Treves as tutor to his son Crispus, and is supposed to have died there about 330. Lactantius was called the Christian Cicero; he wrote an important work, *Institutionum Divinarum libri VII.*, and smaller treatises, *De Ira Dei* and *De Opificio Dei, vel Formatione Hominis.* The famous work on the death of persecutors (*De Mortibus Persecutorum*) is probably also a work of Lactantius. The elegiac poem *De ave Phœnice*, of which an Anglo-Saxon adaptation exists, is believed to be by him. The first edition of Lactantius was printed at the monastery of Subiaco in 1465, and is one of the first specimens of the typographical art. The best editions are those of le Brun and Lenglet du Fresnoy (2 vols. 4to, Paris, 1748), Fritzsche (Leipzig, 1842–44, 2 parts), and G. Laubmann and S. Brandt (Vienna, 1890). Revised by M. Warren.

Lac'teals [plur. of *lacteal*, from Lat. *lac'teus*, milky, deriv. of *lac*, lac'-, *tis*, milk]: the lymphatic vessels of the small intestine, a part of the general absorbent or lymphatic system, pervading all parts of the body, distinguished as lacteals, since they imbibe from the glandular mucous surface of the small intestine, following the ingestion of fatty food, a milky, white, opaque fluid, the chyle. The chyle is fat digested by the pancreatic and biliary fluids, reduced to an emulsion, molecular particles of fatty matter suspended in an albuminoid liquid. The lacteals take up the chyle, traverse the mesentery, and terminate, by two or three small trunks, in the thoracic duct. Here the chyle mingles with the more watery, opaleseent lymph, and with it passes up to enter the left subclavian vein, and becomes a nutritive element of the blood. See Lymphatics.

Lac'tic Acid [from Lat. *lac*, *lac'tis*, milk]: *acide nanceique* of Braconnot; the acid formed in milk when it turns sour, and existing therefore in buttermilk. It is $C_3H_6O_3$, and is formed from lactose or milk-sugar as follows:

$$C_{12}H_{22}O_{11} + H_2O = 4C_3H_6O_3.$$

The souring of milk is not a process of oxidation, but, like the vinous fermentation of sucrose or glucose, a breaking up into simpler compounds; lactic acid, like alcohol in the other case, being an intermediate product of decay and dissolution. Sucrose undergoes the lactic fermentation like lactose, under the influence of the same special ferments.

The names of Scheele, Braconnot, Berzelius, Liebig, and other great chemists are associated in the early history of the discovery of lactic acid and the extended controversies that grew out of it. Braconnot found it in sour beer, sour meal, sour beet-juice, fermented rice, and many other places, and, supposing it new, called it nanceic acid, after his birthplace, Nancy. Berzelius appears first to have announced that it occurs as a normal constituent of flesh, deducing important physiological conclusions. Liebig denied its occurrence in flesh, but afterward found therein sarcolactic acid, an isomere or metamere of lactic acid. Pure lactic acid is a colorless, sirupy liquid; does not freeze at 12° below zero F.; density = 1·215. There are several methods of manufacture. One is to dissolve 6 parts cane-sugar and $\frac{1}{144}$ part tartaric acid in 35 parts water. After two days add $\frac{1}{18}$ part rotten cheese, 8 parts sour milk, and $2\frac{1}{2}$ parts zinc white. The mixture should be allowed to stand for eight to ten days, with frequent stirring, at a temperature of 100° to 110° F. In a week or so it becomes a paste of lactate of lime, which is dissolved by boiling in water with some hydrate of zinc. The lactate must be evaporated, pressed, washed with cold water, and pressed repeatedly for purification, then decomposed by hydrogen sulphide. The conversion of the sugars into lactic acid is caused by the action of several micro-organisms, most prominent among which is the *Bacillum acidi lactici*. (See Fermentation.) Some of the salts of lactic acid are used in medicine. Revised by Ira Remsen.

Lactin and **Lactose**: See Milk.

Lactom'eter [Lat. *lac*, milk, and Gr. *μέτρον*, measure]: a graduated cylinder for roughly estimating the amount of cream in milk. The term is often applied to the *galactometer*, which is a hydrometer for showing the specific gravity of milk. See Galactometer, Hydrometer, and Milk.

Lactuca'rium [Mod. Lat., deriv. of Lat. *lactu'ca*, lettuce, whence Eng. *lettuce*]: a drug consisting of the dried milky juice from the mature stem of *Lactuca virosa* or lettuce. It is in reddish-brown lumps, masses, or cakes, of an

opium-like smell, and bitter taste. It was introduced into medicine in 1799 as having the property of allaying pain and inducing sleep, like opium, but its powers are very feeble, and it can not be relied upon.

Lacunæ: See HISTOLOGY (*Bone*).

La Cygne, laa-seen′: city (laid out in 1870); Linn co., Kan. (for location of county, see map of Kansas, ref. 6–K); on the Osage river, and the Kan. City, Ft. Scott and Mem. Railroad; 37 miles N. of Fort Scott, 63 miles S. of Kansas City. It is in an agricultural, fruit-growing, and stock-raising region, and has valuable timber, coal, and stone in its vicinity. Pop. (1880) 835; (1890) 1,135; (1900) 1,037.

Ladakh′: a part of Kashmir, British India, extending from 32° to 36° N. lat., and from 76° to 79° E. lon., between Great Tibet in the east and Little Tibet in the west; separated on the N. from Turkestan by the Karakorum. Area estimated at 30,000 sq. miles. Pop. 150,000. It is a wild mountainous region along the upper course of the Indus, mostly of a sterile soil and with a severe climate. It is well cultivated, and its inhabitants, who are Mongolians, raise large crops of wheat, barley, and buckwheat, besides rearing immense herds of sheep, which supply most of the wool used in Kashmir. The mountains contain iron, copper, and lead, and a very important transit trade between China and Hindustan is carried on. Capital, LEH (*q. v.*).

Ladanum: See LABDANUM.

Ladd, GEORGE TRUMBULL, B. D., D. D.: Professor of Philosophy in Yale University since 1881; b. in Painesville, O., Jan. 19, 1842; was educated at Western Reserve College and Andover Theological Seminary. He held the following posts before assuming his present professorship: Pastor Spring Street church, Milwaukee, Wis., 1871–79; Professor of Philosophy in Bowdoin College 1879–81; lecturer on Church Polity in Andover Theological Seminary 1879–81; special lecturer on Systematic Theology in the graduate department of Andover Theological Seminary 1882; lecturer in Harvard Divinity School 1883; special lecturer on Philosophy at the Dōshisha, Kioto, Japan, before the students of the university at Tokio, and at the Summer School, Hakoné, Japan, 1892; president of the American Psychological Association 1893. His principal works are *Principles of Church Polity* (New York, 1881); *Doctrine of Sacred Scripture* (2 vols., New York and Edinburgh, 1883); *Elements of Physiological Psychology* (New York and London, 1887); translations of Lotze's *Philosophical Outlines* (6 vols., Boston, 1884–87); *What is the Bible?* (New York and London, 1888); *Introduction to Philosophy* (New York and London, 1890); *Outlines of Physiological Psychology* (New York and London, 1891); *Psychology, Descriptive and Explanatory* (New York and London, 1894); also numerous articles in periodicals. J. MARK BALDWIN.

Ladi′nos [Sp., crafty or cunning, plur. < Lat. *Latī′nus*, i. e. of Latium, Latin]: a name used in Spanish America, sometimes for persons of mixed European and Indian blood, sometimes for all inhabitants who are not pure Indian. In the census of 1891 of Guatemala it is used to mean Europeans, creoles, Negroes, Chinese, mulattoes, zambos, mestizoes, etc. M. W. H.

Ladins′: a people of Rheto-Roman descent, speaking a Romance dialect; found now only in Eastern Tyrol (Ladin proper) and in the Grisons of Switzerland (Romanche). The language is steadily going out of favor, being generally replaced by Italian. M. W. H.

La′dislas, or **Lancelot**: King of Naples, surnamed THE LIBERAL and THE VICTORIOUS; b. about 1375; succeeded his father, Charles III., under the regency of his mother Margaret in 1387; was driven from Naples in July, 1387, by his competitor, Louis II. of Anjou, whom Pope Clement VII. (of Avignon) had invested with the crown; was reinstated by Otto of Brunswick the same year; repulsed two invasions made by Pope Urban VI. in 1388; was crowned at Gaeta May 29, 1390, by a legate of the new pope, Boniface IX.; maintained a war for several years in the heart of his kingdom against his rival, Louis II., who was in possession of the capital; recovered that city July 9, 1399; was a candidate for the throne of Hungary, and actually crowned Aug. 5, 1403, but soon withdrew his claims; attempted to seize Rome in Aug., 1405; was excommunicated and deprived of his kingdom by the pope June 18, 1406; entered Rome in 1408, retiring in a few months; after a long series of alternations of fortune again took by surprise and plundered that city June 8, 1413, and died at Naples, Aug. 16, 1414. He was perhaps the earliest modern Italian ruler who conceived the project of the unity of Italy; was also a claimant of the throne of Provence and a candidate for the imperial crown of Germany.

Ladislas I. (LOKTEK): King of Poland; b. in 1260; succeeded to the dukedom of Poland in 1296; was deposed in 1300, and in that year attended the jubilee at Rome; was restored in 1304; carried on a long war with the Teutonic Knights; assumed the title of King of Poland in 1319 by consent of Pope John XXII.; defeated the Teutonic Knights at Plowce Sept. 27, 1321. D. at Cracow, Mar. 10, 1333.

Ladislas II.: King of Poland. See JAGELLONS.

Ladislas III.: King of Poland. See LADISLAS V., King of Hungary.

Ladislas IV.: King of Poland; b. at Cracow, May 30, 1595; succeeded his father, Sigismund III., Nov. 13, 1632; compelled the Russians to raise the siege of Smolensk (1632); defeated the Turks in Moldavia (1634), and the Tartars of the Crimea; made a truce for twenty-six years with Sweden (1635); began a war with the Cossacks (1637); married a daughter of the German emperor Ferdinand (1637). D. in Lithuania, May 10, 1648. He was an able and energetic prince, from the female line of the Jagellons, and esteemed so valorous that in his early youth a party among the Russians wished to make him czar.

Ladislas, or **Ladislaus**: the name of seven Kings of Hungary: LADISLAS I., THE SAINT, called also LANCELOT, b. about 1041; succeeded his brother, Geysa I., in 1077; was victorious over the Wallachians, Bohemians, Russians, Cumans, and Poles; conquered Croatia and Dalmatia (1087) for the crown of Hungary; promulgated a new code of laws at the Diet of Zablon (1092); stimulated commerce; aided Boleslas II. in obtaining the throne of Poland; projected the delivery of the Holy Land from the Moslems; erected many churches and monasteries, and favored the clergy in their efforts to civilize the Hungarians. D. July 29, 1095. He was canonized by Pope Celestine III. in 1192. —LADISLAS II., b. about 1134; crowned July 15, 1161, and died Jan. 14, 1162.—LADISLAS III., b. about 1185; was elected in 1204 to succeed his father, Emerich, but died May 7, 1205.—LADISLAS IV., surnamed THE CUMAN, b. about 1250; succeeded his father, Stephen IV., in 1272; made war upon and at first defeated the Cumans (1282), but the latter, re-enforced by vast hordes of Nogai Tartars or Mongols from the plains N. E. of the Black Sea (the empire of Kiptchak), overran and ravaged all Hungary (1285). He then made terms with the Cumans, adopted some of their customs, repudiated his wife, and married one of their princesses, whence his surname, but was finally assassinated by them July 19, 1290.—LADISLAS V. (III. of Poland), b. Oct. 31, 1424; succeeded his father, Ladislas II. (Jagellon), as King of Poland in 1434; was elected King of Hungary in 1440 by the influence of the famous John Huniades, vaivode of Transylvania, by whose aid he defeated the invading Turks in two great battles (1442–43); made a ten years' truce with the Sultan Amurath II. at Szegedin in June, 1444, acquiring thereby the sovereignty of Wallachia, but at the instigation of Cardinal Julian obtained a papal dispensation from his oath, and invaded Bulgaria, where he was defeated and killed in battle, with a great part of the Polish nobility, at Varna, Nov. 10, 1444.—LADISLAS VI., THE POSTHUMOUS, son of Albert of Austria, Emperor of Germany and King of Bohemia and Hungary; b. Feb. 22, 1440, several months after his father's death, when Ladislas V. had already been placed upon the throne; was elected king in 1445; assumed the government in 1451; was crowned King of Bohemia Oct. 28, 1453, and died at Prague Nov. 23, 1457. He was cowardly and cruel, and persecuted the followers of John Huss.—LADISLAS VII., eldest son of Casimir IV. of Poland; b. about 1456; was designated as his successor by George Podiebrad, King of Bohemia, July 19, 1469; crowned at Prague Aug. 16, 1471; entered Hungary with an army on the death of Mathias Corvinus in 1490; was proclaimed king and crowned Sept. 21; fought against the Turks, and repulsed the army of Bajazet in 1501; made peace at Buda Aug. 20, 1503; permitted the proclamation of a crusade against the Turks in 1514, and died at Buda Mar. 13, 1516.

Ladmirault, laă′mĕĕ′rō′, LOUIS RENÉ PAUL, de: general and senator; b. at Montmorillon, Vienne, France, Feb. 17, 1808. He was educated at St.-Cyr, and passed a large portion of his career in Africa. As a general of division he

took a decisive part in the campaign of 1859 at the battles of Marignan and Solferino, being wounded at the latter. He became senator in 1866; distinguished himself in the war with Germany (1870–71); commanded the Fourth Corps and took an important part in the battles of Borny, Mars-la-Tour, and Gravelotte; on the capitulation of Metz became a prisoner of war; after the conclusion of peace received, in recognition of his brilliant services and his victory over the Communists, the command of the territorial division of Paris, and was appointed governor of the capital. When in 1873 the arrangement of territorial divisions was abolished, Ladmirault retained his position of military governor of Paris, and served until 1878. In 1876 he was elected to the Senate, and acted as vice-president of that body several times. In the elections of 1891 he was not a candidate. He is a grand cross of the Legion of Honor.

Ladoga, laa'dō-găă: the largest lake of Europe, comprising an area of 6,804 sq. miles: situated in Russia, between the governments of Viborg, Petersburg, and Olonetz. It receives the water from the lakes of Onega, Saima, and Ilmen, and sends it through the Neva to the Baltic. On account of shallows, sand-banks, and sunken rocks, navigation is very dangerous, and canals have been constructed connecting the Neva with those rivers which flow into the lake, thereby establishing a water communication through the Volga between the Baltic and the Caspian Sea.

Ladrones, lăă-drōnz', or **Marianne** (măă-rēĕ-ăăn') **Islands**: a group of fifteen islands in the Pacific Ocean, formerly belonging to Spain; between 13° and 21° N. lat., and between 144° and 146° E. lon. They are of volcanic origin, have a warm, healthful climate, and comprise an area of 417 sq. miles of fertile land. Only four, including Guam and Rota, are inhabited. They were first discovered by Magellan in 1521, and called Las Islas de los Ladrones (the thieves' islands) on account of a strong propensity to theft observed in the natives. In 1667 the Spaniards established a regular settlement on Guam, and called the islands Marianne islands, after Queen Maria Anna. At the time of this settlement the islands had from 40,000 to 60,000 inhabitants, who received the settlers well, and made great progress until the Spaniards began to attack their independence, when a war broke out which ended nearly with the extermination of the natives. The present number of inhabitants is not more than 10,000, and of these many were transferred by the Spaniards from Luzon. Principal town, San Ignazio de Agaña, situated on Guam island, which now belongs to the U. S.

Ladybird [: *lady*, meaning Our Lady, i. e. the Virgin Mary, + *bird*; cf. Germ. *Marienkäfer*, liter., Mary-beetle]: a common name for coleopterous insects of the family *Coccinellidæ*, of which there are more than 1,000 species and many genera. They are extremely useful to farmers, destroying vast numbers of aphides or plant-lice; but are objects of many superstitions, and are by many viewed with a vague and unreasonable dread. They are usually of an elongated hemispherical shape, frequently have bright colors, and are often spotted. The species are difficult to distinguish.

Lady-chapel: in English ecclesiastical architecture, a chapel forming part of a cathedral or collegiate church, and dedicated to the Virgin Mary. A lady-chapel is attached to nearly every English cathedral, though occasionally wanting, as at Lincoln, York, and Peterborough. It is commonly at the extreme east end of the church, behind the sanctuary, as at Salisbury, Wells, Lichfield, Winchester; at Canterbury it projects from the northwest transept; at Ely it is an independent and very elegant structure, adjoining the north transept. At Durham it is placed at the west end, where it serves a double purpose, as Galilee-porch and lady-chapel. On the Continent no importance seems to have attached to the chapels of the Virgin, ecclesiastically or architecturally. A. D. F. Hamlin.

Lady-crab: See Crab.

Lady Day: Mar. 25, the feast of the Annunciation of the Virgin Mary. In Great Britain it is one of the quarter days upon which rent is usually payable.

Lady Franklin Bay: the Arctic bay on which was located the station of the unfortunate polar expedition of the U. S. Signal Service, 1881–83. It is between lats. 81° and 82° N., between Grinnell Land and Grant Land, and opens into Kennedy Channel. M. W. H.

Lady in the Chair: See Cassiopeia.

Lady's Slipper: See Cypripedium.

Laennec, laă'nek', René Théodore Hyacinthe: physician; b. at Quimper, Brittany, France, Feb. 17, 1781; studied medicine in Paris 1800; obtained the degree of M. D. in 1804; became principal physician at the Necker Hospital in 1816, and Professor of Medicine at the Collège de France in 1822. In 1824 he retired, through ill health, to his native town, where he died Aug. 13, 1826. He was the inventor of the Stethoscope (*q. v.*). Besides articles in different medical journals, he wrote *Traité de l'auscultation médiate et des maladies des poumons et du cœur* (1819).

Laer'tes (in Gr. Λαέρτης): in Greek mythology, the King of Ithaca, son of Acrisius and Chalcomedusa. He joined in the Calydonian boar-hunt, and was a member of the Argonautic expedition. By Anticlea he begat Ulysses (Odysseus), during whose long absence from Ithaca he remained in retirement in the country, forced to see the unseemly orgies of the suitors of Penelope. On the return of Ulysses and the murder of the suitors, he took up his abode in the palace, was rejuvenated by Athene, and fought against the people of Ithaca, who stormed the palace to avenge the death of their kinsmen, the suitors. J. R. S. Sterrett.

Laestryg'ones (in Gr. Λαιστρυγόνες): a giant race of cannibals and pirates (Homer's *Odyssey*, x., 80 ff.) that lived in the far west, where the nights were so short that "herdsman hails herdsman as he drives in his flock, and the other who drives forth answers the call," a myth in which there is probably a hint at the short, bright nights of the far north. Homer himself does not locate them, but the later Greeks claimed Leontini in Sicily as their home, while the Romans placed their abode at Formiæ in Latium. Ancient art has not portrayed them, and four frescoes found in 1848 on the Esquiline Hill are the only pictorial representation we have of them. See Woermann, *Die Odyssee-Landschaften vom Esquilin*; Harrison, *Myths of the Odyssey* (London, 1882, pp. 45 ff.); and Maanga, *La Città di Lamo*.
J. R. S. Sterrett.

Laet, laat, Johannes, de (Fr. Jean de Laet): Flemish author; b. at Antwerp about 1595. In 1633 he was a director of the West India Company, but beyond this little is known of his life. In 1626 he published *De Nieuwe Wereld of Beschrijving van West-Indien* (The New World, or a Description of the West Indies), enlarged in 1630, and which has had many editions in various languages; it is one of the most valuable of the early books on America. Laet also wrote several of the miniature series of the *Republics*, issued by the Elzevirs; edited Píso's *Historia naturalis Brasiliæ*, the natural history of Pliny, etc., and published two controversial works against Grotius's theory of the origin of the American Indians. D. at Antwerp in 1649.
Herbert H. Smith.

Læta're Sunday, Mid-Lent, or **Dominica de Rosa**: the fourth Sunday in Lent, the day on which the pope blesses the Golden Rose (*q. v.*). *Lætare*, rejoice, is the first word of the introit in the missal for this day (Isa. lxvi. 10). On this day only is the organ played during Lent in Roman Catholic churches.

Læ'vius: a Latin poet of the first half of the first century before Christ, of whose life nothing is known. He experimented with a great variety of Greek lyric meters, treating amatory and mythological subjects in a light and sportive vein. Of his *Erotopægnia* there were at least six books, of which only inconsiderable fragments remain. See pp. 287–293 of Baehrens's *Frag. Poetarum Romanorum* (Leipzig, 1886). M. Warren.

La Farge, John: figure and landscape painter; b. in New York, Mar. 31, 1835. He was a pupil of Couture in Paris, and of William M. Hunt; became a National Academician 1869; member of the Society of American Artists 1877, and of American Water-color Society; was awarded a first-class medal for stained-glass work at the Paris Exposition of 1889, and received the decoration of the Legion of Honor. He has executed decorative paintings in Trinity church, Boston, St. Thomas's church, and the Church of the Ascension, New York, and has designed and had executed under his supervision numerous stained-glass windows, including the battle window in Memorial Hall, at Harvard College. His pictures are notable for fine qualities of color. Studio in New York. William A. Coffin.

La Farina, laa-făă-ree'năă, Giuseppe: historical writer; b. at Messina, Sicily, in 1815. At the age of eleven he composed a hymn to Italy which excited great admiration. In

1837, after an ineffectual attempt to detach Sicily from the dominion of the Bourbons by heading a popular insurrection, he fled to Tuscany. The following year he was amnestied and returned to Sicily, but after about three years he was once more forced to retire to Tuscany. Here for several years he occupied himself with literary pursuits and in efforts to promote Italian independence. The revolution of 1848 took him back to Sicily; he was elected deputy to the Sicilian Parliament, then appointed commissioner to the courts of Turin, Florence, and Rome, and in August of the same year he became Minister of War and of the Marines. In the spring of 1849 he took command of the University Legion against the Bourbons, and when the liberal cause was lost he escaped to Paris, where he continued in relations with Daniel Manin and other patriots till 1853. After a few months' stay at Tours he established himself at Turin in 1854. Here he made great efforts to strengthen the political party in favor of a united constitutional monarchy under the house of Savoy. He co-operated with Cavour in the war of 1859, and with Garibaldi in organizing the volunteers. In 1860 he was elected deputy to the Italian Parliament from six districts. D. in 1863. Among the many historical works of La Farina *La Storia d'Italia* may be specially recommended for its warmth and patriotic eloquence. Two volumes, *L'Epistolario di Giuseppe La Farina*, were published at Milan in 1869.

Lafayette: town; capital of Chambers co., Ala. (for location of county, see map of Alabama, ref. 4–E); on the East Ala. Railway; 18 miles N. of Opelika, 84 miles N. E. of Montgomery. It is the seat of Lafayette College, which has 6 instructors, over 200 students, and grounds and buildings valued at $15,000; is an important cotton-market, and has a large general trade and two weekly newspapers. Pop. (1880) 1,061; (1890) 1,369; (1900) 1,629.

Lafayette: city; capital of Tippecanoe co., Ind. (for location of county, see map of Indiana, ref. 5–C); on the Wabash river, the Wabash and Erie Canal, and the Cleve., Cin., Chi. and St. L., the Lake Erie and W., and Louis., N. Albany and Chi., and the Wabash railways; 63 miles N. W. of Indianapolis, 130 miles S. S. E. of Chicago. It has a belt line of railway connecting its factories with the main railways; receives natural gas from wells in Tipton County, and has improved water-works, electric lights, electric street-railway, and paid fire department, with fire-alarm telegraph. There are 25 churches, 9 public schools, public library (opened 1888, cost $50,000, contains 20,000 volumes), 1 savings and 4 national banks, and 3 daily, 8 weekly, and 2 monthly periodicals. The city is the seat of Purdue University, organized in 1873, which in 1900 had 7 departments, 900 students, 120 acres of land, 8 buildings, agricultural experiment farm, $1,800,000 in endowment and annuities, electrical laboratory (cost $40,000), 2 engineering laboratories (cost $120,000), and 10,000 volumes in its library. Near the city is the battle-ground where Gen. Harrison defeated the Indians under Tecumseh in 1811. The city originally derived its chief importance from being the head of navigation on the Wabash river, and then received an impetus which has sustained its growth since the abandonment of the upper Wabash as a channel of commerce. Pop. (1890) 16,243; (1900) 18,116. EDITOR OF "JOURNAL."

Lafayette: town; capital of Lafayette parish, La. (for location of parish, see map of Louisiana, ref. 10–D); on the Vermilion bayou, and the S. Pac. Railway; 60 miles S. W. of Baton Rouge. It is the seat of Mt. Carmel Convent, which has 10 instructors, over 150 students, and grounds and buildings valued at $15,000. The town is in a cotton-growing region, and has a weekly newspaper. Pop. (1880) 815; (1890) 2,106; (1900) 3,314.

La Fayette, MARIE MADELEINE PIOCHE DE LA VERGNE, Comtesse de: novelist; b. at Le Havre, France, in 1634. She received the best possible education, having among her teachers Ménage, Huet, and Segrais, and frequented the society of the Hôtel de Rambouillet. After her marriage with the Count of La Fayette (1655) she resided mainly in Paris. After 1665 a very strong attachment grew up between her and La Rochefoucauld, lasting till his death. D. in 1693. Her literary fame rests on her short stories, *Mademoiselle de Montpensier* (1662) and *La Comtesse de Tende* (about 1680), and her novels, *Zayde* (1670), published under the name of Segrais, and *La Princesse de Clèves* (1678), her masterpiece. These stories seek their interest in the study of passions and the analysis of conduct, and their brevity, directness, and simplicity are in great contrast to the long and involved novels of the time. She wrote also some memoirs: *Histoire de Madame Henriette d'Angleterre* and *Mémoires de la Cour de France, pour les années 1668 et 1689*. Cf. *La Princesse de Clèves, précédée d'une étude par M. de Lescure* (Paris, 1881); d'Haussonville, *Madame de La Fayette* (Paris, 1891). A. G. CANFIELD.

La Fayette, MARIE PAUL JEAN ROCH YVES GILBERT MOTIER, Marquis de: soldier; b. at the Château-Chavagnac, Auvergne, France, Sept. 6, 1757, of an ancient family. His father was killed at Minden, and on his mother's death in 1770 he fell heir to large estates; married in 1774 a granddaughter of the Duc de Noailles; entered the guards, and while a captain of dragoons in 1776 determined to join the Revolutionists in North America; fitted out a yacht at his own expense, and landed Apr. 24, 1777, near Georgetown, S. C.; served as major-general 1777–83 without pay, furnishing also clothing and camp equipage at his own expense to the needy patriots; was wounded at Brandywine, and fought with great honor at Monmouth; was in France 1779–80, where he induced the king to send Rochambeau to North America; conducted the campaign in Virginia, which ended so brilliantly in the siege and capture of Yorktown; and then returned to France; visited the U. S. again in 1784; exerted himself to procure the abolition of slavery in the French colonies, and freed and educated his own slaves at Cayenne; was in the Assembly of Notables, Paris, 1787; demanded the convocation of the States General, to which he was a deputy, 1789; became vice-president of the National Assembly, commandant of Paris, and chief commander of the national guards, which he organized, 1789; founded the Club des Feuillants 1790; protected the king and queen from the mob of Oct. 5 and 6; commanded successfully the army of Flanders 1792; denounced the Jacobins, from whom he escaped to Flanders, but was imprisoned for five years by the Austrians at Olmütz; was liberated by Napoleon, and returned to France in 1799, but would never become a partisan of Napoleon; lived principally upon his estate of La Grange; was in the French House of Representatives 1815; in the Chamber of Deputies 1818; visited the U. S. in 1824–25, and received a grant of $200,000 and a township of land; was chosen to the Chamber of Deputies 1827; took part in the revolution of 1830, and commanded the national guard, but not in person. La Fayette died in Paris, May 20, 1834. In France he was an ardent and consistent democrat, but he was ready to sacrifice his own preferences for the advantage of the public. Even his enemies admitted his perfect honesty, courage, and ability.—His son, GEORGES WASHINGTON LA FAYETTE (1779–1849), and his grandsons, OSCAR (b. 1816) and EDMOND (b. 1818), have figured in French politics as republicans.

Lafayette College: an institution of learning at Easton, Pa.; chartered in 1826, and opened in 1832. Its plan was very liberal for that date, and embraced, besides the ordinary college studies, modern languages, military science and tactics, and civil and military engineering. The first president was Rev. George Junkin, D. D., LL. D., who remained at its head, with a brief interval (1841–44), till 1848. The college suffered very much from lack of funds in the early years of the civil war, but under the presidency of Rev. William C. Cattell, D. D., LL. D. (1863–83), it began a career of remarkable growth. Recognizing the favorable situation for technical studies, Ario Pardee gave large sums of money for the development of the engineering and chemical branches, founding the Pardee School of Science in 1866, and as president of the board of trustees (1881–92) prosecuting the work. Under the presidency of Ethelbert D. Warfield, LL. D. (1891), there are now seven courses—classical; Latin and general; scientific; civil, mining, and electrical engineering; and chemical—leading to corresponding degrees. The faculty consists of 17 professors and 12 instructors. There are (1901) 372 students on the rolls. The buildings are 30 in number, beautifully located upon a campus containing about 40 acres, overlooking the confluence of the Delaware and Lehigh rivers. In addition to the original college building, South College, are Pardee Hall, the main scientific building, chemical laboratory, observatory, gymnasium, infirmary, dormitories, etc. There are fine athletic grounds and other adjuncts of a complete modern college. The college is under the general direction of the Presbyterian Church, through a self-perpetuating board of trustees, chiefly composed of alumni. The college property, at a conservative valuation, amounts to $1,000,000,

including buildings, the fine scientific equipment, libraries, and interest-bearing funds. ETHELBERT D. WARFIELD.

Lafayette Formation: in geology, a formation deriving its name from Lafayette co., Miss., where it is typically exposed; originally known as the Orange sands in the lower Mississippi valley and the Appomattox formation in the Middle Atlantic coast. It appears at the surface as a narrow belt on the Atlantic coastal plain, extending from Baltimore, Md., southward through Virginia and the Carolinas, and thence broadening westward to the lower Mississippi valley, and appears again in Texas. Its area is by estimate 200,000 sq. miles. The formation is composed principally of well-rounded quartzitic pebbles imbedded in orange-tinted loam. The rocks are not solidified, are of but slight economic importance, and, so far as known, contain no fossils. The formation varies in thickness up to about 100 feet, and overlaps terranes containing well-characterized Miocene fossils. It is considered the youngest member of the Neocene. Resting on the eroded surface of the Lafayette are Columbian and other Pleistocene deposits. Consult *Three Formations of the Middle Atlantic Slope*, by W. J. McGee in *American Journal of Science*, ser. 3, vol. xxxv. (1888), and *The Lafayette Formation*, by the same author, in *Twelfth Annual Report of the United States Geological Survey* (1890–91). ISRAEL C. RUSSELL.

Laffitte, läă'fēēt', JACQUES: statesman; b. at Bayonne, France, Oct. 24, 1767; son of a poor carpenter; went in 1787 to Paris; became in1788 a bookkeeper in the banking-house of Perregaux; was soon admitted to the firm; became a regent of the Bank of France 1809, and in 1814 its governor; was in the Chamber of Deputies 1816–17; acquired great reputation by his patriotic management of the public finances; became banker to Napoleon and Louis XVIII.; was widely beloved for his generosity, honesty, and constant devotion to the cause of good government, his own preferences being democratic; supported the revolution of 1830; was Minister of Finance 1830–31. D. in Paris, May 26, 1844.

Lafitau, läă'fēē'tō', JOSEPH FRANÇOIS: Jesuit missionary and author; b. at Bordeaux, France, in 1670. In 1712 he was sent to Canada, where he was stationed at the Iroquois mission of Sault St. Louis, making considerable excursions and becoming intimately acquainted with Indian character and customs. Returning to France in 1717, he published in 1724 his *Mœurs des Sauvages Amériquains*, which passed through several editions. In it he argues for the Asiatic origin of the American race. Parkman and others regard this as the best of the early works on the Indians. Lafitau also wrote *Histoire des Découvertes et des Conquêtes des Portugais dans le Nouveau-Monde* (2 vols., 1733), and a memoir on ginseng, which he believed he had discovered in Canada. D. at Bordeaux, July 3, 1746. H. H. SMITH.

Lafitte, JEAN: long popularly known as *The Pirate of the Gulf*; b. in France about 1780. Of his early life little is known; but he was attracted to the Gulf of Mexico soon after the cession of the territory of Louisiana by France to the U. S. in 1808. He first came into conspicuous notice as the head of a band of adventurers or privateers on the island of Grande Terre, about 35 miles W. of the mouth of the Mississippi. At first he sailed as a privateer under the French flag; but at a later period he took advantage of his opportunities, and captured whatever vessels came in his way, without regard to nationality. His cargoes were sold openly at Barataria, and thither the people of Louisiana resorted for profitable purchases. He successfully evaded an expedition sent against him in 1814, under Commodore Patterson. In September of the same year he was offered inducements to enter the service of Great Britain. Lafitte, however, sent the letters to the Governor of Louisiana, with the assurance that he would enter the service of the U. S. in case of pardon for past offenses. After some hesitation these terms were accepted. He not only was employed to occupy and defend the passes of Barataria Bay, but he fought with his men under Gen. Jackson in the battle of New Orleans, on Jan. 8, 1815. Though he was formally pardoned by President Madison in a proclamation issued Feb. 6, 1815, there are some reasons for thinking that he returned to his former life, with headquarters on Galveston island. He is believed to have perished at sea in 1817, but details in regard to his death are entirely wanting. He was handsome in person and had boundless influence over his men. See Latour, *War in Louisiana*; Gayarré, *Louisiana*; Parton, *Life of Jackson*; and *De Bow's Review* (vols. xii. and xix.). C. K. ADAMS.

Laflamme, läă'flăăm', TOUSSAINT ANTOINE RODOLPHE, D. C. L.: jurist; b. in Montreal, Canada, May 15, 1827; was educated at St. Sulpice College, and admitted to the bar in 1849. He became one of the editors of *L'Avenir*; in 1867 was elected president of the Institut Canadien, Montreal; has been Professor of the Law of Real Property in McGill University; declined a puisne judgeship in the Supreme Court in 1875. He was Minister of Inland Revenue in 1876; Minister of Justice 1877–78, and represented Jacques Cartier County in Parliament 1872–78. NEIL MACDONALD.

La Flèche, laa-flesh': town; in the department of Sarthe, France, on the left bank of the Loire; has manufactures of paper and leather, and a brisk trade in grain, wine, wax, cattle, and fowls (see map of France, ref. 4–D). The palace, which was built by Henri IV., and which for some time belonged to the Jesuits, who here had a celebrated school, is now used for a school of artillery. It contains a picture gallery and a library of 20,000 vols. Pop. (1896) 10,477.

La Fontaine, laa-fōñ'tān', JEAN, de: poet and fabulist; b. at Château-Thierry, Champagne, France, July 8, 1621. His family, though not noble, was of good standing, and his father held the office of *maître des eaux et forêts*. In 1641 he began the study of theology, but abandoned it eighteen months later. The dreamy temperament and the utter indifference to responsibility that marked his whole life showed themselves from the first, and he began to live freely and carelessly to his own pleasure, which he found partly in literature. Neither office, which his father gave up to him in 1643, nor marriage, which his father arranged for him in 1647, changed his irregular and improvident mode of life. His literary beginnings were slow. A poetical adaptation of the *Eunuchus* of Terence (1654) had and deserved little success. In 1658 he composed a narrative poem, *Adonis*, and dedicated it to Fouquet. Presented to that minister by a relative, he was received into his household. Thereafter he continued to live on the bounty of patrons, who provided for him somewhat as for a child. On the disgrace of Fouquet, to whom he remained frankly loyal, the Duchess of Bouillon (1662), the Duchess of Orleans (1667), Mme. de la Sablière (1671), and Mme. d'Hervart (1693) became in turn his protectors. To please the Duchess of Bouillon he began to write his *Contes et nouvelles en vers*, the first two collections of which appeared in 1665 and 1666. These revealed his special talent for story-telling and made his reputation, and he continued to add to them during the rest of his life. They were short tales in verse which recall the *fabliaux* of the Middle Ages, the *Decameron* of Boccaccio, and the *Heptameron* of Marguerite of Navarre, from which sources his matter is in part borrowed. They are frankly licentious, one series having been forbidden by the censor (1675), but are told with a graceful and nimble art. The first collection of the fables, containing those that now form the first six books, appeared in 1668, dedicated to the dauphin. In these he does not widely depart from the manner of Æsop and Phædrus, from whom the subjects of more than 100 of the 122 are taken. In the second collection (1678), comprising five books, and the third, making a twelfth book (1694), he drew his materials more largely from the fables of Bidpai, from Abstemius, from miscellaneous sources, and from his own invention, and especially treated his materials more freely, giving wider scope to his observation and fancy. He was admitted to the Academy in 1684. D. Apr. 13, 1695. Although he produced much in many fields, as the plays *Clymène* (1660) and *Galatée* (1682), the dramatic satire *Le Florentin* (1685), the operas *Daphné* (1679) and *Astrée* (1691), occasional poems, as *Élégie aux Nymphes de Vaux* (1661), *La Quinquina* (1682), and *Discours à Mme. de la Sablière* (1684), and, better remembered, the story in prose and verse *Les Amours de Psyché* (1669), he is read and prized pre-eminently as a fabulist. In his fables human nature and conduct are observed with power and portrayed with great naturalness, simplicity, grace, spirit, and variety. A supple and alert versification adds to their effect. La Fontaine is easily the master of modern times in this field. The best editions of his works are those of Walckenaer (6 vols., 1822–23); Marty-Laveaux (4 vols., 1857–60); Moland (7 vols., 1872); and Regnier (Édition des Grands Écrivains), 11 vols., 1883–93). Cf. Saint-Marc Girardin, *La Fontaine et les Fabulistes* (Paris, 1867); H. Taine, *La Fontaine et ses fables* (Paris, 7th ed. 1879). A. G. CANFIELD.

Lafontaine, Sir LOUIS HIPPOLYTE: statesman; b. at Boucherville, Lower Canada, in Oct., 1807; became a prominent advocate and politician. He was accused in 1837 of

sympathy with the insurgents, a reward was offered for him, and he escaped to Europe, but was recalled, and became Premier of Canada for some time, resigning his office in 1851. In 1853 he became chief justice of the queen's bench, a baronet in 1854, and died in Montreal, Feb. 26, 1864.

La Fourche, laa-foorsh′: a bayou in Southeastern Louisiana, an outlet of the Mississippi, which begins at Donaldsonville on the right bank, and flows S. E. through the parish of La Fourche Interior to the Gulf of Mexico, with a total length of 150 miles. It is navigable by steamboats for about 100 miles from its mouth, and is one of the principal channels of communication between the Gulf and the interior. Great crops of sugar and cotton are raised in the region through which this bayou flows.

Lafuente, laa′fwān′tā, Modesto: critic and historian; b. at Rabanel de los Caballeros, Palencia, Spain, May 1, 1806. He studied philosophy and theology at León and the University of Santiago de Compostela, and in 1830 became Professor of Rhetoric, subsequently of Philosophy, at Astorga. In 1838 he removed to Madrid, and became a journalist and critic. Under the names *Fray Gerundio* and *Tirabeque* he published in periodical form various series of critical and satirical essays—*Colección de Capilladas y Disciplinazos* (16 vols.); *Viaje por Francia, Bélgica y Alemania* (2 vols.); *Viaje aerostático*; *Teátro social del siglo XIX.* (2 vols.); *Revista Europea* (4 vols., 1844–50). His chief work was *Historia generál de España*, begun in 1850 and completed in 1862 (2d ed. 26 vols., 1874). D. Oct. 25, 1866.

A. R. Marsh.

Lagarde, Paul Anton, de: textual critic; b. in Berlin, Prussia, Nov. 2, 1827; studied in Berlin and Halle; returned as teacher to Berlin in 1854, and in 1869 was made Professor of Oriental Languages in Göttingen and there died Dec. 22, 1891. He published *Analecta Syriaca* (Leipzig, 1858); *Titi Bostreni quæ servata sunt* (1859); *Constitutiones apostolorum græce* (1862); *Clementina* (1865); and many similar works of interest and importance, including elaborate preparations for a critical edition of the Septuagint. A complete list down to 1890 will be found in vol. iv. of the *Schaff-Herzog Encyclopædia*. His library is now the property of the University of the City of New York.

La Gasca, Pedro, de: See Gasca.

Lager Beer: See Beer.

Lagoa dos Patos, laă-gō′ăă-dōs-paa′tōs: the largest lake in Brazil; in the eastern part of the state of Rio Grande do Sul; length from N. E. to S. W. 144 miles; greatest breadth, 41 miles. It is parallel to the Atlantic coast, from which it is separated only by a narrow region of sand-dunes and swamps. At its southern end it narrows eastward to a channel called the Rio Grande do Sul, about 50 miles long, but only river-like for about 20 miles above its mouth. The lake itself is mostly shallow, but there is a navigable channel for deep-draught vessels. At its northern end it receives the river Jacuhy (*q. v.*), or Guahyba. The Lagoa Mirí, to the S. W., and partly in Uruguay, is about half as large as the Lagoa dos Patos, into which it empties by a navigable channel, the Rio São Gonçalo, about 45 miles long. Both these lakes have evidently been formed by the cutting off from the ocean of an old indentation of the coast. At present their only outlet is the Rio Grande, and even this is obstructed by a shifting bar. Tides are felt in the lower part of the Lagoa dos Patos, but salt water rarely enters the lake proper. See H. von Ihering in *Deutsch. geogr. Blätter* (Bremen, 1885, p. 164, *et seq.*). Herbert H. Smith.

Lagoa Mirí: See Lagoa dos Patos.

Lago Maggiore, laa′gō-maăd-jō′rā [Ital., Greatest Lake; *La′go* < Lat. *la′cus*, lake + *maggio′re* < Lat. *major*, greater]: the longest of the lakes of Northern Italy; situated between Piedmont, Lombardy, and the Swiss canton of Ticino, and traversed, or rather formed, by the river Ticino, which carries its waters to the Po; is 39 miles in length, and varies from half a mile to 5½ miles in breadth, and is remarkable for the beauty of its scenery, wild, rugged granite mountains alternating with vineclad hills.

Lagomy′idæ [Mod. Lat.; liter., those belonging to the hare-mouse tribe; Gr. λαγώς, hare + μῦς, mouse + patronymic ending -ίδαι, plur. of -ίδης, descended from]: a family of mammals of the order Rodentia (*q. v.*); externally resembling a guinea-pig, and to some extent a rabbit, having a squat body, with the hinder limbs not very greatly exceeding the fore ones, the back arched, and the buttocks projecting backward; the head is deep, but the profile scarcely arched backward; the eyes small, the snout hare-like, the ears short, and the tail almost wanting. The skull is depressed. The teeth have four upper and two lower incisors characteristic of the Duplicidentati, and five molars in each jaw, mostly provided with vertical grooves on the outer as well as inner surface. The clavicles are wanting. This family includes a few species combined in one genus (*Lagomys*, Cuv.), which was formerly associated with the hares and rabbits in the same family; but the numerous differences between the two groups have caused modern mammalogists to separate them. The *Lagomyidæ* are of smaller size than most *Leporidæ*, the largest not exceeding the guinea-pig in size; they inhabit cold mountain regions, and species are found in Northern Asia and Eastern Europe, as well as the Himalaya Mountains and the Rocky Mountains, the best known among the latter being the little chief hare, *Lagomys princeps* of Richardson.

Theodore Gill.

Lagoon′ or **Ellice Islands**: a group of Polynesian coral islands, claimed by the British. They lie between 5° 30 and 11° 20′ S. lat., and 176° and 180° E. lon., between the Gilbert and Fiji islands. They consist of nine islands and several islet groups, with a total population of about 2,500. The principal island is Ellice, near the center of the group.

M. W. H.

Lagos, laa′gōs, or **San Juan de los Lagos**: a city in the northeastern part of the state of Jalisco, Mexico; on the Mexican Central Railroad; 120 miles E. N. E. of Guadalajara, and 295 miles by the railway from Mexico; 6,153 feet above the sea (see map of Mexico, ref. 6–F). It is celebrated for its fairs held in December. In the vicinity there are extensive deposits of iron ore and opal mines. Lagos was founded about 1570. Pop. (1889) 13,500. H. H. S.

La′gos: a British crown colony and protectorate, on the Slave Coast, Gulf of Guinea, West Africa. Area (1891), 1,069 sq. miles; since enlarged (1,500 sq. miles) by small territories secured by treaties with chiefs along the east frontier of Dahomey (see map of Africa, ref. 5–C). Lagos was secured by Great Britain (1861) for the special purpose of giving its merchants facilities for the palm-oil trade. Until 1886 it formed a dependency of the Gold Coast. Pop. (1897) about 2,000,000. The city of Lagos, at the mouth of the Ogun river, affords the only natural harbor along 1,000 miles of the coast. Pop. (1897) 32,500. The value of the trade between Europe and Lagos is about £1,400,000 a year, though most of the roads and rivers to the interior are still kept closed by the Mohammedans living inland. C. C. Adams.

Lago′tis [Mod. Lat.; Gr. λαγώς, hare + οὖς, ὠτός, ear], or **Lagid′ion** [Mod. Lat. = Gr. λαγίδιον, dimin. of λαγώς, hare]: the name of two small rodents, known as mountain viscachas, and related to the chinchillas. They are about the size of rabbits, burrow among the rocks, and are found on the western slope of the Andes in Chili, Peru, and Ecuador. F. A. L.

La Grande: city; Union co., Ore. (for location of county see map of Oregon, ref. 2–I); on the Union Pac. Railway; 50 miles S. E. of Pendleton. It is in a rich mining, lumbering, and agricultural region, in the western half of the Grande Ronde valley, and ships large quantities of lumber, grain, and live stock. It has water-works, electric lights, machine-shops, and three weekly newspapers. Pop. (1880) 836; (1890) 2,583; (1900) 2,991.

Editor of "Gazette."

La Grange: city; capital of Troup co., Ga. (for location of county, see map of Georgia, ref. 4–F); on the Atlantic and West Point and the Ga., S. and Fla. railways; 71 miles S. W. of Atlanta. It has 5 churches for white people and 3 for colored, a high school, and 2 colleges for whites and 2 colleges for colored, cotton-factory, oil-mill, ginnery, iron-foundry, plow-factory, and 2 weekly newspapers. Pop. (1880) 2,295; (1890) 3,090; (1900) 4,274.

Editor of "Reporter."

La Grange: town; capital of La Grange co., Ind. (for location of county, see map of Indiana, ref. 1–F); on the Gr. Rapids and Ind. Railroad; 45 miles N. W. of Fort Wayne. It is in a farming section, and has a variety of manufactures and four weekly newspapers. Pop. (1890) 1,784; (1900) 1,703.

La Grange: city (incorporated in 1853); Lewis co., Mo. (for location of county, see map of Missouri, ref. 1–H); on the Mississippi river, and the St. L., Keo. and N. W. Railroad; 11 miles N. of Quincy, Ill., 175 miles N. by W. of St. Louis. It has important manufactures, a large river commerce, and a weekly and a quarterly periodical, and is the seat of La Grange College (Baptist, chartered 1859), which

has 6 instructors, over 200 students, and grounds and buildings valued at $30,000. Pop. (1880) 1,336; (1890) 1,250; (1900) 1,507.

La Grange: city; capital of Fayette co., Tex. (for location of county, see map of Texas, ref. 5–I; on the Colorado river, and the Mo., Kan. and Tex. and the S. Pac. railways; 75 miles S. E. of Austin. It contains 5 churches, high school, several private schools, cotton-compress, oil-mill, carriage and wagon shops, and 4 weekly newspapers, and handles large quantities of cotton and corn. Pop. (1880) 1,325, (1890) 1,626; (1900) 2,392.

EDITOR OF "FAYETTE COUNTY DEMOCRAT."

Lagrange', JOSEPH LOUIS: geometer; b. at Turin, Italy, Jan. 25, 1736. At the age of nineteen he was made a Professor of Geometry in the Royal School of Artillery, Turin. In 1766 he was invited to Berlin by Frederick II. to succeed Euler as mathematical director of the Academy, of which he was made president. Here he wrote his *Mécanique Analytique*. After the death of Frederick (1786) he received invitations from the sovereign of his native Sardinia, as well as from those of Naples and Tuscany, but ultimately accepted one in 1787 to take up his residence at Paris (receiving a pension from the Academy, of which he had been elected in 1772 a foreign associate), where the rest of his life was passed. D. in Paris, Apr. 10, 1813.

The method of the Variation of Parameters, expounded to a certain point by Euler, but perfected by Lagrange, is one of his important contributions to analytical mechanics. The ellipse which a planet would describe around the sun were there no other attraction undergoes fluctuations of form by attractions of other heavenly bodies. The essence of the method in question is that, holding fast to the idea of the simple curve—the ellipse—though it be never realized, the actual motion of the body is conceived to be on an elliptic curve, the parameters (or elliptic elements) of which are ever varying through the disturbing action of foreign attractions. To subject this motion, which under the name of "revolving orbits" had its origin with Newton, to analytical calculation, and to determine the influence of each planet in disturbing the elliptic motion of others, was the problem, the solution of which is in great degree due to Lagrange. As a natural sequence to this problem arising out of this perpetual change in the planetary orbits comes the greater problem of the stability and permanence of the solar system, the establishment of which is Lagrange's greatest achievement. The orbits being thus in constant fluctuation, it is of the highest interest to know whether the resulting changes necessarily will be limited in amount, or whether they will increase progressively until the stability of the solar system shall be destroyed.

Lagrange demonstrated (though Laplace had preceded him with a partial demonstration) that the fluctuation of the orbital elements is limited to small amounts, and is periodic, extending, however, through long periods of time. Thus, e. g., the eccentricity of the earth's orbit, now diminishing, will continue to do so for 24,000 years, and then begin to increase. At the same time the apsides and nodes are in motion. The grand cycle of the earth's perihelion, which coincided with the vernal equinox 4089 years B. C. (about the date chronologers assigned to the biblical account of the creation), will be completed in 110,000 years. His complete works were reprinted by the French Government in thirteen volumes during the years 1869–89, under the general title of *Œuvres de Lagrange*.

Revised by S. NEWCOMB.

La Grita, laa-gree'tăă: a city in the southern part of the state of Los Andes, Venezuela; 56 miles from the frontier of Colombia; in a beautiful valley 4,905 feet above the sea. Pop. (with the district) 10,500. It is surrounded by coffee-plantations, and exports coffee, cacao, etc. Mines of copper and coal are reported from the vicinity. La Grita is celebrated for its delightful climate (mean temperature 66° F.). It was founded in 1576, and was the scene of a victory over the Spaniards in 1813. H. H. S.

La Guaira, laa-gwī'răă: a city of Venezuela; the most important port of the republic; on the Caribbean Sea; less than 7 miles in a direct line nearly N. of Caracas, but separated from it by the mountain-wall of the Silla (see map of South America, ref. 1–D). The mountains rise precipitously from the shore, leaving a strip from 700 to 1,000 feet wide, on which La Guaira has been built in two long streets, with outlying houses where the rocky slopes permit their erection. Owing to the reflection from the rocks and sand, and to the cutting off of the cool land-breezes, the heat is very great, though exceeded by other places on the coast and llanos; the mean annual temperature is 82·6° F., and the oppression is increased by the great humidity and by the slightness of the fall (5·4°) at night. The port is an open roadstead, much exposed to the waves, and formerly communication between ships and shore was troublesome, and often interrupted; but in 1891 a breakwater was finished at a cost of nearly $5,000,000, and this gives shelter to a limited number of vessels, steamers loading directly from jetties. The city also has been greatly improved, the former unsightly squares cleaned and ornamented, and a good water-supply furnished. The old stage-road to Caracas, 23 miles long, has been supplanted by a railway which ascends the mountains by a tortuous route, with a grade, in parts, of 3·5 per cent., affording magnificent views. Another railway, 3 miles long, runs along the shore eastward to Macuto, a popular resort for bathing. La Guaira exports coffee, cacao, hides, etc., and imports nearly all classes of goods for the Caracas markets. It is connected by cable with Cuba and Florida. The city was founded in 1588. It was sacked by filibusters in 1595 and by the French in 1680, but in the eighteenth century it repulsed several attacks from the British and Dutch. During the war for independence it was a point of great importance. The city was completely destroyed by the earthquake of Mar. 26, 1812, which also overwhelmed Caracas. Pop. (1892) about 14,000. See LA GUAIRA in the Appendix. HERBERT H. SMITH.

La Guéronnière, laa-gā'rō'ni-ār', LOUIS ÉTIENNE ARTHUR DEBREUIL HELION, Vicomte de: diplomat and publicist; b. in Limoges, France, in 1816. In 1850 he became chief editor of the *Pays*, and attracted great attention by his *Portraits politiques* of Louis Napoleon and the Comte de Chambord. After the *coup d'état* of Dec., 1851, he became a decided supporter of Napoleon, was elected a deputy, became a member of the Conseil d'État (1853), and took charge in the Ministry of the Interior of the delicate relations of the Government to the press and to literature, in which capacity his conciliating manners enabled him to discharge his functions with advantage. In 1861 he was made senator, and became one of the most popular orators, especially on the questions relating to Italy and to home government. In 1868 he was made ambassador to Belgium. As a writer, he became the most trusted agent of the Napoleonic policy, and his pamphlets (*brochures*) were often the first indication of coming events. D. in Paris, Dec. 23, 1875.

Laguna: See KERESAN INDIANS.

La Hague, Cape: See CAPE LA HAGUE.

La Harpe, laa-aarp', FRÉDÉRIC CÉSAR, de: patriot; b. at Rolle, Vaud, Switzerland, in 1754; studied law at the University of Tübingen; became tutor to a young Russian nobleman, with whom he traveled through Italy and France, and was recommended by Baron Grimm to Catharine II., who appointed him tutor to her two grandsons, Alexander and Constantine. His enthusiasm for the French Revolution made his stay in Russia somewhat difficult, and in 1793 he left the country, but received a pension for life, and resided partly in Geneva, partly in or near Paris, until 1814. He supported the revolution in Switzerland in 1797 that led to the establishment of the Helvetian republic, and was a member of the Swiss Directory 1798–1800. On his visit to Paris the Emperor Alexander received his former tutor with great esteem, made him a Russian general, and exercised through him considerable influence on the political reorganization of Switzerland. In 1817 he returned to Lausanne. D. Mar. 30, 1838. Revised by C. H. THURBER.

La Harpe, JEAN FRANÇOIS, de: b. in Paris, France, Nov. 20, 1739; made his *début* as a poet in 1759 with a volume of *Heroïdes*; wrote *Warwick* (1763), *Timoléon* (1764), and two other tragedies; became in 1768 literary critic on the *Mercure de France*; gained several prizes from the Academy; obtained praise by a drama, *Mélanie, ou la Religieuse* (1770); was elected member of the Academy (1776), and in 1786 appointed Professor of Literature at the newly established Lycée. Here large audiences gathered year after year to hear his lectures on literature, from which originated his best work, *Cours de la littérature ancienne et moderne* (16 vols., 1799–1805). He joined the Revolution with enthusiasm, and lectured with the red cap on his head; was nevertheless arrested and kept in prison for some time, which wrought a singular change in him; the philosopher of the school of Voltaire became a fervent Catholic. As a

poet, La Harpe is entirely forgotten, but his *Cours de la littérature* is still an interesting and instructive book, in spite of the superficiality and harshness with which some parts are treated. D. Feb. 11, 1803. Revised by A. G. Canfield.

Lahire, Lorent de: See Hires.

Lahontan, Lake: the name given to a body of water which in the Pleistocene period occupied the western depression in the Great Basin of Utah and Nevada, while Lake Bonneville (*q. v.*) occupied the eastern depression. Lahontan, named after an early explorer of the region, was an extremely irregular lake, rising among the mountain ranges, many of which then formed islands or long narrow promontories. The shores, cliffs, bars, and deltas of the lake are still distinctly perceptible; the lake bottom is now a series of desert plains between the mountain ranges, with salt-lakes and muddy *playas* occupying its lowest depressions. Judging by the deposits formed in the expanded lake, there were here, as in Lake Bonneville, two epochs of high water, separated as well as preceded and followed by relatively arid epochs. It is plausibly supposed that these humid lacustrine periods were contemporaneous with the glacial epochs of the northeastern part of the country. W. M. Davis.

Lahore: the principal city of the Punjaub, British India; on the western bank of the Ravi, in lat. 31° 36′ N., and lon. 74° 18′ E. (see map of N. India, ref. 4–C). The city is surrounded by a high brick wall, and consists mostly of narrow, dirty, and overcrowded streets between high houses which present only bare walls toward the streets. It has many magnificent Mohammedan mosques and Hindu temples, and its extensive bazaars are well stocked. Outside the wall are other fortifications, stretching 7 miles in circuit, inclosing beautiful and luxuriant gardens and promenades, interspersed with large monuments and ruins of the former splendor of the city, when it was the residence of the Mogul emperors and had 1,000,000 inhabitants. Since 1849 it has been a British possession. Pop. (with the suburbs) 176,854. The city gives its name to a civil division of the British territory in that province, and to the headquarters district of the division. The division has an area of 8,961 sq. miles.

Lahsa, or **El-Ahsa** (the latter word in Arabic meaning land where water sinking through the surface is retained by a lower layer): a territory in Arabia; included between Asiatic Turkey, the Persian Gulf, Oman and Nedjed. It is generally sterile, hot, and without water, but dotted with oases, in which wheat, millet, fruits, and garden vegetables grow plentifully. Camels (many thousands of which are annually sold to Syria and other parts of Arabia), horses, and dates furnish the principal sources of revenue. The aba, a coarse over-garment, is made in great quantities. Since 1819, when the Ottomans occupied part of the region after the war with the Wahabees, a small tribute is nominally paid the sultan. The chief towns are El-Katif and Ras-el-Khyma. Pop. about 160,000. Edwin A. Grosvenor.

Lai'bach, or **Laybach**: capital of the duchy of Carniola, Austria; beautifully situated on a plain on a river of the same name, on the road from Vienna to Trieste (see map of Austria-Hungary, ref. 7–D). It is an old town, with some manufactures, a considerable trade, many good educational institutions, and several interesting buildings; as, for instance, the Cathedral of St. Nicholas, the Gothic town-house, the castle, and the palace of Count Auersberg. The town is noted as the place where the congress of the great powers was held in Jan., 1821, to consider the revolution in Italy. Here and at Troppau, where the congress began its sessions, the policy of the Holy Alliance was fully carried out. Austrian intervention was authorized, and a large force entered Italy and restored the old order of things. Pop. (1890) 30,505.

Laidlaw, lād'law, John, D. D.: a minister and professor in the Free Church of Scotland; b. in Edinburgh, Apr. 7, 1832; was educated at Edinburgh University, Reformed Presbyterian Divinity Hall, Glasgow, and New College, Edinburgh; was minister of the Free Church at Bannockburn 1859–63, at Perth 1863–72, and at Aberdeen 1872–81; Professor of Systematic Theology at New College (Free Church), Edinburgh, since 1881. Dr. Laidlaw has published *The Bible Doctrine of Man*, Cunningham lectures, 1878 (Edinburgh, 1879; 2d ed. 1894); *The Miracles of our Lord* (London, 2d ed. 1890; New York and Toronto, 1892); and has edited *Memorials of Rev. John Hamilton* (Glasgow, 1881) and *Memorials of a Ministry*, that of Rev. E. A. Thomson (Edinburgh, 1891). C. K. Hoyt.

Laing, Malcolm: historian; b. on the island of Mainland, Orkneys, in 1762; studied at the University of Edinburgh, and was called to the bar in 1785, but devoted himself chiefly to literature. He wrote a continuation of Henry's *History of Great Britain* (1785), and a *History of Scotland from the Union of the Crowns to the Union of the Kingdoms* (1800), with dissertations on the Gowry conspiracy and on the Ossian poems, adding in the second edition an essay arguing the guilt of Mary Queen of Scots in the murder of Darnley. He was elected a member of Parliament in 1807, and died in the Orkneys in Nov., 1818.

Laird. David: statesman; b. at New Glasgow, Prince Edward Island, Canada, Mar. 12, 1833; educated at Presbyterian Seminary, Truro, Nova Scotia; engaged in journalism, and since its establishment editor of *The Patriot* of Charlottetown. He was a member of the executive council of Prince Edward Island 1872–73, and while holding that position was a delegate to Ottawa to negotiate terms of union with the Dominion Government; held the portfolio of Minister of the Interior 1873–76, and was Lieutenant-Governor of Northwest Territories 1876–81. In 1874 as a commissioner he concluded with certain Indian tribes in the Northwest a treaty whereby they surrendered a tract of country comprising 5,000 sq. miles. Neil Macdonald.

Laissez Faire, lā'sā'fār': See Political Economy.

Lajard, lāā'zhaar', Jean Baptiste Félix: archæologist; b. at Lyons, France, Mar. 30, 1783; accompanied as secretary a mission to Persia in 1807; became interested in the study of Oriental religions and Oriental influences upon ancient Greece, and made a fine collection of cuneiform cylinders, which were obtained by the Imperial Library. He occupied diplomatic posts in Persia, Greece, Russia, and Denmark, and was afterward in the public service at Marseilles; was elected in 1830 a member of the Academy of Inscriptions. Of his numerous and learned miscellaneous writings, the most important is the *Recherches sur le Culte public et les Mystères de Mithra en Orient et en Occident* (Paris, 1847–48). D. at Tours in Sept., 1858.
Revised by Benj. Ide Wheeler.

Lake, Gerard, Viscount: general; b. in England, July 27, 1744; entered the army in 1758; served in the closing campaigns of the Seven Years' war, in the American war (1781), and in Holland under the Duke of York in 1793–94; rose to the rank of general; was commander-in-chief in Ireland during the insurrection of 1797–98; defeated the rebels and recovered Wexford June 21; defeated the French troops under Humbert at Killala, Sept. 8; was made commander-in-chief in India in 1800; conducted the Mahratta war (1803) with brilliant success, taking Delhi (Sept. 12), Agra (Oct. 17), and winning the decisive victory of Laswari (Nov. 1), which brought the Mogul emperor into vassalage to Great Britain, for which he was made (Sept. 1, 1804) Baron Lake of Delhi and Laswari. He defeated Holkar near Bhartpur Apr. 2, 1805; returning to England in 1807 was made viscount (Oct. 31), and was appointed governor of Plymouth, where he died Feb. 20, 1808. The title became extinct by the death of the third viscount, June 24, 1848.

Lake Champlain: See Champlain, Lake.

Lake Charles: town; capital of Calcasieu parish, La.; on the Calcasieu river, and the Kan. City, Watkins and Gulf and the S. Pacific railways; 30 miles N. of the Gulf of Mexico, 145 miles E. of Houston (see map of Louisiana, ref. 10–B). It contains a large rice-mill, ice-factory, sugar-factory, several saw, shingle, and wood-working mills and carshops, and has water-works, electric lights, 3 banks, and 4 weekly newspapers; and is the seat of Lake Charles College (undenominational), opened 1890. Pop. (1880) 838; (1890) 3,442; (1900) 6,680. Editor of "American."

Lake City: town (originally an Indian settlement; founded as a military and trading post about 1836); capital of Columbia co., Fla. (for location of county, see map of Florida, ref. 2–I); on the Fla. Cent. and Pen., the Ga. S. and Fla., and the Savannah, Fla. and W. railways; 60 miles W. of Jacksonville, 105 miles E. of Tallahassee. It derives its name from a number of picturesque lakes which surround it, and is the seat of the State Agricultural College and of the agricultural experiment station. It is in a fertile region; is center of Florida Sea island cotton industry; and has large phosphate, lumber, and turpentine interests. Pop. (1880) 1,379; (1890) 2,020; (1900) 4,013.
Editor of "Tobacco Plant and Columbia Co. Citizen."

Lake City: town; Calhoun co., Ia. (for location of county, see map of Iowa, ref. 4–E); on Lake creek, and the Chi. and N. W. Railway; 27 miles S. W. of Fort Dodge, 75 miles N. W. of Des Moines. It is in an agricultural region, and has two weekly newspapers. Pop. (1880) 249: (1890) 1,160; (1900) 2,703. EDITOR OF "BLADE."

Lake City: city: Wabasha co., Minn. (for location of county, see map of Minnesota, ref. 10–G); on Lake Pepin, an enlargement of the Mississippi river, and the Chi., Mil. and St. P. Railway; 93 miles S. E. of St. Paul. It is in an agricultural region; has steam-elevators, saw-mills, flour-mills, foundry, machine-shops, and plow and wagon factories; and contains a public library, 2 State banks with combined capital of $100,000, a private bank, and 2 weekly newspapers. It is in the midst of beautiful scenery, and is a popular summer resort. Pop. (1880) 2,596; (1890) 2,128; (1900) 2,744.

Lake-dwellings (called by archæologists *palafittes*, *pfahlbauten*, or *pile-buildings*): dwellings, sometimes forming villages, constructed on piles or on fascines over marshes, the shallow waters of inland lakes, or along the margins of great rivers or estuaries. Remains of such dwellings have been found in many countries. So numerous were such structures in the Gulf and Lake of Maracaibo, along the Orinoco, and in other parts of Venezuela, that in allusion thereto the early Spanish explorers named that province "Little Venice." The houses of these water-villages were supported by lofty piles on separate platforms or floors of split logs, connected with one another by bridges of similar construction. Each house consisted of two rooms, with floors of matting and low sloping roofs of thatch. These houses were reached from the shore in dugout canoes, and entered by means of long, notched step-logs. Very similar, although more compact, villages are found in New Guinea, in the lakes of Central Africa as well as on the Gold Coast, in the Celebes, the Caroline islands, and in Borneo and Southern Asia.

Both Hippocrates and Herodotus, writing in the fifth century B. C., mention pile-dwellings; the former referring to villages built over the shoals of the river Phasis, the latter to the Præonians, true lake-dwellers those—who, having their village far out over the waters of Lake Prasias, connected with the shore by only a long, narrow bridge, were able to defy even Darius and his army—everywhere else victorious—when he invaded Thrace. The platforms on which their dwellings were built were furnished with trap-doors, through which, by letting down baskets, the people caught fish, and we are told that they tethered children by the feet to keep them from falling into the water, and kept cattle, feeding them in part on fish. Curiously enough, Roumanian fishermen inhabit wooden huts similarly supported over the waters of the same lake to this day.

Lake-dwellers are mentioned, although less specifically, by ancient writers of the Orient; and on the bas-reliefs of Assyria such people and their villages have been found characteristically depicted. The Celtic peoples of Western Scotland and Ireland inhabited crannogs, or defensive lake-villages, from post-Roman times to the sixteenth century, though more in the nature of artificial islands stockaded and transfixed by piles than of pile-dwellings proper.

In 1829 numerous piles, apparently artificial, were discovered in Lake Obermeilen, near Zurich, but it was not until the winter of 1853–54 that their true nature as the remains of pile-buildings was revealed. That winter followed a drought of unusual severity, and was so cold that the lakes were frozen to the bottom except in parts, causing the waters to recede so far that an effort to reclaim some of the land thus laid bare was made by dwellers along the shore, and many piles and relics of a stone-age people were thus discovered. These discoveries were followed up first by Dr. Ferdinand Keller, of Zürich, and subsequent researches revealed the fact that many lakes and marshes throughout the continent of Europe, generally, had at one time contained extensive pile-villages. The most noteworthy of these settlements were in the Alpine lakes of both Switzerland and Northern Italy. In Zurich, Neuchâtel, Constance, Bienne, Geneva, Morat, and other Swiss lakes alone, more than two hundred such villages have been explored, from twenty to fifty (as in Neuchâtel) having been found in each of the above-named lakes. The village of Wangen, in the Lake of Constance, was supported by a parallelogramic platform at least 2,000 feet in length by 350 feet in width, while that of Sutz, in the Lake of Bienne, measured more than 960 sq. rods, or nearly 262,000 sq. feet, and was connected with the land by a pile-supported bridge or gangway, 300 feet long and 40 feet wide. These villages were constructed in various ways. Usually piles from 8 to 10 and 12 feet long, sharpened by hacking or with fire, were driven into the bottoms of the lakes from 3 to 5 feet apart. On the tops of these beams were fastened, either with wooden pins or by mortising, and over them platforms of closely laid, undressed logs or of riven boards were laid. The piles were sometimes further stayed by cross-pieces or poles notched into them and pinned below. In some cases, where the bottoms of the lakes were soft or yielding, the village platforms were supported on stacks of brush-wood and trees, or fascines of faggots laid across one another horizontally and pinned down with piles or ballasted with stones or layers of clay and gravel. Less frequently large square frames of logs were made, to be laid along the bottoms, and upright posts mortised into them, and on these the superstructures were reared. On the other hand, when the lake bottoms were hard or stony, the ends of piles were simply rested on them and held in place by heaps of stones. However held up, each of the platforms was coextensive with the whole village—the huts being built in rows upon it, rarely more than 3 or 4 feet apart from one another. These huts were square, the walls made of posts or longer piles wattled with osiery and plastered with clay, as were also the floors, which were skirted usually with actual mop-boards. The rooms were provided with square hearths made of stone slabs, and were from 12 to 30 feet in length and from 10 to 20 feet in width. The roofs were of thatch, also weighted down with stones, or bound with poles.

Some of the villages were reached by gangways connecting with the mainland, and there is evidence that in many cases at least these were provided with drawbridges, which could be lifted up in times of danger or at night. Other towns were approached only in dugout canoes, several of which have been found, ranging in size from 10 to 40 feet in length by from 18 inches to 4 feet in width amidships.

The relics found under the sites of these ancient lake-dwellings are of immense variety, and so numerous that nearly all the great museums of the world and many private collections have been supplied with a series of them. A study of these relics makes it evident that these Swiss lakes were occupied by the same people for thousands of years, during which time they passed from a comparatively rude, but in some respects remarkably advanced, condition of the stone age, into that of the bronze age, and in the latest villages even into that of the iron age, corresponding to the semi-historic period of Europe; also that the lake-dwellers were not a peculiar race, but belonged to the prehistoric nations which peopled the mountains and mainlands of Central Europe generally.

The oldest station was that of Lake Mosseedorf, near Berne, which has furnished the most complete collections representing the stone-age period of the lake-dwellings yet found. Evidently, like many of the later villages, it was destroyed by fire; and to this we owe the representative character of the relics found in the lake bed where it stood. In this stone hammers, picks, celts or hatchets and chisels, knives, arrow and spear heads of flint, saws toothed with flakes set in wood with asphalt, horn and bone tools in great variety, including harpoons of stag-horn, fish-hooks made of boar's tusks, and a skate made from the leg-bone of a stag, were discovered. Rather rude but diversified vessels of earthenware also were found in abundance. The people had already advanced to a fair state of barbaric society; for the remains of grains—wheat, barley, millet, flax seed, of apples, service berries and other fruits—and the bones of several species of domesticated animals—the ox, horse, sheep, goat, swine—prove that they were both tillers of the soil and herdsmen.

Perhaps the most interesting and productive lake-village site discovered was that of Robenhausen, in the bog of the former Lake Pfaffikon; for, while principally a stone-age settlement, it continued to be occupied up to or into the bronze period. It covered an area of at least 3 acres (nearly 131,000 sq. feet), and was built on more than 100,000 piles. It had been, as shown by the character and stratification of the relic beds, successively burned and rebuilt, yet showed signs of persistent and almost continuous occupancy. In the lowest stratum the pottery, like that of Mosseedorf, was crude and less varied in form than that of the uppermost, but in the latter occurred highly ornate forms of earthenware—bowls, cups, pipkins, cooking-pots, urns and vases, decorated with incisions, textile impressions and low-relief patterns—

and more abundant bones of domesticated animals. The platform of the last construction had also been formed of split planks more than 2 feet in width by 3 and 4 inches in thickness, well fitted together; and between the houses thus supported, cattle stalls had been constructed. Crucibles, made of horse-dung and fire-clay, were also found in the upper layer, and showed metallic gloss, evidencing their use in smelting; yet no relics of bronze or other metals were discovered. In a single cut made for a watercourse through the beds of refuse from this village more than 5 tons of animal bones and relics of broken articles were taken. Among the bones were those of cattle, horses, asses, sheep, goats, pigs, fowls, dogs; and of wild animals those of the urus or wild European ox, bison, elk, stag, chamois, bear, wolf, fox, beaver, and many smaller animals, besides abundant remains of birds and fishes. Of relics there were thousands. Those of wood included spoons and ladles, tubs, bowls and trenchers, flails, hackels and spindles; clubs, and hatchet-handles, some with stag-horn sockets for celts; spear, harpoon and arrow shafts, long and short, and long-bows of yew. Floats and fish-hooks, matting coarse and fine, fishing-nets and cloths of great variety, made of bast, flax, and wool, were found, including skeins and balls of yarn, besides great numbers of stone tools and weapons, milling and hearth stones, and spindle-whorls both of stone and pottery. Still more numerous and varied were objects of bone and horn—bodkins, needles, platting-tools, dirks, scrapers and spatulæ for tawing, chisels and wedges, sockets and handles, harpoon and arrow heads, etc. Here also great stores of grain and several pounds of cakes and coarse bread, charred and thus perfectly preserved, were procured.

Various villages were more strictly of the bronze age. The most representative and richest of these was that of Auvernier in Lake Neuchâtel. Here, although some stone objects occurred, indicating ethnical connection with the older lake-dwellers, most of the tools and weapons were of bronze, and these—broadswords, socketed spear-heads, arrow-points, celts, axes, chisels, hammers, anvils, knives, sickles, and an exceedingly great variety of ornaments—bracelets, anklets, torques, neck, finger, and ear rings, brooches, and superb hairpins from 4 to 14 inches long, in numerous fanciful forms and styles, many provided with large heads damascened in gold—all resemble, more or less, other remains of the bronze age in Europe, from Scandinavia to the Mediterranean. Characteristic molds of sandstone or fire-clay and other appliances of the bronze-worker's art were, however, found, indicating that the objects described were of native or home production. Pottery, too, was abundant, still finer and more varied in form and ornament than that of even the later stone-age settlement above described. Not far from this bronze-age station in the same lake occurred the settlement of Marin, essentially like the others, save that here the weapons, tools, ornaments, armor and horse-trappings, etc., were generally of well and peculiarly forged fibrous iron. Remains of domesticated animals, especially of the horse and ox, were more numerous, and the presence not only of superior art remains, but also of Roman and Gallic coins, attests to the fact that this (in common with a few other settlements of the iron age in other lakes) continued to be occupied down to the dawn of historic times in Western Central Europe. The antiquity of the older bronze-age villages has been variously estimated, after most careful computations, at from 3,000 to 4,000 years, while the stone-age villages are thought to reach back at least 6,000 or 7,000 years. The rapid development toward barbaric civilization evidenced by some, even of the purely stone-age remains, affords a striking example, as do the vastly different cliff-dwellings of North America, of the influence of defensive necessities and habits of living developed therefrom, on the advancement of peoples.

In the case of the dwellers in caves and cliff-shelters, the dry, still air of their homes has preserved for centuries their frailest art products; in that of the lake-dwellers, the tranquil waters have preserved their very bread and wearing material.

By a study of these abundant remains and the architecture of these two peoples we may see that the necessity for huddling their houses together in a limited space developed at once rectangular buildings and perfect unity of village organization, giving rise speedily to a confederative if not communal society. Abiding perforce permanently in the places thus occupied, they were of necessity obliged to till the soil and to domesticate animals (few, however, with the cliff-dwellers). Thus the accumulation of food-stores and property, inviting constant aggressions from outsiders on the one hand, stimulating commerce on the other, not only fostered culture-growth and gave rise to new wants and artificial necessities at home, but continually increased the power of these erstwhile weakling tribes, until they were able to extend their occupancy of the land abroad, spreading their arts and culture far beyond, and in time forcing them on all intervening peoples. Thus in the Old World we may look to the lakes as the source of barbaric culture which, had it not been checked by greater cultures from the south, would in time have built up a civilization almost purely indigenous to and well-nigh coextensive with Europe; as, in the New World, cliff-dwellers had already started on the road to a barbaric civilization—exemplified in the existing pueblos of New Mexico and Arizona and by the ancient Mexicans and Central Americans—which well-nigh dominated the vast southwestern part of the continent, and, but for the coming of the Spaniards, doubtless would have developed as remarkably toward civilization in other than architectural points as did the culture of the lake-dwellers in the later bronze and early iron ages.

Authorities.—The greatest authority on the lake-dweller remains of Switzerland was their scientific discoverer, Dr. Ferdinand Keller, at the time president of the Society of Antiquities of Zurich. The results of his researches were published at various times from 1854 to 1876, in a series of reports to this society. These were soon after translated in substance by John Edward Lee, and published finally, in a second edition, under the title of *The Lake-dwellings of Switzerland and other Parts of Europe* (2 vols. 8vo, London, 1878). The subject has been more generally presented by Frédéric Troyon in his *Habitations Lacustres des Temps Anciens et Modernes* (Lausanne, 1860). The writings of Tylor, Lubbock, and Wood, and the early reports of the Smithsonian Institution contain much information on this subject. Frank Hamilton Cushing.

Lake Erie: See Erie, Lake.

Lake Forest: city; Lake co., Ill. (for location of county, see map of Illinois, ref. 1–G); on Lake Michigan, and the Chi. and N. W. Railway; 28 miles N. by W. of Chicago. It is the seat of Lake Forest University (Presbyterian, chartered 1856), and has two weekly newspapers. Pop. (1880) 877; (1890) 1,203; (1900) 2,215.

Lake Forest University: an institution of learning which comprises six distinct schools: (1) Lake Forest Academy, (2) Ferry Hall Seminary, (3) Lake Forest College, (4) Rush Medical College, (5) Chicago College of Dental Surgery, and (6) Chicago College of Law. The first three are located at Lake Forest, a suburb of Chicago; the three professional schools are in Chicago. The charter was granted in 1857, but the college was not opened until 1876, and the professional schools were not associated with the undergraduate departments until 1887. The undergraduate work at Lake Forest is in charge of 40 instructors, and in 1899–1900 429 students were enrolled. The professional schools employ 33 instructors, and in 1900 had 963 students, making a total enrollment of 963. The university is Presbyterian by affiliation, but its board of control is self-perpetuating. Lake Forest Academy is designed to prepare young men for college, while Ferry Hall Seminary not only does the same work for young women, but also offers to them two years of college work. Lake Forest College is coeducational, and is organized upon the elective plan, a certain number of credits being required for graduation, and work upon a major subject being required for three years. College work is offered in seventeen departments. Aside from the three professional schools in Chicago, the undergraduate equipment at Lake Forest is represented by fifteen buildings upon 65 acres of campus. John M. Coulter.

Lake Geneva: city; Walworth co., Wis. (for location of county, see map of Wisconsin, ref. 7–E); on Lake Geneva, and the Chi. and N. W. Railway; 10 miles S. E. of Elkhorn, the county-seat. It is a summer resort in a rich farming section, and has several educational institutions, flour-mills, and two weekly newspapers. Pop. (1890) 2,297; (1900) 2,585.

Lake George: post-office name of Caldwell (*q. v.*).

Lake George: See George, Lake.

Lake Leman: See Geneva, Lake of.

Lake Leopold II.: See the Appendix.

Lake Moeris: See Moeris.

Lake of Geneva (in Switzerland): See Geneva, Lake of.

Lake of the Woods: a large lake on the boundary between Minnesota and Canada. A small detached portion of Minnesota lies on its northwest side. Its principal affluent is Rainy Lake river, and its waters flow N., through the Winnipeg river into Lake Winnipeg. It contains many small wooded islands, formed by inequalities in the drift-covered surface which its occupies. It is 1,060 feet above the sea, 400 feet lower than Lake Itaska. Wild rice (*Zizania aquatica*) is abundant on its shores. ISRAEL C. RUSSELL.

Lake Poets: a name given by *The Edinburgh Review* to a number of English poets, of whom Coleridge, Wordsworth, and Southey were the most important, who at the beginning of the nineteenth century lived in the lake region of Westmoreland and Cumberland, England. They had little in common as poets, except the desire to break loose from the conventionalities of the literature of that day.

Revised by H. A. BEERS.

Lakes [O. Eng. *lacu*, from Lat. *la'cus*, lake, basin, tank. Probably merged in M. Eng. with Anglo-Fr. *lake*, *lak* from O. F. *lac* < Lat. *la'cus*]: bodies of water nearly or quite surrounded by land. The physical features of lakes should be considered in connection with the progress of the general denudation by which the surface of the land is worn down from the constructional form given by uplifting forces. On newly uplifted lands, even if of generally even surface, lakes may be numerous, as in Florida, where they occupy slight inequalities in the surface of the uplifted sea-bottom, which is not yet well drained by the deepening of river channels. In case the uplifting of a region is accompanied by fracturing, the constructional depressions between the uplifted blocks may contain lakes, as among the tilted lava blocks which form the mountain ranges of geologically recent dislocation in Southern Oregon; although here the climate is too dry at present to fill the basins to overflowing. In regions of geologically modern mountain growth, great lake basins frequently lie between adjacent ranges, because there has not yet been time enough to fill the basins with waste from the mountains or to cut valleys across the basin rims. If the climate is moist enough, the basins fill and overflow, and their lakes are fresh; such are probably the lakes of Central Africa, under the belt of heavy equatorial rains; although one of them, Tanganyika, is on the verge of insufficient rainfall, its outflow to the Lukuga and Congo being intermittent and its waters brackish. Great basins are generally in continental interiors, remote from the oceans, where the rainfall is now relatively scanty; their lakes are therefore reduced by evaporation to a moderate depth and variable area; having no outlet, their waters retain all the mineral substances brought into them in solution, and are therefore salt. Such lakes occupy shallow depressions on the desert plains that have been formed by the partial filling of the great basin by mountain waste, like Great Salt Lake of Utah or like the many lakes of the interior desert of Central Asia. These great basin-lakes may be fresh or brackish, if they occupy marginal depressions, whose overflow runs on to disappear in the central sandy wastes; thus Titicaca, 12,500 feet elevation, between ranges of the Andes, is brackish, overflowing S. E. by the Desaguadero to the salt-swamps of Lake Aullagas, at somewhat less elevation. In some desert basins a lake may form in the wet season, but change to a salt-marsh or a salt-bed in the dry season, as the Hamum swamp of Persia and various salinas of the Argentine Republic. In recent geological times the climate was moister, and many of the interior basins were filled even to overflowing. (See BONNEVILLE, LAKE, and LAHONTAN, LAKE.) In deserts near the seacoast depressions that might in moister regions fill with water and overflow are evaporated to submarine levels, as the Dead Sea, 1,300 feet below the Mediterranean, or the Chottes, salt-lakes occupying small depressions in the Algerian Sahara near the coast, which it has been proposed to flood by an inflowing canal from the Mediterranean.

Lakes are usually destroyed by the progress of river development, being filled by delta growth at the inlet and drained by cutting down the outlet; thus former lakes disappear, leaving plains, such as the Vale of Kashmir. (See PLAIN.) In certain cases, lakes of small size and brief duration are created during the normal advance of river and valley development. Thus the hasty descent of landslides may dam a valley, as has frequently happened in Switzerland. In older rivers, where flood-plains (see FLOOD-PLAIN) have been produced, the river may cut off a meander, whose arms then soon become silted up, leaving the abandoned curve as an oxbow lake, of which many occur on the Mississippi flood-plain in all stages of formation and extinction. The growth of a river flood-plain sometimes shuts off lateral streams, forming lakes, as on either side of the Red river of Louisiana, and probably along the Yang-tse-Kiang in China. When a side stream carries more detritus into a valley than the main stream can carry away, it may accumulate in an alluvial fan (see DELTA), and form a lake on the main stream above it; thus Lake Pepin has been formed on the upper Mississippi above the entrance of the Chippewa; thus Tulare Lake lies south of the alluvial deposits formed across the broad valley lowland of California by Kings river, which carries much detritus down from the high Sierra Nevada. Deltas of large rivers, mouthing in the sea, frequently inclose shallow lakes between their distributaries, or between the delta and the mainland, as Lake Ponchartrain in Louisiana. The head of the Gulf of California has been cut off by the delta of the Colorado river, but as the climate there is very dry this shallow basin seldom has water in it, unless for a time fed by a distributary of the river, as in 1891. The action of shore-waves may build bars across small bays, inclosing ponds, as on the south shore of Martha's Vineyard, Mass.

After a land region has been denuded during one or more geological epochs, the constructional lakes that may have existed in the youth of the region are destroyed by the perfected establishment of the river valleys; but if then a new deformation of the region occurs, the valleys will be warped, and deep lakes may again be formed along their courses, this being the most probable origin of the greater marginal lakes of the Alps, Lakes Geneva, Lucerne, Constance, Maggiore, Como, Garda, and others. Old mountains, long unwarped, have no lakes, as the Appalachians, except in their northern glaciated portion, as explained below. Other disturbances of normal river action produce lakes, as earthquake shocks, causing subsidence of certain parts of the land; thus several lakes were formed on the flood-plain of the Mississippi in Southeastern Missouri in 1811. Lakes are commonly associated with volcanic action. Small lakes may exist in lofty volcanic craters, as frequently happens in Java, or in the broad and shallow calderas left by the destruction of ancient volcanic cones, as Lakes Bolsena and Braeciano in Italy, as well as others in the Azores, and in Sumatra. Crater Lake, in Northern California, lies in a very deep caldera, 7 miles in diameter. Explosive volcanic eruption has sometimes produced cavities below the surrounding surface, such as the Maare or pit-crater lakes of the Eifel district of Western Germany. Lava-flows often obstruct valleys and produce lakes, as has been observed in Iceland. Lake Tiberias is thus formed on the Jordan in Palestine. Glaciers sometimes obstruct streams, as in the Merjelen Lake in the Alps, inclosed by the great Aletsch glacier. Small lakes form on the Greenland ice-sheet in summer.

Climatic changes are responsible for the appearance or disappearance of many lakes. The climate of interior regions is frequently such as to produce deserts where under a moister Pleistocene climate large lakes existed in considerable numbers, as explained above. On the other hand, the colder climatic conditions which caused the extension of Pleistocene glacial sheets over Northwestern Europe and Northeastern America and elsewhere produced many basins. Some lakes existed only while the ice was present to obstruct the drainage of the region. (See AGASSIZ, LAKE; GLEN ROY, and PRAIRIE.) The erosive action of the ice often excavated rock basins of greater or less extent, but there is much difference of opinion among geologists as to how far this process was carried. Yet such is the admitted origin of many small tarns in the highlands of Scotland and Wales, as well as in the Alps, Sierra Nevada, and other mountains. The irregular deposition of the drift that was dragged along by the ice, washed out in front of it, and finally left strewn unevenly over the land as the ice melted away, has obstructed many a valley; most of the numerous lakes of Finland, the Scandinavian peninsula, Scotland, Canada, and New England result from the combined action of glacial erosion and deposition. In Minnesota and Northern Germany the glacial drift-sheet and its moraines cover nearly the whole surface, and unnumbered shallow lakes lie in the depressions. The combination of the various processes of glacial action is undoubtedly responsible for more lakes than all other processes together, although glacial lakes are already decreased in number by filling and draining since the disappearance of the ice. Glacial erosion and drift obstruction along old valleys, aided by a gentle warping of the surface,

are probably the chief agencies by which the great lakes of North America, including those of Northern Canada, have been formed.

Temperature, Fauna, etc.—The temperature of the deeper lake waters is determined in the winter season, when cool surface water generally sinks to the bottom; but after the whole body of water is reduced to 39°, at which temperature fresh water has its greatest density, further cooling acts only on the surface waters, which then may soon freeze. If the winter is not long or severe enough to reduce the bottom temperature to 39°, the lake will seldom freeze over. From the conservative influence of water, the districts around the Great Lakes of North America have tempered summers and winters. The reflection of sunshine from the surface of the Swiss lakes is said to have an influence in hastening the vintage on their inclosing northern slopes. The winter ice-crop of lakes is now a matter of considerable commercial value near the large northern cities of the U. S.

In addition to the ordinary lacustrine fauna, seals are found in Lakes Wener and Wetter of Sweden, and Baikal of Siberia, indicating a former connection with the sea during a depression of the land. An open water or "pelagic" fauna has been found in Lake Geneva, Switzerland, consisting of transparent crustaceans and lower forms. The fauna of salt lakes is very limited. Minute lunar tides of a few inches oscillation have been detected in Lake Michigan by careful averages of its level with respect to lunar culminations; but these are generally masked by the effects of winds. Oscillations of lake level, well known in Switzerland, where they are called *seiches*, are produced by sudden changes of atmospheric pressure, or wind squalls; their period varies with the length and depth of the lake, and with the number of nodes in the oscillating waves. These oscillations are of common occurrence on the Great Lakes of North America, whose waters are seldom free from slight rise or fall in period of an hour or less. The change of level often exceeds a foot, and under favorable conditions it may reach 5 feet, as at Chicago, Apr. 7, 1893. The larger lakes have currents, driven by the prevailing winds; as in Lake Michigan, where the waters sweep eastward around the southern end of the basin, the lake waves and currents act upon the shores, forming cliffs, beaches, and bars, like those of the ocean.

W. M. Davis.

Law of Lakes.—The common law of England treats the waters and the bed of all lakes as private property. Accordingly, the House of Lords decided that a grant from the crown of all fishings in Lough Neagh, a lake about 15 miles long and 10 miles wide, in the northeast of Ireland, conveyed nothing. (*Bristow* vs. *Cormican*, 3 Appeal Cases 641). Whether the rule that each adjoining proprietor, where there are several, is entitled *usque ad filum aquæ*, as in the case of a stream above tide-water, was left undecided, although Lord Blackburn suggested that the rule could not be conveniently applied. In Scotland it is applied to the bed of lakes, and the space inclosed by lines drawn from the boundaries of each proprietor to the middle line of the lake is deemed appurtenant to his land, unless the terms of his title limit him to the water-line. Each owner, in using the bed of the lake, as in dredging for marl or taking coal, must keep within his own boundaries. The rights of boating, fishing, and fowling, however, are to be enjoyed in common over the whole water surface by all the owners of the lake bed. Lord Hatherly thus explains the origin of this common right: "A person proceeding from property of his own to fowl or to fish upon a lake, could not be conveniently arrested the moment he arrived at the *medium filum aquæ ex adverso* of his own land." *Mackenzie* vs. *Bankes*, 3 Appeal Cases 1324.

Small Lakes in the U. S.—These are governed by the law of the State in which they are located. It thus happens that the Federal courts are obliged to apply one set of rules to a case growing out of property claims to one lake and a different set of rules to a case involving claims of the same character to a lake in another State.

These rules are variable, and may be divided roughly into three classes. At one extreme is the doctrine of the New Jersey courts, that all the lakes of that commonwealth are private property; that the State has no interest in their waters nor their soil, and that the public has no rights of fishing, fowling, or boating upon them. (*Cobb* vs. *Davenport*, 32 New Jersey Law 369.) None of the lakes are large, and only one is used at all for commerce. Somewhat inconsistently with this general view it has been held that a deed of land bounded by a lake carries title only to the shore, and not, as in the case of fresh-water streams, to the center.

At the other extreme is the Massachusetts rule, which rests upon the colonial ordinances of 1641 and 1647. These set apart and devoted all great ponds (that is, ponds of more than 10 acres, and since 1869 of more than 20 acres) to public use, and reserved to the commonwealth the ownership of the soil under them and of their waters. This ownership has been held by the Massachusetts Supreme Court, though by a vote of four to three, to enable the State to give to municipalities the use of the waters, without making compensation to riparian owners on the outlet streams for damages sustained by such diversion. (*Wattuppa Reservoir Company* vs. *City of Fall River*, 147 Mass. 548.) The law of New Hampshire treats great ponds and lakes as public property, but the State is not allowed to divert their waters to the harm of riparian owners without making due compensation therefor. *Concord Manufacturing Company* vs. *Robertson*, 18 *Lawyer's Reports Annotated* 679.

Between these extremes is the rule which, with some modifications, obtains in New York, and in most of the Western States. Lakes and ponds which are not navigable in fact are private property. Small lakes which are actually navigable are subject to a double proprietorship. The adjoining land-owners possess the title to the bed of the lake, while the State retains sovereign rights in its waters, such as fishing, ferrying, and transportation. These rights of the State are held in trust for the public, and can not be alienated to private owners. If the State in its exercise of the right of eminent domain grants to a municipality the use of the waters of a lake, such grantee must make due compensation to riparian owners for the diversion. (*Smith* vs. *City of Rochester*, 92 New York 463.) This rule, so far as the ownership of the lake bed is concerned, was declared by the U. S. Supreme Court to be the local law of Illinois, and to warrant the conclusion that a grant to the plaintiff of 4½ acres bounded on a small lake, carried with it the title to about 25 acres of dry land between it and the water's edge, and a much larger area of the lake bed—that is, the area in front of the 4½ acres between the lake's margin and center. The fact that the lake was of a circular form with an irregular margin, and the center line difficult to run, was thought not to be entitled to much weight. *Hardin* vs. *Jordan*, *Mitchell* vs. *Small*, 140 U. S. 371, 406.

The Supreme Court of Minnesota has slightly modified this rule. It holds that when the State grants to a person land bounded upon a non-navigable lake his title extends to the center line; but when the bounding lake is in fact navigable, the State remains owner of the bed and of the waters, but only as trustee for the public, and can not convey title to the waters or to the bed to any one. It also holds that the riparian owner has the right to accretions or relictions, and if the lake recedes his boundary follows the water, though as the result he thus may acquire title to the middle line of the original lake. *Lampley* vs. *Metcalf*, 53 *Northwestern Reporter* 1139.

Great Lakes in the U. S.—These are held uniformly to be public waters. The State owns the land under them as it does the soil under tide water, in trust for its people that they may enjoy the navigation of the waters, carry on commerce over them, and have liberty of fishing therein freed from the obstruction or interference of private parties. Accordingly, it has been decided that an act of a State Legislature purporting to grant to a railway company the fee of lands under the waters of Lake Michigan had but the effect of a license; that it could be revoked, and the State could resume control of such lands. (*Illinois Central Railroad* vs. *Illinois*, 146 U. S. 387.) The U. S. Supreme Court has even held that these great lakes are high seas, within the meaning of that term as used in a statute giving to the Federal courts jurisdiction over crimes committed upon the high seas, declaring that "a large body of navigable water other than a river, which is of an extent beyond the measurement of one's unaided vision, and is open and unconfined, and not under the exclusive control of any one nation or people, but is the free highway of adjoining nations or people, must fall under the definition of 'high seas.'" *United States* vs. *Rodgers*, 150 U. S. 249.

Francis M. Burdick.

Lakes [from Fr. *laque*, *lac*, from Pers. *lāk*, deriv. of *lak*, lac. See Lac]: pigments prepared by combining animal or vegetable dyes with metallic oxides, usually alumina or oxide of tin. Lakes are used as pigments for painting, for wall-paper, in calico-printing, and in lithographic and print-

ing inks. Almost all coloring-matters may be made to produce lakes, but in practice a few only are found available for this purpose.

Carmine lake, called also Florentine, Vienna, Munich, and Paris lake, has a beautiful red color, and is the finest of all lakes. It is made by adding an alkali to a decoction of cochineal mixed with alum. *Madder lake* has a more or less deep rose-color, with a bluish tint. In Persoz's process madder is washed with cold water, wherein some sulphate of soda is previously dissolved, and boiled for about twenty minutes, with ten times its weight of a 10 per cent. solution of alum free from iron. The liquid is filtered and cooled to 40° or 35°. The red-colored solution is then treated either (*a*) by saturating cautiously with carbonate of soda equal to from one-tenth to one-eighth the weight of the alum used, so as to cause the formation of a basic alum, which remains in solution, and which is precipitated on boiling, as an insoluble basic sulphate of alumina, holding all the coloring-matter in combination, or (*b*) by adding a solution of acetate of lead, containing 78 parts of the salt for every 100 of alum used, filtering from the precipitated sulphate of lead, and boiling to precipitate a colored basic acetate of alumina. This is much finer than that precipitated by carbonate of soda. *Alizarin-red lake* is now used instead of madder lake. In preparing *Brazil-wood lake* the wood is boiled with water, and the solution should be left some time to permit impurities to settle.

Logwood gives a violet lake on the addition of an alum solution to its decoction, and precipitation cold by carbonate of potash. *Alkanet* yields a pure lake when the finely cut roots are boiled with potash, and the solution is precipitated by alum.

Persian or French berries furnish a yellow lake called *Dutch pink*. Potash or soda is added to the decoction, and then a solution of alum is poured in as long as a precipitate is formed. The color is brightened by treating the moist precipitate with a tin solution. In preparing *fustic lake* the decoction of the wood is treated with a little glue or skimmed milk to remove tannic acid, then made alkaline, and precipitated with alum. *Quercitron* and *weld lakes* are made in the same manner. In *annotto lake* the aqueous solution of annotto is mixed with carbonate of soda, heated to boiling, and precipitated by an excess of alum.

Orange lakes may be made by boiling annotto with carbonate of soda, and precipitating by alum or salt of tin, by boiling turmeric with potash and precipitating with alum. *Blue lakes* are seldom prepared.

Green lakes are usually prepared by mixing blue and yellow lakes, or blue pigments, such as Prussian blue, ultramarine, indigo, etc., with yellow lakes. A very good *green lake* is made by exhausting 1 lb. of bruised coffee-berries with 1 gal. of water, adding 2½ to 3 lb. of sulphate of copper, and precipitating with caustic potash, avoiding an excess. *Aniline lakes*, so called, are not true lakes.

Revised by IRA REMSEN.

Lakewood: popular winter resort; Ocean co., N. J. (for location of county, see map of New Jersey, ref. 5-D); on the Central Railroad of N. J.; 44 miles S. by W. of New York city. It derives its name from its location in a vast pine forest, studded with many pretty lakes. The place was known as the Three Partners' Sawmill from about 1786 till 1814, as Washington Furnace till 1832, as the Bergen Iron Works till 1866, and as Bricksburg till 1880, when the Legislature authorized its present name. During this period lumbering and the manufacture of charcoal iron were carried on. Since 1880 the place has grown rapidly, and now has 4 large hotels, many private and boarding cottages, 2 seminaries, 2 libraries, a weekly newspaper, electric-light plants, and many metropolitan advantages.

Lakey, EMILY JANE: See the Appendix.

Lakhimpur, or **Luckimpoor**: a district of British India; situated in the eastern part of Assam, between lat. 26° 51′ and 27° 54′ N., and between lon. 93° 49′ and 96° 4′ E. The Brahmaputra river for about 400 miles of its course passes through this district, and is navigable for steamers at all times of the year to Dibrugarh, and in the rainy season to Sadiya. The area of the district is about 11,500 sq. miles, the greater part thinly settled by independent hill-tribes. Elephants, rhinoceroses, wild cattle, deer, buffaloes, and bears are numerous. Coal, petroleum, limestone, iron-clay, and gold are found, and rice and tea raised. Tea, India-rubber, muga silk, beeswax, ivory, etc., are exported; opium, tobacco, salt, oil, and cotton cloth are imported. Lakhimpur has an annual fair, which is held at the town of Sadiya. Pop. of settled portion about 200,000.

Lakota: See SIOUAN INDIANS.

Lakshmi, lŭk-shmēĕ [Sanskr., liter., sign, omen, (hence) luck, fortune, happiness, beauty, and (by personification) the goddess of happiness and beauty]: in Hindu mythology, the goddess of beauty and good luck, the consort of Vishnu the Preserver, and the mother of Kāma, the god of love. She is said to have sprung in the full perfection of maidenly beauty from the foam of the sea, as is said of Aphrodite. (See VENUS.) The complexion of her skin is delicate saffron, and her attendant, like that of Minerva, is the owl, showing that some Hindus had confounded her with Saraswati, the goddess of learning. As the goddess of abundance and fertility, she is worshiped by agricultural laborers, the worship consisting of offerings of flowers and grain. In painting and sculpture she is represented as a very young girl, with the full breasts of a mature matron, thus typifying budding beauty conjoined with full fertility. She is frequently represented as reclining at the feet of Vishnu. A huge lotus supports them as they ride upon the silver foam of the churned ocean of milk.

Revised by R. LILLEY.

Lalande′, JOSEPH JEROME LE FRANÇAIS, de: b. at Bourg-en-Bresse, Ain, France, July 11, 1732; educated at Lyons by the Jesuits; studied mathematics and astronomy at Paris, and in 1751 was sent to Berlin to make observations complementary to those made by la Caille at the Cape of Good Hope concerning the distance between the earth and the moon. In 1762 was appointed Professor of Astronomy at the Collège de France, and Director of the Observatory at Paris. He conducted the *Connaissance de Temps* from 1760 to 1775, and from 1794 till his death. His lectures were exceedingly attractive, not only to the student, but to educated people in general, and his success in diffusing astronomical knowledge and interest was very remarkable. His most prominent writings are *Traité d'Astronomie* (4 vols.) and *Histoire céleste français*, the latter being a series of observations on the fixed stars. D. Apr. 4, 1807.

Lallemand, lăăl′măăn′, CHARLES FRANÇOIS ANTOINE, Baron: general; b. at Metz, June 23, 1774; entered the French army in 1792; distinguished himself in the campaigns in Egypt, Portugal, Prussia, Spain, and Russia; was brigadier and baron in 1811, and was made lieutenant-general and member of the chamber of peers on Napoleon's return from Elba. He accompanied Napoleon in the Waterloo campaign, and was sent as commissioner to Capt. Maitland to treat for the emperor's surrender to the British navy. He was sent a prisoner to Malta, and on his release went to Turkey, Persia, and Egypt in an unsuccessful search for employment, after which he made his way to the U. S., where he proposed to found a colony of French imperialist refugees. An attempt had already been made in Alabama but had failed, and Lallemand's venture in Texas was also unsuccessful, but he and his companions fell back upon the project of a colony in Alabama. Lands were obtained and the so-called state or canton of Marengo was founded on the banks of the Tombigbee river, where a city was laid out, and named Eagleville. Lallemand, however, took no personal part in the Marengo colony. Napoleon, dying in 1821, bequeathed 100,000 francs to Lallemand, but the French Government opposed his receiving it on account of his having been tried and condemned to death in France during his absence. In 1823 he fought in the Spanish war; went afterward to Brussels; entered France without molestation; returned to the U. S., and established a successful school in New York. After the revolution of 1830, Lallemand was restored to his military and political honors (1832), took his seat in the chamber of peers, and was for two years military commander in Corsica. D. in Paris, Mar. 9, 1839.

L'Allemand, PAULINE: opera-singer; b. in Syracuse, N. Y., about 1862; studied in Paris, Dresden, and Stuttgart; made her first appearance as Zerlina in *Don Giovanni* in Königsberg, Prussia, with great success. She was one of the sopranos who sang in 1886 in the American Opera Company, and won success in the *rôles* of Carmen, Suzanne in *The Marriage of Figaro*, and Katherine in *The Taming of the Shrew*.

D. E. HERVEY.

Lalo, lăă′lō′, ÉDOUARD VICTOR ANTOINE: composer; b. in Lille, France, Jan. 27, 1823; studied first in the conservatory there, and subsequently at the Paris Conservatory. His compositions were principally operatic. His first effort

was *Fiesque*, which took third prize at a *concours* at the Théâtre Lyrique, Paris, in 1867. A ballet, *Namouna*, was performed at the Opéra, Mar. 6, 1882; it was afterward transformed into an orchestral suite. His greatest opera was *Le Roi d'Ys*, which was produced at the Opéra Comique, May 7, 1888. He also composed a violin concerto for Sarasate; a *Symphonie Espagnole* for violin and orchestra; a violoncello concerto for Fischer; a *Fantaisie Norvégienne* for violin and orchestra; other works for violin and for violoncello, some songs and smaller pieces. He received the decoration of the Legion of Honor in July, 1880. D. suddenly Apr. 23, 1892. D. E. Hervey.

La Luz, Span. pron. laa-looth': a town of the state of Guanajuato, Mexico; 8 miles N. W. of Guanajuato city (see map of Mexico, ref. 6–G). It owed its existence to the famous La Luz silver lode, one of the richest in the world; the mines, as late as 1845, produced $200,000 weekly. They are now almost abandoned, owing to the difficulty of drainage. Pop. with suburbs (1889) about 11,000. H. H. S.

Lama, laa'ma, or **Llama**: a member (*Auchenia lama*) of the camel family, found in the Andes, especially in Peru, in a state of domestication. Except in color it very much resembles the Guanaco (*q. v.*), and is believed by good authorities to be merely a long domesticated race of that species. The lama is rather lightly built, has a long body, and long, slender neck. The ears are large, and carried erect, and, as in the camel, the knee is free from the body. The animal stands about 3 feet high at the shoulders. The color is white, marked with brown or black spots, or sometimes nearly black. The lama was domesticated by the ancient Peruvians, who used it as a beast of burden, ate its flesh, and wove the long hair into garments. Under Spanish rule the lama was chiefly used for transporting gold from the mountains to the coast, 100 lb. being a good load. See also Vicugna. F. A. Lucas.

Lama, or **Lamas**, Grand: See Lamaism.

La'maism [Tibetan *b*lama, superior]: the corrupt form of Buddhism which prevails in Tibet and Mongolia and a great part of Tartary. Its chief characteristic is the worship of grand lamas, in whom Buddha is supposed to be incarnate. These priest-gods are very numerous, every lamasery or monastery of note having one at its head. The most important are the *rGyelva Rin-po-chhé*, or *Dalai Lama*, at Lhassa; the *Pan-sen Rin-po-chhé*, at Tashilumbo, in Farther Tibet; the *Guison Tamba*, at the lamasery of the Great Kuren, on the river Tula; the *Chang-Kia-Fo*, at Peking; and the *Sa-Dcha-Fo*, at the foot of the Himalayas. After the grand lamas rank the *khutuktus*, or incarnations of celebrated Buddhistic saints; and next to these in the lamaic hierarchy come the *khubilghans*, in whom dwell the souls of former patrons or founders of lamaseries. The lower classes of lamas are incarnations of nobody in particular, and gain consideration only by superior learning or talents; among them, therefore, are found scholars, scribes, artists, physicians and sorcerers, prayer-makers, and artisans. They form a large proportion of the population—about one-third, according to M. Huc. The history of Tibetan Buddhism may, according to Csoma de Körös, be divided into two distinct periods. The first began in the seventh century A. D., when King Srong-Tsan-Gambo married two princesses from Nepaul and China. Both ladies brought to their new home images of Buddha and works on the Buddhistic faith, to which the king became a willing convert. He encouraged the building of temples and colleges, and sent to India his minister, who there learned Sanskrit and arranged a Tibetan alphabet after Kashmirian characters. Srong-Tsan-Gambo wrote an historical treatise on Buddhism, called *Mani-Kambum*, or The Hundred Thousand Precious Commandments, and obtained the name of *Chakravartin* (wheel-turner, or circulator of doctrine). Many sacred works were translated from the Sanskrit, and Buddhism continued to flourish until the close of the tenth century, when it was nearly extirpated. In the eleventh century it was revived by Atisha, hBrōmston, and other learned Tibetans, and from this second period dates its division into sects.

In the fourteenth century Tsong-Kapa, a native of the province of Amdo, effected a revolution in Tibetan Buddhism. This reformer's birth (in 1355) was caused and accompanied by miraculous circumstances. He came into the world with a long white beard; his countenance was grave and majestic; he spoke from the moment of his birth, all his utterances showing a knowledge of the mysteries of existence. At the age of three years he desired to lead a religious life, and his mother, favoring such early devotion, herself cut off his hair and flung it outside the tent. From it sprang a marvelous tree, having fragrant wood and leaves inscribed with sacred characters. Tsong-Kapa withdrew to the mountains, and spent his time in prayer and contemplation, seldom returning to his parents' tent. During one of his visits thither he met a wandering lama from the West, who remained with him and instructed him in religion. When the teacher died the pupil, eager for further knowledge, traveled westward to seek it, and at last reached Tibet. There he was stopped by a spirit (*lha*), who told him that in that country he was destined to teach prayers and rites. Tsong-Kapa remained at this meeting-place, to which was given the name *Lha-Ssa* (land of spirits), and applied himself to reform the worship of Buddha. He gained a reputation for sanctity, and, in spite of opposition from the priests of higher rank, was joined by many lamas, who were called Yellow Caps to distinguish them from the Red-Cap lamas, or adherents to the old forms. The new sect soon spread over all Tibet and Tartary. Its founder died in 1419 at the lamasery of Kaldan, near Lhassa, which he had established, and there, according to Lamaic belief, his body still remains, unchanged in appearance, and miraculously supported above the earth. He left various writings, of which the most important is *Lam-Rim-Tsien-Bo* (the Progressive Path to Perfection).

The title of *rGyelva Rin-po-chhé* (precious or holy majesty), proper to the grand lama of Tibet, was given toward the end of the fifteenth century. The Mongols call him *Dalai* or *Talé Lama*, by which name he is generally known. His territorial power dates from 1640, when Nag-dvang-bLo-bzang-rgya-mtsho was made temporal lord of Tibet by the Mongol conqueror of that country and China. There has since then been a constant succession of Dalai Lamas, none of whom has made any mark in history. These Tibetan sovereigns have no share in secular business, which is transacted by a viceroy called *nomekhan* (spiritual emperor) and four ministers chosen from the lama class. The Dalai's office, like that of all other living Buddhas, is to sit cross-legged in his temple and silently receive the adoration of the faithful, toward whom he occasionally extends his hand in token of blessing. An incarnate Buddha never dies. He quits his body only, after a brief period, to enter that of a young child. Therefore when a grand lama departs no grief is shown—merely an anxiety to know where he may be found in his new form. Sometimes he tells this before his withdrawal, or after it sends a sign, which is interpreted by the augurs. The Dalai Lama is chosen by lot from three chaberons or living Buddhas of tender age; at least such a form of election is gone through, but its result is determined by the Emperor of China or his ministers. Like the Tibetan sovereign, the living Buddha of a lamasery has no real power, that being in the hands of a non-incarnate lama-chief, assisted by subordinate officers.

A lamasery (*dGon-pa*) or monastery consists of numerous houses or huts built around a temple (*Lha-Khang*, spirit-house). The lamas have no common refectory, but live according to their wealth, which, as they are not under vows of poverty, is sometimes considerable. Those who have reached a certain rank as theological scholars receive an allowance from the endowment. Some are paid liberally by the faithful for their services as physicians, exorcists, or intercessors for departed souls. Others engage in trade or transcribe the sacred writings. Lamaic temples are built in the Indo-Chinese style, and are profusely adorned with paintings and sculptures. Opposite the principal entrance is a broad flight of steps surmounted by an altar, upon which are the images. In front of the chief idol, and hardly more lifelike than it, sits the living Buddha.

Besides the monk-lamas, there are hermits who inhabit cells or caves and spend their time in contemplation. Also a large class of wandering lamas, who travel from tent to tent and from lamasery to lamasery, receiving everywhere a welcome as ready as that given in Europe to the itinerant friars of the Middle Ages. Female lamas, or nuns, are also found. Their number, however, is comparatively small.

As a rule, Lamaists are devoted to their religion, and give generously for the building of lamaseries and other pious objects. They are fond of going on pilgrimages to holy places, such as Lhassa; the lamasery of the Five Towers near which Buddha is said to dwell within a mountain; and Tsong-Kapa's birthplace, where is a famous lamasery. There grows the tree sprung from the reformer's hair, all

efforts to propagate which have, says Huc, been unsuccessful. Penance forms a part of the pilgrim's duties. The more zealous penitents make the circuit of the lamasery, prostrating themselves at each step, with their foreheads touching the ground. Or they carry a heavy load of prayer-books, and thus gain credit for having repeated all the prayers therein contained. Lighter forms of penance are, walking round the lamasery while telling the beads of a rosary, or turning a prayer-wheel. This devotional machine is usually a sort of barrel, moving upon an axis and inscribed all over with prayers. The worshiper sets it going, and it turns prayers for his benefit while he pursues some more mundane occupation. The most common rosary-prayer is that called the *Mani*, consisting of six syllables: *Om Mani Padme Houm* (Oh, the gem in the lotus! Amen).

Even a casual student of Lamaism must observe the similarities between its ceremonial and that of Roman Catholicism. These were pointed out by Huc, for which frankness his interesting book was placed in the *Index Expurgatorius*. To account for them, he premised that the wandering lama, Tsong-Kapa's instructor, was in reality a Christian missionary. The canonical books of Tibet exceed in length those of every other country. They are comprised in two collections, the Kan-jur (*bKaah hgyur*), consisting of 108 volumes, containing 1,083 distinct works; and the Tan-jur (*bsTan-hgyur*) of 225 volumes, each weighing from 4 to 5 lb. in the Peking edition. A large proportion of both collections is translated from the Sanskrit, but they contain also many original treatises by Tibetan and Tartar authors. See *Travels*, by E. R. Huc; the works of Alexander Csoma de Körös; *Die Lamaische Hierarchie*, being vol. ii. (1859) of K. Fr. Köppen's *Die Religion des Buddha*; Schlagintweit's *Buddhism in Tibet* (Leipzig and London, 1863); and Waddell's *The Buddhism of Tibet, or Lamaism . . . and its Relation to Indian Buddhism* (London, 1895). Revised by R. Lilley.

Lama-Miau, or **Dolanor**: a town of Mongolia; in a sandy and barren plain about 4,000 feet above the level of the sea; 150 miles N. of Peking. It is a town of considerable dimensions, mostly inhabited by Chinese, though not, like most other Chinese towns of the same rank, surrounded with walls. A considerable trade is carried on here, the Mongols bartering their cattle, horses, sheep, hides, etc., for tea, tobacco, and Chinese fabrics of all kinds. It has an ecclesiastical and a trading quarter. About 3 miles from the Chinese town are numerous lamaseries and temples. See Williamson's *Journeys in North China, Mongolia, and Manchuria* (London, 1870), and Prjevalsky's *Mongolia* (1876).

Lamanskiĭ, Vladimir Ivanovich: writer; b. in St. Petersburg, Russia, in 1833; has been since 1865 Professor of Slavic Languages at the University of St. Petersburg. He is an ardent and learned Slavophil, and has written several historical and political works. The best known of these is his *Historical Investigation of the Græco-Slav World in Europe*, in which he develops the theory of its contrast to the Latin-Germanic (St. Petersburg, 1871). A. C. C.

Lamantin: See Manatee.

Lamar': town; capital of Barton co., Mo. (for location of county, see map of Missouri, ref. 6–D); on the north branch of the Spring river, and the Kan. City, Ft. Scott and Mem. and the Mo. Pac. railways; 125 miles S. of Kansas City. It is in an agricultural region, has an abundance of coal and timber in its vicinity, and is principally engaged in farming and manufacturing. There are 7 churches, 5 public schools, 2 banks, and 3 weekly newspapers. Pop. (1890) 2,860; (1900) 2,737. Editor of "Democrat."

Lamar, or **Lamar y Cortezar**, José: Spanish-American general: b. at Cuenca, in the province of Quito (now Ecuador), in 1778. When very young he went to Spain, where he entered the army, fought against the French at Saragossa and in Valencia, and was taken prisoner, but escaped. In 1815 he was sent to Peru with the rank of brigadier, and he was governor of Callao Castle when it surrendered, Sept. 21, 1821; he then resigned his commission, joined the patriots, and San Martin made him general of division. In 1822 he was a member of the governmental junta, and at the decisive battle of Ayacucho (Dec. 9, 1824) he commanded the Peruvian contingent, and was made marshal. Congress elected him president of Peru, Aug. 24, 1827—an unconstitutional choice, as he was not a native of the country. The main aim of his administration was to destroy the influence of Bolivar and Colombia. To this end he demanded and obtained the deposition of Sucre, Bolivar's friend, from the presidency of Bolivia. On July 3, 1828, Colombia declared war on Peru; Lamar, being defeated by Sucre near Cuenca, Ecuador (Feb. 26, 1829), signed a treaty of peace; he subsequently tried to evade this treaty, but his own officers, Gamarra and San Roman, rose against him; he was arrested June 7, 1829, and exiled to San José de Costa Rica, where he died Oct. 11, 1830. In 1847 his remains were removed to Lima with great pomp. Herbert H. Smith.

Lamar, Lucius Quintus Cincinnatus: jurist; b. near Eatonton, Ga., July 15, 1797; studied law at Litchfield, Conn.; was admitted to the bar, removed to Milledgeville, Ga., in 1819, and soon attained high position in his profession. He was chosen by the Legislature to compile the statutes of the State from 1810 to 1820. In 1830 he was elevated to the circuit court bench. The duties of this office he discharged with great dignity and ability; his decisions were considered of the highest authority, not only in Georgia, but in the adjoining States. Without any known cause, he fell, at his home in Milledgeville, by his own hand, on July 4, 1834. Judge Lamar became noted for the classic purity of his composition, and in forensic eloquence stood among the first orators of his day.

Lamar, Lucius Quintus Cincinnatus, LL. D.: justice of U. S. Supreme Court; son of L. Q. C. Lamar, jurist; b. in Jasper co., Ga., Sept. 1, 1825; graduated at Emory College, Oxford, Ga., with highest honors; studied law, was admitted to the bar, and rose rapidly in his profession; subsequently moved to Mississippi, and settled at Oxford in that State; was elected to Congress in 1856; was re-elected to Congress (the thirty-sixth), and resigned his seat in that body after Mississippi passed her ordinance of secession in 1861. At the outbreak of the war he accepted a colonelcy in the provisional army of the Confederate States, but was afterward sent on a European mission. On his entrance into Congress in 1857, Mr. Lamar took a high position as a debater and orator. In 1872 he was again elected a member of the House from Mississippi to the Forty-third Congress. His speech upon the death of Mr. Sumner was one of the most eloquent ever delivered in the House. He was U. S. Senator from Mississippi 1877–85; became U. S. Secretary of Interior Mar. 6, 1885: resigned 1888, and became associate justice U. S. Supreme Court. D. at Macon, Ga., Jan. 23, 1893. See his *Life, Times, and Speeches*, by Mayes (1896).

Lamar, Mirabeau Buonaparte: president of Texas and politician; brother of L. Q. C. Lamar, jurist; b. at Louisville, Ga., Aug. 16, 1798; became a merchant and planter; established in 1828 a State Rights' newspaper, *The Columbus Inquirer*; removed in 1835 to Texas, where he was distinguished at the battle of San Jacinto; became a major-general, attorney-general of Texas, and secretary of war; in 1836 was chosen vice-president, and was (1838–41) president of Texas. In 1846 he fought at Monterey and on the Comanche frontier. He was appointed in 1857 U. S. minister to the Argentine Republic, and in 1858 to Costa Rica and Nicaragua. D. at Richmond, Tex., Dec. 19, 1859.

Lamarck', Jean Baptiste Pierre Antoine de Monet, Chevalier de: naturalist; b. at Bazentin, France, Aug. 1, 1744; studied at the Jesuits' College at Amiens; entered the army at the age of seventeen, serving in the Seven Years' war, and at its close devoted himself to medicine and physical science at Paris, and in 1776 published a paper on atmospheric vapors, followed by the *Flore Française* (1778). In 1779 he was chosen to the Academy of Sciences; became botanist of the Jardin du Roi 1788; edited the *Dictionnaire de Botanique* (15 vols., 1785) for Panckoucke's *Encyclopédie Méthodique*, and was Professor of Zoölogy at the museum 1794–1818. His principal works are *Système des animaux sans vertèbres* (1801); *Philosophie Zoologique* (1809), in which he announced, through his four laws, a view of the process of evolution substantially in accord with the Neo-Lamarckianism of the present day; *Histoire naturelle des animaux sans vertèbres* (1815–22); *Tableau encyclopédique de la Botanique* (1791–1823), and other works. D. in Paris, Dec. 18, 1829. Revised by D. S. Jordan.

Lamarckianism (from its first exponent, the Chevalier de Lamarck): a term applied to that phase of Evolution (*q. v.*) which formed nearly the whole of the evolution of Lamarck, who believed that all changes in form and structure of both animals and plants could be directly attributed to the effects of use and disuse, of environment, etc. He ignored heredity, natural selection, and the like. For modern Lamarckianism, see Neo-Lamarckianism. J. S. K.

La Mar'mora, Albert, Count de: soldier and naturalist; elder brother of Alfonso; b. at Turin, Italy, in 1789; received his military education at Fontainebleau, and in 1808 served in Calabria, then in Lombardy, afterward in Austria; at Bautzen was decorated by the hand of Napoleon I.; fought at Leipzig; was made prisoner at Torgau, and released only in time to join the Sardinian forces at Grenoble in 1814. Having taken part in the revolutionary movement of 1821, he was banished to the island of Sardinia, where he spent nine years in studying the island, especially its geology. In 1826 appeared his first volume of statistics of Sardinia, reprinted at Paris in 1839. After traversing the island nineteen times, he described it minutely in a work which is highly esteemed. He was recalled in 1831 by Charles Albert, and his military rank was raised. In 1848 he went to Venice to assist Manin. After being named to the senate he was sent to Sardinia as royal commissioner, and by his earnest and friendly councils he calmed the passions of the Separatist party. In 1857 he published the third and last volume of his *Viaggio in Sardinia*. In 1860 appeared his *Itinerario*. D. in 1863.

La Marmora, Alfonso Ferrero, Marquis de: general and statesman; b. at Turin, Italy, Nov. 17, 1804, of an old and noble family; left the military academy in 1823 with the rank of lieutenant of artillery; was raised to the rank of captain in 1831, and between that year and 1848 he visited almost every country in Europe for purposes of military study. He took an active and important part in the battles of 1848; saved the life of the king in the insurrection at Milan; was made brigadier-general and was for a short time Minister of War. In 1849 he was sent to Tuscany to restore the grand duke; then to Genoa to suppress the republican insurrection there—an event which he describes in his work, *Un Episodio del Risorgimento Italiano*. In Oct., 1849, being again Minister of War, he introduced sweeping reforms in the military system, including obligatory instruction. In 1854 he organized and took command of the 15,000 troops sent to the Crimea, led them to the victory of the Tchernaya, and returned to Piedmont to resume his post as Minister of War. In 1859 he accompanied Victor Emmanuel to the field, and after the peace of Villafranca he became Premier. In 1861 he was sent as extraordinary ambassador to Prussia, and in November of that year was appointed governor of Naples, where he was active in suppressing brigandage and maintaining order. From 1864 till 1866 he was again head of the cabinet, and on the outbreak of the war in the latter year took part in the campaign against Austria, but resigned in consequence of the defeats that he suffered in that campaign. He was sent as minister to Paris in 1867, and was governor of Rome in 1870–71. He published in 1873 *Un po più di luce*, etc., in which Bismarck's policy was attacked and certain diplomatic dispatches were made public. A sharp controversy followed and la Marmora was censured by the ministry. After this he lived in retirement. D. at Florence, Italy, Jan 5, 1878. See his *Life* by Massari (1880).

Revised by F. M. Colby.

Lamarque, lăă'maark', Maximilien, Count: soldier; b. at St.-Sever, in the department of Landes, France, July 22, 1770; entered the army in 1791, and distinguished himself in Spain by the capture of Fuenterrabia in 1794. In 1801 he was made a brigadier-general; took part in the battle of Austerlitz; served under Joachim Murat in Naples in 1808; put down the rebellions in Calabria; captured the island and fortress of Capri from the English, and was rewarded with extensive estates. On his return from Elba Napoleon made him governor of Paris, and later on he sent him to put down the insurrection in the Vendée, which task he fulfilled with much forbearance and firmness. On the second return of the Bourbons he left France, being exempted from amnesty, and lived at Amsterdam, but was allowed to return in 1818. In 1828 he was elected a member of the Chamber of Deputies, where he sided with the opposition, and exercised some influence by his peculiar eloquence and disinterested character. He also published several pamphlets which attracted considerable attention by their forcible style. He was one of the 221 signers of the famous address against the policy of the court, and was active in the revolution of 1830. His sympathies were with the democratic element and he continued his opposition under the July monarchy. D. in Paris, June 1, 1832. His funeral, June 5, occasioned an insurrection in Paris which cost many lives. Among his writings are *Nécessité d'une armée permanente*, etc. (Paris, 1820); *De l'esprit militaire en France* (1826); and *Souvenirs, mémoires et lettres* (Brussels, 1835).

Lamartine, lăă'măăr'teen', Alphonse Marie Louis, de: poet and statesman; b. at Mâcon, France, Oct. 21, 1790. He studied in a boarding-school at Lyons (1800–02) and at the college at Belley (1803–07), but the chief formative influences of his youth were received from his mother, whose example and precept strengthened his deep religious instincts, and from books, especially the Bible. He traveled in Italy in 1811–12. Upon the restoration of the Bourbons in 1815 he entered the royal body-guard. During the 100 days he took refuge in Switzerland, and resigned from the guards after the battle of Waterloo. The next years were spent in desultory literary attempts while waiting for an appointment in the public service. In the fall of 1816 he went to Aix in Savoy for his health, and there met and loved the lady, Julie des Herettes, Mme. Charles, who, as Elvire or Julie, is so often celebrated in his verse, and whose death in Dec., 1817, affected him deeply. The poems of the years 1817–19, of which the *Lac* is the most famous, were colored, if not inspired, by this experience. They appeared in 1820 with the apt title *Méditations poétiques*, and made a great impression by the genuineness of their feeling and the directness, simplicity, and eloquence of expression. This volume was one of the greatest literary successes of the century, and had a stimulating influence on the new currents of poetry. Besides praise it brought Lamartine appointment in the diplomatic service at Naples. In the same year he married an English lady, Marianne Birch. The period 1824–29 was passed at Naples, at St.-Point, Lamartine's estate near Mâcon, and at Florence, whither he was transferred in 1825. In 1823 appeared the *Secondes Méditations poétiques*, and in 1825 his continuation of Byron, *Le Dernier chant du pélérinage d'Harold*. In 1829 he was elected to the Academy, having previously been a candidate in 1824. In 1830 he published the *Harmonies poétiques et religieuses*, on the eve of the revolution of July. The agitations of the time drew him into politics, toward which he had discovered leanings some time before; he published a pamphlet, *La Politique rationelle*, containing a liberal programme, and offered himself unsuccessfully for the National Assembly. A journey to the East followed (1832), described in *Voyage en Orient* (1835), and suddenly interrupted by his daughter's death (1833). Meanwhile he had been elected from Bergues to the Assembly, to which he was returned later from Lyons. He began soon to win great fame and power as a political orator. The poems of those years, *Jocelyn* (1836) and *La Chute d'un ange* (1838), mere episodes of a vast poem on the history of humanity that had been in his thoughts since 1821, and *Les Recueillements poétiques* (1839), were more philosophic in tone than the earlier works, with more frequent negligences, and hardly increased his poetic popularity. Partly as an expression of his political sympathies, which were growing more democratic and allying him with the opposition, he wrote his most important prose work, the *Histoire des Girondins* (1847), which became at once an influence. In 1848 he favored a provisional government, became its chief as Minister of Foreign Affairs, and for four months wielded supreme power, holding in check the uprising of May. In the insurrection of June he had to give way to Cavaignac, and immediately dropped into obscurity, retiring from public life before the end of the year. His style of life had involved him in enormous debts and the rest of his life was consumed in a struggle to free himself by his pen. The romantically treated episodes of autobiography, *Les Confidences*, had been begun in 1843, and now appeared (1849) containing *Graziella* and *Raphaël*. The *Nouvelles confidences* followed in 1851. After this his work betrays more and more the conditions of age and toil under which it was written. It comprised literary and critical periodicals, novels, *Genièvre* (1849); *Le Tailleur de pierres de Saint-Point* (1851); *Fior d'Aliza* (1866); and histories, *Histoire de la Restauration* (6 vols., 1851–53); *Histoire de la Turquie* (6 vols., 1854); *Histoire de la Russie* (2 vols., 1855). In 1867 the Government came to his aid with a pension of 25,000 francs. D. Feb. 27, 1869. An edition of his *Œuvres complètes* was published in Paris (41 vols., 1860–69). His *Mémoires* appeared in 1871, *Correspondance* (6 vols.) in 1873–75, *Poésies inédites* (1875). See Ollivier, *Lamartine* (Paris, 1874); C. de Pomairols, *Lamartine* (Paris, 1889); E. Deschanel, *Lamartine* (2 vols., Paris, 1893); F. Reyssié, *La Jeunesse de Lamartine* (Paris, 1892). A. G. Canfield.

Lamas, Andrés: statesman, diplomat, and historian; b. at Montevideo, Uruguay, Nov. 30, 1817. He was educated

in his native city, and early began to amass historical documents, gathering one of the finest private collections in South America; selections from this have been published from time to time as *Colección de Obras, Documentos y Noticias para servir á la historia del Rio de la Plata.* He has also published other historical works. Dr. Lamas was one of the founders of the Montevideo Historical Institute; was prefect of the city during the nine years' siege; was subsequently Minister of Finance, and several times minister to Brazil and the Argentine Republic. HERBERT H. SMITH.

Lamb, CAROLINE: See MELBOURNE.

Lamb, CHARLES: essayist; b. in London, Feb. 10, 1775. His father, who was a servant to one of the benchers of the Inner Temple, had some literary taste and a rare fund of humor, and was author of a small volume of verse. Charles was educated at the school of Christ's Hospital from his seventh to his fifteenth year, Coleridge being a fellow pupil and friend, and in 1789 obtained a clerkship in the South Sea House. In 1792 he became an accountant in the office of the East India Company, and remained at this post until 1825, when he retired on a pension. There was a tendency to insanity in the family, which manifested itself in Charles for a short time in 1795, and in his sister Mary the next year, when she killed her mother with a knife. In 1797 Lamb printed a small volume of verses written by himself, Coleridge, and Charles Lloyd. He devoted much attention to early English literature; published in 1807 *Tales from Shakspeare*, and in 1808 *Specimens of English Dramatic Poets who Lived about the time of Shakspeare.* He twice appeared as a dramatic author, having printed in 1801 a tragedy, *John Woodvil*, and in 1806 a farce, *Mr. H——*, which was brought out at Drury Lane theater. Neither of these plays had the slightest success, and the author wisely devoted thereafter his literary efforts to the field in which he is best known and most universally appreciated. Several brilliant essays appeared from time to time in Leigh Hunt's *Reflector* (1810) and in other periodicals, but it was not until 1820 that he began the *Essays of Elia* in *The London Magazine.* They were collected in 1823, and established his reputation as one of the most brilliant and thoughtful of humorists. In 1833 he added the *Last Essays of Elia.* After his retirement in 1825 from the drudgery of office labor, the remaining years of his life were passed in the companionship of a host of literary friends, to whom he was much attached. He was never married. D. at Edmonton, Dec. 29, 1834. An admirable biography and selection from his letters was published by T. N. Talfourd in 1840, and his *Final Memoriats* in 1848. A complete edition of Lamb's works and correspondence, with memoir, by Canon Ainger, was published in 1888. Also see Hazlitt, *Mary and Charles Lamb* (1874).—MARY ANN LAMB, b. in London in 1765, sister of Charles, was a woman of considerable literary talent, and took part in some of her brother's works, especially the *Tales from Shakspeare.* She resided through life with Charles, who was tenderly attached to her; received a pension after his death from the East India Company, and died at St. John's Wood, London, May 20, 1847.

Lamb, MARTHA JOANNA READE NASH: historical writer; b. at Plainfield, Mass., Aug. 13, 1829; resided after her marriage in Chicago, but in 1866 removed to New York, devoting herself to literature. Her distinguishing work was *The History of the City of New York* (2 octavo vols., 1877–81). She edited *The Homes of America* (1879); wrote *Memorial of Dr. J. D. Russ* (1881); *The Christmas Owl* (1881); *Snow and Sunshine* (1882); *Historical Sketch of New York* for the tenth census (1883); *Walt Street in History* (1883). In 1883 she became editor of *The Magazine of American History.* D. Jan. 2, 1893.

Lambayeque, lăm-bī'ā-kā: a coast department of Northwestern Peru; separated from Libertad in 1874; bounded N. W. by Piura, E. by Cajamarca, S. E. by Libertad, and S. W. by the Pacific. Area, 17,939 sq. miles. The eastern part lies on the slope of the coast Cordillera; the remainder is much broken, but has no very high land; it is generally dry, and portions are arid, but the valleys are very fertile. Agriculture is almost the only industry, the principal products being sugar-cane, tobacco, cotton, and rice. Pop. (1876) 85,984. Lambayeque, the capital, is situated on a plain bordering the river of the same name, about 6 miles from the sea; it is connected by railway with the ports of Pimentel and Eten. The river is subject to floods, which have repeatedly inundated and nearly destroyed the town. Estimated pop. (1889) 8,000, a large proportion being sambos and Chinese coolies. HERBERT H. SMITH.

Lambeck, PETER (*Lambecius*): librarian; b. at Hamburg, Germany, Apr. 13, 1628; studied in Holland, France, Italy; taught history in a gymnasium in his native city, and became rector of the same in 1660. On his conversion to Roman Catholicism in 1662 he became the superintendent of the Royal Library at Vienna, where he died Apr. 3, 1680. He is chiefly noted for his *Prodromus historiæ litterarum* (2d ed. 1710), the first chronological survey of the history of literature, and for *Commentarii de biblioth. Vindobonensi* (8 vols.; 2d ed. by Kollar, 1766–82), valuable for its contributions to the language and literature of Old High German.

Lamber, JULIETTE: See ADAM, Mme. EDMOND.

Lambert, ALEXANDER: See the Appendix.

Lambert, JOHANN HEINRICH: b. Aug. 29, 1728, at Mülhouse, in Alsace, in humble circumstances, but succeeded by industry and perseverance in developing his natural talent for mathematics and natural science; traveled much as private tutor to two young Swiss noblemen, and went in 1764 to Berlin, where Frederick II. made him a member of the Academy of Sciences. His *Photometria, sive de mensura et gradibus luminis colorum et umbræ* (1760) contains the first scientific representation of the measurement of the intensity of light; and his *Insigniores Orbitæ Cometarum Proprietates* still occupies an honorable place in the history of astronomy. His metaphysical writings, on the contrary, are quite forgotten. D. at Berlin, Sept. 25, 1777.

Lambert, JOHN: soldier: b. at Kirkby Malhamdale, Yorkshire, England, Sept. 7, 1619; studied law, and on the outbreak of the great rebellion entered the parliamentary army as captain under Lord Fairfax. He was conspicuous in the principal battles of the war; was colonel at Marston Moor (1644) and major-general in the Scots war (1650), in which he gained the actions of Hamilton and Inverkeithing; was appointed lord deputy of Ireland in 1652; was a member of Cromwell's council and Parliament (1654); and aided Cromwell to become Protector, but opposed his assumption of sovereign power in 1657, refusing to take the oath of allegiance, and was dismissed from court with a pension. In May, 1659, he was chiefly instrumental in the reinstallation of the Rump Parliament; defeated the royalists at Chester in August; came into conflict with and forcibly dispersed the Rump in October, thereby becoming head of the committee of safety and virtual ruler of England. Lambert started with an army to oppose Monk (November), but, the troops deserting in great numbers, he was soon seized by order of Parliament (Jan., 1660) and sent to the Tower, whence he escaped and reassembled forces against Monk; captured a second time, he was tried and condemned to death (June, 1662) by the new court of king's bench under Charles II. His sentence was commuted to banishment, and he died on the island of Guernsey in 1683.

Lambertville: city; Hunterdon co., N. J. (for location of county, see map of New Jersey, ref. 3–C); on the Delaware river, and the Penn. Railroad; 16 miles N. of Trenton, 44 N. E. of Philadelphia, 71 S. W. of New York. It has 2 rubber-factories, iron-foundry, railway construction and repair shops, shoe-factory, and cotton, paper, spoke, and twine mills. The city is lighted with gas and electricity, and contains 5 churches, high school, 3 ward schools, a parochial school, and 2 weekly newspapers. Pop. (1880) 4,183; (1890) 4,142; (1900) 4,637. EDITOR OF "BEACON."

Lambeth: a suburb of London, on the south of the Thames, opposite Westminster, with which it is connected by the Waterloo, Westminster, Lambeth, and Vauxhall bridges. It is a parliamentary borough and returns four members to the House of Commons. Lambeth Palace, an edifice of the Middle Ages, has been for centuries the principal residence of the Archbishops of Canterbury, and has a library of 30,000 books and 14,000 manuscripts, and a series of portraits of the archbishops, some of whom are buried here. The so-called Lollards' Tower (dating from 1434) of the palace derived its title from the notion that heretics were formerly confined in it, and was in reality a water-tower. St. Thomas's Hospital (built at a cost of £500,000), one of the great London hospitals, stands on the Albert embankment, facing the houses of Parliament, and treats about 70,000 indoor and outdoor patients annually. The celebrated Doulton pottery-works are also situated here, and hat-making, engineering, and glass-making are extensively carried on. See LONDON.

Lambeth Articles: nine articles adopted at a conference held in the palace of the Archbishop of Canterbury, at Lambeth, on Nov. 20, 1595, between the delegates of the University of Cambridge, William Whitaker and Tyndal, Archbishop Whitgift, and others. The conference was called to settle the theological controversy which had broken out in the university, which was the stronghold of Calvinism. The articles adopted are Calvinistic, and were drawn up by Whitaker. They have never had full symbolical authority in the Church of England, were indeed suppressed at the request of Queen Elizabeth, but are interesting as showing the ascendency of Calvinism among the English theologians of that period. For history, see Schaff's *Creeds*, i., 658–662; for text, see same, iii., 523, 524.

Lambeth Conference: See the Appendix.

Lambin, Denys (*Dionysius Lambinus*): classical scholar; b. at Montreuil, on Lake Geneva, in 1520; was educated in Italy, Amiens, and in Paris. For the greater part of his life he enjoyed the intimate friendship of Cardinal Tourron, a diplomat of some renown. He accompanied his patron on all his extensive travels, remaining in Italy for eleven years (1549–60), chiefly in Rome, where he was on friendly terms with many well-known scholars, such as Gabriel Faernus and Muretus. His ample leisure he occupied in the collation of MSS. in the Vatican Library which were to serve him as the basis of his contemplated editions. In 1561 he was called to Paris as professor of Greek and Latin. He died of apoplexy, superinduced by the horrors of the night of St. Bartholomew, in 1572. His editions of Horace, Lucretius, Plautus, and Cicero mark an era in the textual history and exegesis of these authors. They are distinguished by sobriety of treatment and a profound knowledge of the author's style. His vast learning, in marked contrast to the works of many of his contemporaries, is kept under control, and his commentaries have furnished much of the exegetical material found in modern editions of the above authors. See Orelli, *Onomasticon Ciceronis* (vol. i., appendix, pp. 478–491). Alfred Gudeman.

Lambinet, laăm'bĕĕ'nā', Émile: landscape-painter; b. at Versailles, France, Jan. 13, 1815. He was a pupil of Drölling and of Horace Vernet; was awarded medals in the Salons of 1843, 1853, and 1857, and the decoration of the Legion of Honor in 1867. He was a sympathetic and able painter. D. at Bougival, Jan. 1, 1878. W. A. C.

Lambruschini, laăm-broos-kee'nĕe, Raffaello, Abbé: writer and teacher; b. at Genoa, Italy, Aug. 14, 1788; passed some years at Rome in the study of theology under the tuition of his uncle, the cardinal, after which the young abbé returned to his father, then living in Tuscany, to devote himself to agricultural and philanthropic pursuits, going from time to time to Florence for the benefit of scientific lectures, especially on political economy, for which he entertained a very vivid interest. At the age of forty, Lambruschini published his first work—a work which proved him an elegant, careful, and thoroughly instructed writer anxious to promote all real progress. The habit of training plants suggested to him the true method of training men; Vieusseux intrusted to him the education of his nephew, and he afterward established a boarding-college for boys at his villa of San Carboni, and devoted himself exclusively to education. In 1836 he took the direction of *La Guida dell' Educatore*. In 1848 he, with Ricasoli and Salvagnoli, wrote politieal articles for *La Patria*, and was elected deputy to the Tusean Assembly. In 1849 he published his *Libri della Educazione*, then his *Dialoghi sulla Istruzione*, enlarged and reprinted in 1871. In 1859 he was made inspector-general of the schools in Tuscany, afterward of all the elementary schools of the kingdom, besides being intrusted with the superintendence of the Istituto di Studii Superiori, in which he was professor. He was a member of the senate. D. at Florence, Mar. 9, 1873.

Lamellibranchia'ta [Mod. Lat. < *lamella*, a thin plate + *branchiæ*, gills]: a class of molluscs to which many names—Acephala, Conchifera, Bivalva, Aglossa, Pelecypoda, etc.—have been given at various times. For the general structure of these forms, of which the oyster and clam may serve as types, see Mollusca. The Lamellibranchs are bilaterally symmetrical molluscs, the body being compressed from side to side. The mantle folds are large, and each secretes a calcareous covering so that the soft parts are inclosed in a two-valved shell, the valves being united only by a hinge on the dorsal line. Inside of the mantle cavity are the gills, which in most forms hang as two broad plates from the body-wall (whence the name of the group). The foot extends down in the median line, and is either capable of being freely protruded into the surrounding water, or, in those forms where the mantle edges are united, a small opening is left for its extension. Connected with the hinge of the shell is an elastic ligament which tends to keep the two valves apart; they are closed by one or two adductor muscles, the number of these forming the basis of the groups Monomyaria and Dimyaria, into which the Lamellibranchs were formerly divided. By others a division was made into Asiphonia and Siphonata accordingly as a siphon were absent or present at the hinder end of the body. The siphon (familiar to all as the neck of the clam) is a double tubular structure formed by the edges of the mantle, and occurs well developed only in those forms with burrowing habit. It there serves to bring water to the mollusc and to carry away the waste. When the siphon is present it is furnished with muscles to retract it, and as these muscles are attached to the shell, the conchologist can tell at once, by the markings on the shell, whether the animal had a well-developed siphon or not. In the Lamellibranchs there is no well-developed head (hence Acephala); tentacles, cephalic sense organs, lingual ribbon, etc., are lacking. On either side of the mouth are a pair of folds which serve to bring currents of water, and with them food, to the opening. The alimentary canal is long and convoluted, and in many species the intestine passes through the heart. Some have the sexes separate, others have them united in the same individual. All are aquatic, many occurring in fresh water, but the majority are marine; none is terrestrial.

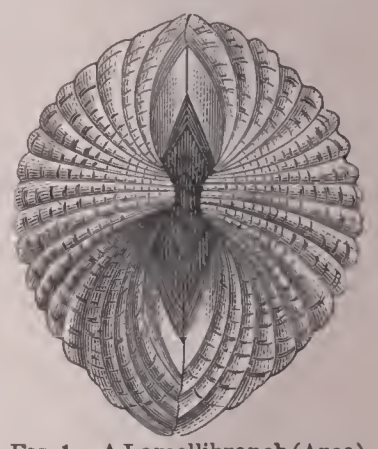


Fig. 1.—A Lamellibranch (Arca) showing the hinge line and the two equal valves of the shell.

The subdivision of the Lamellibranchiata into smaller groups has long been a difficult problem. The divisions upon the basis of muscles and upon the presence or absence of a siphon widely divorced nearly related forms. The tendency is to make the structure of the gills the basis, and Pelseneer's groups are adopted here. The primitive gill or ctenidium (see Mollusca) consists of a central axis containing blood-vessels, and from this on either side arise a number of gill-leaves, in much the same way that the barbs arise from the shaft of the feather. The gill-leaves may be elongated, folded back upon themselves, and be united with their fellows, and the classification is based primarily upon these modifications. The names of the principal families in each order are given below.

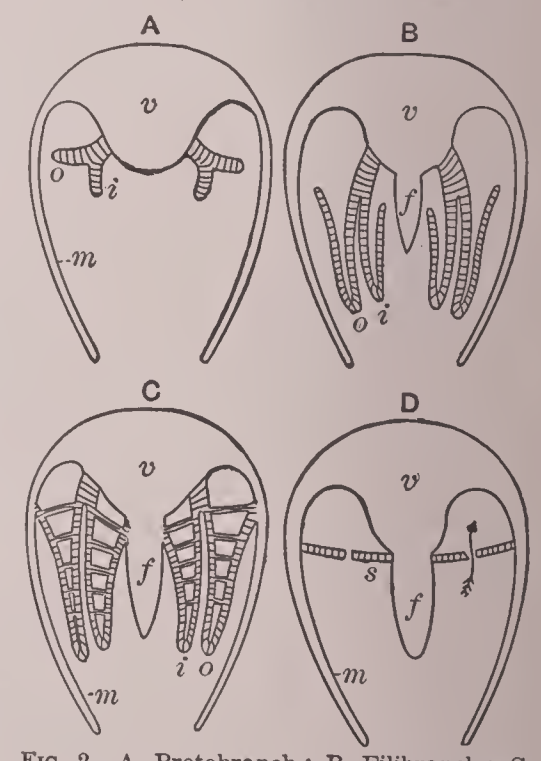


Fig. 2.—A, Protobranch; B, Filibranch; C, Eulamellibranch; D, Septibranch gills; *f*, foot; *i*, inner gill-leaf; *m*, mouth; *o*, outer gill-leaf; *s*, septum; *v*, visceral mass.

Order I. *Protobranchia*.—Gills a feathered ctenidium, its point projecting freely into the mantle cavity. Foot with a creeping disk. Cerebral and pleural ganglia distinct. Contains the *Nuculidæ* and *Solenomyidæ* (Fig. A).

Order II. *Filibranchia*. — Gill-leaves modified into long threads or filaments, each bent upon itself, and its tip extending upward, as is shown in the illustration B. Contains the *Anomiidæ*, *Arcidæ*, *Trigonidæ*, and *Mytilidæ*.

Order III. *Pseudolamellibranchia*.—Gill filaments bound

together by ciliated disks or by vascular processes. Contains the *Pectinidæ*, *Aviculidæ*, and *Ostræidæ*.

ORDER IV. *Eulamellibranchia.*—Filaments not distinguishable, the vascular connections being so numerous as to make the whole of each row appear like a membrane perforated by numerous holes. These are the true Lamellibranchs, and here are found the great majority of the bivalve molluscs (Fig. C).

ORDER V. *Septibranchia.*—The gills are altered to a muscular partition, broken by holes, separating a ventral from a dorsal mantle cavity (Fig. D). The *Poromyidæ* and *Cuspidariæ* belong here.

The oysters and clams are an important food element; the teredos (see TEREDINIDÆ) mine and destroy the timber of ships and the piling of wharves in the marine seas of the globe; while the pearl oysters and the fresh-water mussels supply the pearls and mother-of-pearl. Some live buried in mud or sand, while others become fastened to solid objects in various ways. Thus the oysters grow fast to rocks or other shells, while the mussels and pinnas anchor themselves by silken threads (byssus) spun by glands in the foot. Living for the most part the most sedentary of lives and protected by their shell, they have but little call for sense organs besides those of taste and touch. Eyes are rare; they occur at the end of the siphons in certain forms, while in the scallops (*Pectinidæ*) highly developed visual organs occur on the margin of the mantle. For the literature of the group, see MOLLUSCA.

J. S. KINGSLEY.

Lamelliros'tres [Lat. *lamella*, a thin plate + *rostrum*, beak, bill]: an order of birds containing the ducks, in the widest meaning of the word, and the flamingoes. By most modern authorities the screamers, *Palamedea* or *Anhima*, are also included in the order. Excluding these last, the members of the order are characterized by a bill whose sides are furnished with little horny plates, projections, or *lamellæ*, such as we are familiar with in the common duck. The end of the bill bears a horny nail, the rest is covered with soft skin. The toes are webbed. The palate is desmognathous, the sphenoid has low, basipterygoid facets, rudimentary in the flamingo, the angle of the jaw is produced and curved upward. The eggs are numerous, and the young are covered with down and able to run and swim as soon as hatched. Lamellirostres is the equivalent of Huxley's *Chenomorphæ*, less the flamingoes, and is about synonymous with the *Anseres* of modern writers. See DUCK, FLAMINGO, GOOSE, SWAN, etc.

F. A. LUCAS.

Lamennais, laă'mā-nā', HUGUES FÉLICITÉ ROBERT, Abbé, de: politico-religious writer; b. at St.-Malo, Brittany, France, July 19, 1782; acquired very early a comprehensive knowledge of theology, philosophy, and history; adopted, though only after some hesitation, the ecclesiastical career; received the tonsure in 1811, and took holy orders in 1817. It struck him that lack of true religion was the real cause of all the mental and moral troubles from which the age suffered; and although he moved along through many and very singular windings, and changed his standpoint and allies more than once, at the bottom of all his different views of the world lies the idea that the regeneration of the time depends on a religious revival. The first work in which he set forth his idea with full power was his *Essai sur l'Indifférence en Matière de Religion* (4 vols., 1817–20), a brilliant apology for the Church and the monarchy, hailed with enthusiasm by the Ultramontane clergy and the old-conservative statesmen, but offensive to the Gallican party in the French Church, and hateful to all the different shades of democracy and liberalism. It awakened a certain suspicion, however, even among its best friends. The monarchy, he held, was not based on its legitimacy, but on its usefulness to the Church, and in the Church the highest authority was not sought for in the infallibility of the pope, but in the universal consent of all Christians. In his next following works, *La Religion considérée dans les Rapports avec l'Ordre civil et politique* (2 vols., 1825–26) and *Progrès de la Révolution et de la Guerre contre l'Eglise* (1829), this idealization of the existing Church and monarchy developed into a tendency toward reform of both; and after the July revolution in 1830 he openly broke with the old monarchy, and tried in his journal, *L'Avenir*, to establish an alliance between the Church and the free constitutional government. He was immediately denounced at Rome, and the pope condemned in 1832 the views set forth in *L'Avenir*. Nor was he accepted by the doctrinaires, who felt that his present standpoint was only an intermediate station from which he soon would pass into radicalism. At the first moment he submitted completely to the papal condemnation: *L'Avenir* was suspended; but after a year's silence and meditation he published in 1834 his *Paroles d'un Croyant*, which made an unexampled sensation; it ran through 100 editions in a few years, and was translated into all European languages. The pope condemned it, and Lamennais answered by his *Affaires de Rome* (1836). By these two books he broke absolutely with the Church, and in his subsequent works, *Le Livre du Peuple* (1837), *Esquisse d'une Philosophie* (3 vols., 1841–43), *De la Religion* (1841), *Du Passé et de l'Avenir du Peuple* (1842), he appeared as the apostle of the democracy, as the prophetic expounder of the alliance between Christianity and radicalism. In 1849 he was a member of the Constituent Assembly: after the *coup d'état* he lived in absolute retirement. D. Feb. 27, 1854. In accordance with his will, his corpse was taken to Père la Chaise and deposited among the poor and unknown, without any funeral rites; not even a simple stone marks his grave. His works have been collected in *Œuvres complètes* (11 vols., Paris, 1844 ff.); *Correspondance* (2 vols., 1866); *Œuvres posthumes* (2 vols., 1866). See E. Spuller, *Lamennais* (Paris, 1892).

Revised by A. G. CANFIELD.

Lamentations, Book of: a canonical book of the Old Testament, following the book of Jeremiah, and generally attributed to that prophet. It consists of five chapters. Each is composed of twenty-two verses (except the third, which has sixty-six), according to the number of letters in the Hebrew alphabet, and is an acrostic, each verse beginning with a distinct letter. The contents are, as indicated by the title, a series of dirges or threnodies upon the downfall of Israel. Some have found the occasion of its composition in the defeat of Josiah at Megiddo, and regard the references to the ruin of Jerusalem as predictive; but the internal evidence is decisive that it must have been written after the event it commemorates. Little opposition has been made by modern critics to the tradition derived from the Septuagint text and supported by the Talmud, which refers its authorship to Jeremiah, treating it as an appendix to the prophecies.

La Mesa, laa-mā'saă (in full, LA MESA DE JUAN DIAZ): a town of Colombia, state of Cundinamarca; beautifully situated on a plain 25 miles W. N. W. of Bogota; 4,225 feet above the sea (see map of South America, ref. 2–B). It is surrounded by plantations of sugar-cane, coffee, and cacao, and is the chief center of trade between the towns of Cundinamarca and Tolima. Pop. (1892) about 9,000, and rapidly increasing.

H. H. S.

Lameth', ALEXANDRE THÉODORE VICTOR, Count de: party leader; b. in Paris, Oct. 28, 1760; descended from a noble family of Picardy; was one of three brothers who figured largely in French politics during and subsequent to the Revolution, after having rendered services in the American war of independence on the staff of Count Rochambeau. Alexandre became a colonel in 1785, and was elected a deputy from the nobility of Péronne to the States-General in 1789, but joined the Third Estate, and took an active part in the destruction of the privileges of the nobility and clergy. He was chosen president of the National Assembly Nov. 20, 1790; afforded protection to Louis XVI.; tendered him counsels which were disregarded; was a member of the constitutional committee; had frequent conflicts with Mirabeau, who taunted him with his subservience to the court; and he opposed the violent counsels of Robespierre and the Jacobins. On the outbreak of war with Austria (1792), Lameth served as field-marshal in the army of the North; was accused by the Assembly (Aug. 10), together with La Fayette; escaped from France, was seized by the Austrians, and imprisoned three years; repaired to England in 1795; was well received by Fox and the Whigs, but, being ordered by Pitt to leave the country, joined his brother Charles at Hamburg. Under the consulate and empire Lameth was prefect of several departments; was appointed lieutenant-general by Louis XVIII. in 1814, and during his reign was for four sessions a leader of the opposition in the Chamber of Deputies. Lameth wrote much on politics, his most important work being *Histoire de l'Assemblée constituante*. D. in Paris, Mar. 18, 1829.

Revised by F. M. COLBY.

Lameth, CHARLES MALO FRANÇOIS, Count de: soldier and party leader; b. at Paris, Oct. 5, 1757; brother of A. T. V. Lameth; served as captain on Count Rochambeau's staff in the American Revolutionary war; was wounded at the capture of a British redoubt at Yorktown, and promoted to be

colonel. During the Revolution his career was like that of his brother Alexandre; he was at one time (July 5, 1791) chosen president of the National Assembly, in which he had taken the lead in many important measures of reform, but, like his brother, opposed both Mirabeau and the more violent element represented by Robespierre. He tried to uphold the constitutional monarchy and to defend the king against the attacks of red republicans. At the opening of the campaign of 1792 he served as field-marshal, but had to flee after the events of Aug. 10, 1792, and settled at Hamburg. From 1809 to 1814 he served in the army under Napoleon, obtaining the rank of lieutenant-general. After the Restoration he lived in privacy until elected to the Chamber of Deputies in 1829; co-operated in the revolution of 1830, and died in Paris, Dec. 28, 1832.—His elder brother, Count Théodore, b. at Paris, June 24, 1756, also served in America, and was a deputy in 1791 and 1792. He contended for the constitution of 1791 with remarkable courage and firmness, and remained at his post even after the events of Aug. 10 and the September massacres, but finally was forced to flee. He took little part in polities for the rest of his life, though he returned to France after the *coup d'état* of the 18 brumaire. D. at Busagny, Oct. 19, 1854.

Revised by F. M. Colby.

La Mettrie, laa-mā'tree', Julien Offray, de: philosophical writer; b. at St.-Malo, Brittany, Dec. 25, 1709; studied medicine, and was appointed physician in the army of the Duke of Gramont, but was discharged on account of his *Histoire naturelle de l'Âme* (The Hague, 1745), which book was publicly burnt for its materialism and atheism. After the publication of *La Politique du Médecin de Macchiavel* (Amsterdam, 1746) he was compelled to leave France, and sought refuge in Holland, but he was expelled from that country on account of his *La Faculté vengée* (1747) and *L'Homme-machine* (Leyden, 1748). He removed to Berlin on the invitation of Frederick II., with whom he lived in great intimacy. Here he wrote *L'Homme-plante* (1748), *Art de jouir* (1751), etc. D. suddenly Nov. 11, 1751. Frederick II. wrote his *éloge*. Cf. Queprat, *La Philosophie matérialiste au XVIII^e Siècle* (Paris, 1873).

Revised by A. G. Canfield.

La'mia, or **Lami'a** (in Gr. Λάμια and Λαμία): 1. A daughter of Poseidon, who bore to Zeus Libyssa the first or Delphic sibyl. 2. A beautiful Queen of Libya, whom Hera robbed of her children because she was beloved by Zeus. Hera made of her a hateful, ugly witch, who went about strangling all the children she could find. She could take out and replace her eyes at will. The name included numerous hobgoblins, who, vampire-like, sucked the blood of young men. 3. A mistress of Themistocles. 4. An Athenian flute-player, the daughter of Cleanor. When past her prime she became the mistress of Demetrius Poliorcetes, who captured her along with the rest of the harem of Ptolemy. She gained complete ascendency over Demetrius, who even allowed her to levy taxes at her own pleasure, and himself levied a tax of 250 talents on the Athenians to serve as pin-money (rouge) for her. The Athenians and Thebans built temples to her as Aphrodite Lamia, and Sicyon erected a stoa in her honor. (See Droysen, *Geschichte des Hellenismus* (Gotha, 1878), ii., 2, pp. 192–193, with note.) 5. A city of Phthiotis, in Thessaly, still called Lamia, though under Turkish sway it was called Zeitun. It was situated 30 stadia N. of the Sperchius river and 50 stadia from the Gulf of Malia. The city gave its name to the Lamian War (*q. v.*). 6. A surname of the Roman Ælian gens, e. g. L. Ælius Lamia.

J. R. S. Sterrett.

Lamian War: a war between the Macedonians and the Athenians and their Greek allies. Alexander the Great had already irritated the Athenians by requiring them to offer him divine honors, but it was more than they could stand when at the Olympic games of the year 324 B. C. he caused to be promulgated a decree allowing all political exiles to return to their native countries throughout Greece, and promising to use force should any state refuse to comply with his wishes. After the death of Alexander in 323 B. C., Athens and Ætolia determined to resist the return of so many dangerous persons, even at the price of a war. Against the advice of Phocion the Athenians instructed Leosthenes to collect an army of mercenary troops. He succeeded in raising 8,000, Ætolia sent 7,000, while at the insistence of Athens most of the states of Northern Greece and the Peloponnesus sent troops to aid in the war. In a battle at Heraclea (323 B. C.) Antipater was worsted and withdrew into the city of Lamia (*q. v.*) after having been deserted by the Thessalian troops. Lamia was invested by Leosthenes, who, having been killed early in 322, was succeeded by Antiphilus. Leonnatus had now come from Asia Minor to the aid of Antipater with nearly 25,000 men. Antiphilus raised the siege of Lamia and hastened to offer battle to Leonnatus, who was killed in a cavalry charge. In the meantime Antipater had escaped to the highlands of Southern Thessaly, where in an intrenched camp he awaited the coming of Craterus with re-enforcements that swelled the Macedonian army to nearly 50,000. The battle took place at Crannon, on Aug. 5, 322 B. C. Its issue was doubtful, but the Greeks were disheartened and offered to treat. Antipater declined to receive the embassy, stating that he would treat only with the individual states. The allies gradually dropped off, leaving Athens and Ætolia alone. Antipater then marched upon Athens, which sent Phocion and Demades to treat with Antipater, but he demanded the surrender of the patriotic orators, Demosthenes, Hyperides, and others, the establishment of a Macedonian garrison at Munychia, the payment of the cost of the war, and the reduction of the number of Athenian citizens to 9,000, citizenship being reckoned on a property basis. The terms had to be accepted. The orators fled, were condemned to death, and were hunted down and executed. The Ætolians obtained better terms than did the Athenians.

J. R. S. Sterrett.

Lamina'ria [Mod. Lat., deriv. of Lat. *la'mina*, thin plate]: a genus of seaweeds. The species *L. digitata*, *bulbosa*, and *saccharina*, all deep-sea plants, are prized in Europe for the rich supply of iodine afforded by them when burned as kelp. The stem of *Laminaria digitata* (sea-tangle, girdle) is manufactured into bougies and uterine tents for surgeons' use. In some cases these tents are superior to tents of compressed sponge. It is remarkable that the sea-tangle of the American coasts, specifically identical with that of Europe, is unfit for this use. See Kelp.

Lamini'tis: See Farriery.

Lam'mas Day: the festival of St. Peter's chains (Aug. 1), probably so called because it was an ancient practice on this day to make an offering of bread as first-fruits of the year; hence Lammas for O. Eng. *hlāfmæsse*, i. e. loaf-mass.

Lammas Lands: See the Appendix.

Lammergeier, lăm-mĕr-gī'er [from Germ. *lämmergeier*, lamb-vulture]: a bird of prey having the appearance of an eagle and the habits of a vulture; found in the mountainous portions of Southern Europe and Central Asia. The length is a little under 3½ feet, the spread of wing about 10; the general color of the old birds is very dark brown above, tawny below, head white, with a black line on either side, and tuft of black bristles beneath the chin. The bill is strong, the feet weak. The tales of the lammergeier's strength and boldness seem to have little foundation in fact. It kills small animals, but feeds to a great extent on carrion. It is fond of marrow bones and tortoises, both of which it breaks by dropping them upon the rocks. It is supposed to have been one of these birds which killed the poet Æschylus by mistaking his bald head for a stone and dropping a tortoise upon it.

F. A. Lucas.

Lammermoors': a range of hills, 1,732 feet high, forming the boundary between East Lothian and Berwickshire, Scotland, and covering the southeastern part of the latter county, where it presents a bold, rocky, and dangerous coast to the North Sea.

Lam'nidæ [Mod. Lat., liter., those belonging to the Lamna tribe; *lamna*, the typical genus (from Lat. *lamina*, thin plate) + Gr. patronymic suffix *-ίδα*, plur. of *ίδης*, descended from]: a family of sharks, with a fusiform body; the caudal fin with the lower lobe a little smaller than the upper; with a keel on each side of the tail; and two dorsal fins, the first of which is behind the pectorals. The family embraces several genera, including the mackerel shark, and the formidable man-eater of the American waters. The row of teeth on the upper jaw in all these forms exhibits a break a short distance from the symphysis on each side, where the teeth are much smaller than the others. Two well-defined groups represent the family—viz., Lamnæ, in which the teeth are lanceolate or sigmoidally curved, and not serrated; and Carcharodontes, in which the teeth are triangular and serrated. The two groups are represented in the Atlantic as well as Pacific waters of North America, the Atlantic species being *Lamna cornubica* and *Carcharodon carcharias*. The family was well represented in past geological epochs,

and enormous teeth of *Carcharodon* are found in Tertiary beds. Revised by D. S. Jordan.

Lamont, Daniel Scott, A. M.: U. S. Secretary of War; b. at Cortlandville, N. Y., Feb. 9, 1851; educated at McGranville Academy and Union College. Mr. Lamont was private secretary to Mr. Cleveland while Governor of New York 1883–85; and private secretary to Mr. Cleveland during his first term as President 1885–89. In 1893 he entered Mr. Cleveland's cabinet as Secretary of War. C. H. T.

Lamotte, lăă'mot', Antoine Houdard, de: author and critic; b. in Paris, France, Jan. 17, 1672; studied in a Jesuit college; obtained success in writing operas of the pastoral type, and also with four tragedies, of which *Inez de Castro* (1723) is considered the best. He became blind at the age of forty; was admitted to the Academy in 1710; was dramatic censor, and noted for the literary paradoxes in his critical essays. He wrote many fables, odes, and eclogues, depreciated Homer, and brought out an "improved and corrected" *Iliad* in French verse, reduced to ten books, which involved him in a violent controversy with Madame Dacier. D. in Paris, Dec. 26, 1731. His complete works form 10 vols. (1754). Revised by A. G. Canfield.

Lamp [from O. Fr. *lampe* < Lat. *lampas* = Gr. λαμπάς, torch, candle, lamp, deriv. of λάμπειν, shine]: a contrivance for providing light by burning some liquid, which is raised to the flame by means of a wick, and so burned slowly and regularly. The simplest lamp is a mere bowl or saucer, in which a wick is dipped; this sometimes floats in the combustible liquid, being held up to the surface at one end by a floating ring or disk, and sometimes lies on the edge of the vessel in a groove, or corrugation, or spout made for the purpose. The lamps which hang in the mosques of Damascus and Cairo, often of splendid enameled glass or Persian decorated pottery, are of the former kind, as are the silver and brass ones so numerous in the larger Roman Catholic churches of Europe. The Greek and Roman lamps were generally of the other sort. They exist by thousands in museums, occasionally richly adorned, but much more commonly made in the cheapest way of common pottery. The bronze lamps of Etruscan make are sometimes very richly adorned with relief sculptures. Some have several wicks; one in the Museum of Cortona has sixteen, surrounding a central reservoir; this one was intended to be hung from the ceiling or from a projecting arm, as it has no foot, and the under side is richly adorned. Some bronze lamps found in Pompeii, and now in the Naples Museum, are far more delicately and tastefully made than the Etruscan specimens. One large one at Naples has a beautiful stand of bronze about 6 inches high, evidently intended to rest upon a table, and to raise the low and flat lamps to a convenient height for reading. Among the Romans of means it was more general to rest the lamp upon or to hang it from a Candelabrum (*q. v.*). It is not known that the ancients had any means of increasing the light, steadying the flame, or preventing smoking, such as the modern lamp-chimney.

All the modern devices for improved lighting by means of lamps consist in new fluids for burning, or in appliances for making the flame brighter and steadier, or both. Thus petroleum has been used in Asia for many centuries, but modern ingenuity has provided a purified form of it, and has also furnished lamps which burn it without smoke, with a vivid and steady light, and with little danger of explosion or of the flame communicating with the fluid in the reservoir. Of all these improvements, the greatest is the lamp-chimney, producing a steady upward current of air. The cylindrical wick, moving up or down between two concentric tubes, and allowing the air to reach the inside as well as the outside of the flame, is a further advance; this, of course, would be impracticable without the chimney. There are certain devices which aim to supplement and assist the capillary attraction of the wick, such as that of the moderator-lamp, which has an apparatus with a piston pressing downward upon the oil in a tube, and controlled by a spring; and the carcel-lamp, in which a clockwork pump keeps up a steady supply of oil.

By extension the term lamp is applied to many lighting appliances which are not based upon a burning liquid; thus the oxyhydrogen light in some of its forms is called Dobereiner's lamp, Drummond's lamp, and by other similar names, and in electric lighting it is usual to speak of arc-lamps and incandescent lamps.

Lampadedro'mia [in Gr. Λαμπαδηδρομία, the torch-race]: a race originally intended to commemorate the bringing of fire from heaven by Prometheus, who concealed it in a reed, and as he ran from heaven to earth swung the reed to keep the spark alive. Several files, with several relays of racers in each file, competed with each other for the prize. Each runner had to maintain a high rate of speed, and hand over the torch still lighted to the next runner in his file. The last runner in a given file, who first reached the goal with his torch lighted, gained the victory for his file, so that he was spoken of as the first and last runner. This race was the most popular festival at Athens, as well as throughout the Greek world, for it was held in honor of all the fire and light gods. J. R. S. Sterrett.

Lampasas: city (former government abolished 1889, present city organized Apr., 1890); capital of Lampasas co., Tex. (for location of county, see map of Texas, ref. 4–H); on the Sulphur fork of the Lampasas river, and the Gulf, Col. and S. Fé Railway; 60 miles N. W. of Austin. It is in an agricultural and stock-raising region, has an assessed property valuation of over $2,000,000, and contains a national bank with capital of $80,000, and a monthly and three weekly periodicals. Pop. (1890) 2,408; (1900) 2,107.

Lampblack: a term applied technically to carbonaceous pulverulent matters deposited during the imperfect combustion of carburetted gases or vapors. The quality, both as regards fineness and color, for use in pigments, blacking, and printing-inks, varies greatly with the materials burned in the manufacture and with the methods employed. For the cheaper commercial qualities the materials employed are gas-tar, wood-tar, petroleum, soft resinous woods like pine, pitch, rosin, and even bituminous coals. In making ordinary lampblack several qualities are obtained at the same time in the same apparatus, by means of the following arrangement: The fireplace is connected with the soot-chambers by means of a brickwork gallery or horizontal flue at least 14 feet long, in which inferior tarry material deposits. A series of chambers or condensers then usually follows, in which the successive deposits increase in fineness and value successively. The last chamber has suspended over it a loose conical hood, of coarse woolen material, through which the draught percolates, and which of course collects the finest black of all. As the pores of this hood become clogged it is shaken or tapped. Its contents are reserved for fine printer's ink and similar uses.

Lampblack in crude form always contains some oily, tarry, or resinous matters. When printer's inks or oil-colors are to be prepared, these impurities are immaterial, but when water-colors are wanted, as when to be ground with gum-water to make imitation India inks, etc., the resinous and tarry matters must be removed beforehand. This may be done by careful calcination, but not without detriment to the quality of the finer blacks. A better way, therefore, is to work into a paste with heated oil of vitriol, which chars and destroys the hydrocarbonaceous matters. Thorough washing with water yields then a very superior material for India ink. Revised by Ira Remsen.

Lampman, Archibald: See the Appendix.

Lamprey [M. Eng. *lampreie*, from O. Fr. *lamproie* < Lat. *lam'petra* (later *lampedra*), lamprey]: the common name of the *Petromyzontidæ*, cartilaginous fishes of the group *Hyperoartia*, class *Marsipobranchii*, having an eel-like body, a round, sucking mouth with numerous teeth, and seven round gill-holes on each side of the neck. Europe has two abundant species, the *Petromyzon marinus* and *Lampetra fluviatilis*; the U. S. have a number of species, among which are *P. marinus* and species of *Ammocœtes* and nearly allied genera. They are prized as food by some. The lampreys are represented in Australia by the pouched lamprey (*Geotria australis*), which has an enormous pouch upon the throat. See Petromyzontidæ.

Lampri'dius, Ælius: one of the *scriptores historiæ Augustæ*, who lived in the time of Constantine the Great. Four biographies are inscribed with his name—namely, those of Commodus, Antoninus Diadumenus, Elagabalus, and Alexander Severus. See Augustan History.

Lampsacus (Λάμψακος): ancient Greek city in Mysia, on the Hellespont, opposite Callipolis; famous for its wines; a center of phallic worship. With Myus and Magnesia it was assigned to Themistocles for his maintenance. Few remains exist. Lapsaki, a modern village of 200 houses, occupies the ancient site. E. A. G.

Lamps, Electric: devices for converting the energy of an electric current into light. The two systems of lighting

by electricity have been described under ELECTRIC LIGHTING. It remains to describe somewhat more minutely the construction and operation of the devices for the utilization of the electric arc, and of glowing carbon filaments for the purpose of artificial illumination.

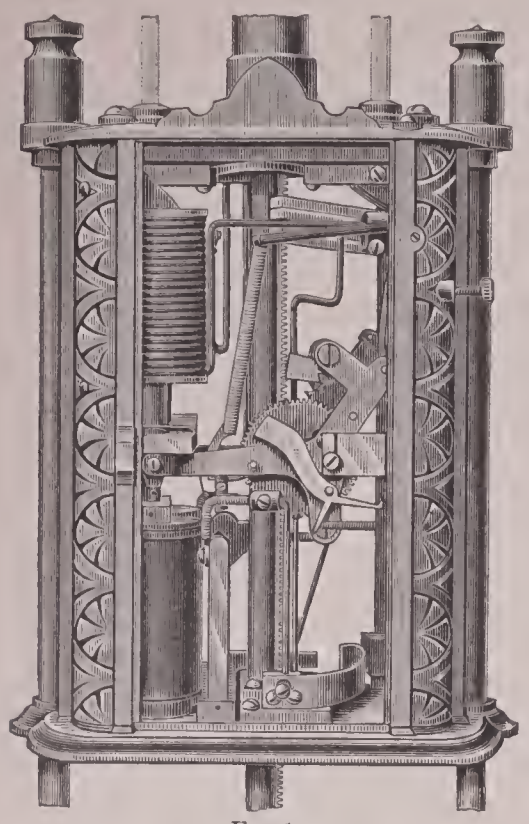


FIG. 1.

The numerous practical devices which have been used to secure the adjustment of the two carbon-pencils as they wear away, when the electric arc is maintained between their separated ends, may be divided into two general classes—one for use on constant-current circuits, and the other on constant potential circuits. The former class constitutes the larger number of lamps in operation in the U. S. (1894), but the latter class is coming rapidly into public favor. Both classes are subdivided into lamps for direct currents and lamps for alternating currents.

The operating mechanism of constant-current lamps is either differential in action or else the feeding of the upper carbon is effected wholly by means of a high resistance electro-magnet connected as a shunt or by-path to the arc. While the main current traverses the arc, a small part goes past by this shunt.

Fig. 1 illustrates one form of differential lamp. The upper or series electro-magnet is wound with a few turns of coarse wire, while the lower or shunt magnet is wound with a fine wire helix of many turns. The ends of this latter are connected to the positive and negative terminals as a shunt to the arc.

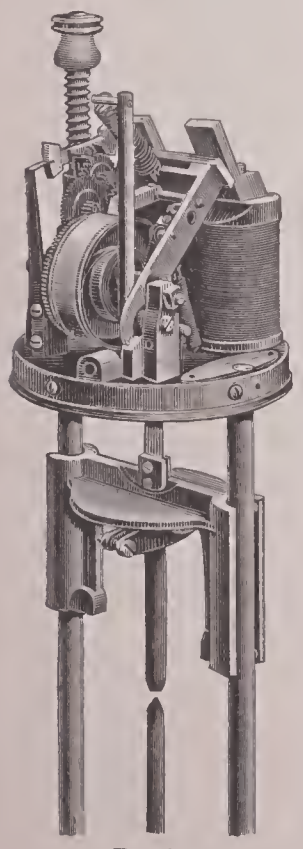


FIG. 2.

The regulation of this lamp is effected in the following manner: The movement of the upper carbon-holder is controlled by a train of wheels carried on a lever which swings on a fulcrum. This lever is shown in the center of the figure. The escapement is held out of action when the lever is drawn up so as to separate the carbon-pencils, and is set free when the lever is drawn down. The lever has attached to it a retractile spring, capable of lifting it together with the connected train of wheels, the carbon-holder, and the upper carbon-pencil. The iron core of the upper magnet rests on the lever and depresses it. As soon as the current is sent through the lamp, the core of the upper helix is lifted and the spring lifts the lever and the upper carbon by means of the gear-train. The arc is thus formed between the carbons, and as they wear away the potential difference between them increases and a larger current is deflected through the shunt. The shunt magnet then draws down its core and the attached lever till the escapement is released and the wheel-train allows the carbons to approach by gravity. This shortens the arc, diminishes the shunt current, and the lever rises by the combined action of the series magnet and retractile spring till the escapement is again locked. The arc is thus maintained at a nearly constant length.

In the other class of constant-current lamps the series coil has no office except to lift the carbon-holder when the current is turned on, and its armature is then held rigidly in front of its poles. The shunt magnet is arranged to release the hold of the clutch on the rod of the carbon-holder, or to release the detent which holds the rack and pinion out of action so long as the potential difference between the carbon-pencils is less than a predetermined value. The variation of potential difference required to operate the shunt magnet is from one to five volts.

Arc-lamps adapted to multiple lighting on constant potential circuit contain only a shunt magnet, which serves the purpose of feeding the upper carbon downward.

The Siemens & Halske band lamp illustrates this type. Fig. 2 shows the actual mechanism, and Fig. 3 an outline of the parts. The name of the lamp is derived from the band of copper which is wound on the drum *b*, and carries the carbon-holder. An inclined frame *r* turns on pins at *c* and supports the drum, the pinion-wheels, and the escapement. The magnet *m* is connected as a shunt to the arc. Its attraction of its iron armature, *e*, and the weight of the carbon-holder draw down the frame *r*, while the opposing spring, *f*, pulls in the opposite direction. When the copper band unwinds, the pinion-wheels revolve and the escapement with its balance lever, *a*, oscillates rapidly. So long as the frame is near its highest position, a tongue projecting from *a* strikes a stop, *d*, and the motion of the gear-train is arrested. When the frame descends, the balance lever is released and the copper band is slowly unwound from the drum by the weight of the carbon and holder.

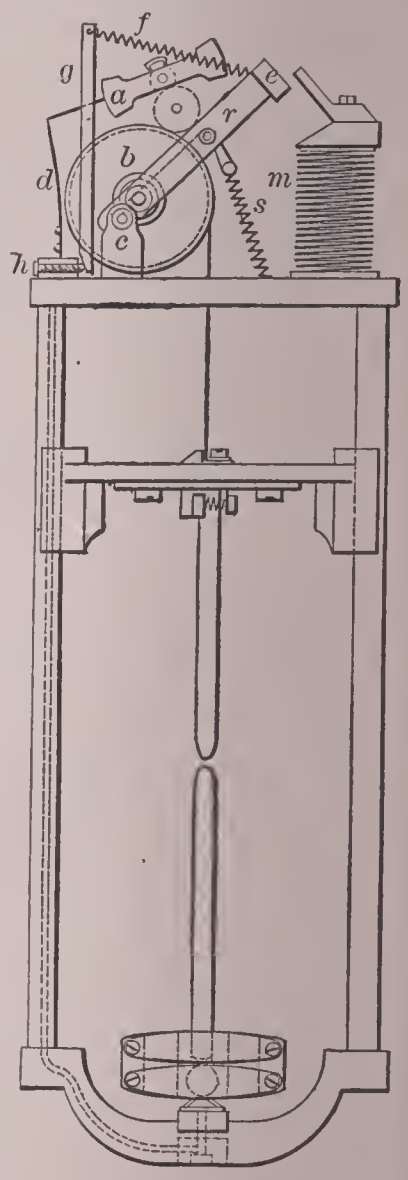


FIG. 3.

When the current is turned on, the magnet *m* draws down the frame, the copper band unwinds, and brings the carbons together. This diverts the current from the magnet, and the spring *f* lifts the frame, and the arc forms between the carbons. By the separation of the carbons the magnet *m* is again excited, and draws down the frame to a position of equilibrium. Any increase of the arc thus causes an excitation of the magnet sufficient to release the escapement at the point *g*, and so to start the feeding mechanism. The feed of the lamp is thus secured at regular time-intervals.

Two such lamps can be placed in series on a 110-volt circuit. A regulating resistance must be placed in series with them; for, if the resistance of the circuit is nearly all in the arcs, an increase in their length increases the resistance and decreases the current in nearly the same ratio, so that the potential difference between the carbons remains nearly constant, leaving no margin of change to operate the feeding mechanism. About 25 per cent. of the energy required for the lamps is absorbed by this regulating resistance.

Arc-lamps for alternating currents are constructed in substantially the same manner as those for direct currents, except that all iron composing the cores and armatures of the electro-magnets must be laminated.

The light-emitting portion of an incandescent or glow-lamp is the carbon filament. Its efficiency depends upon the temperature at which it can be run. The possible limit is the temperature of the volatilization of carbon, which is probably lower in a vacuum than at atmospheric pressure;

but there is another effect, which puts a lower limit upon the temperature which can be maintained in practice. When the filament is above red heat an action begins by which the carbon is dissociated and is projected upon the inclosing bulb, which gradually blackens by the deposit of carbon particles. This disintegration is greater with filaments having a dead-black surface than with those possessing a smooth, hard, steel-gray one. Hence the latter is usually the better, even though its emissivity is smaller.

The successful processes of manufacturing filaments require the use of materials containing carbon in chemical combination with other elements, such as cotton, silk, woody fiber, or pure cellulose. Such materials, after being reduced to the proper form, require baking at a high temperature out of contact with the air, and then raising to incandescence by means of the electric current in an atmosphere of hydrocarbon vapor. The first process is called carbonization; the second flashing. By the first, the volatile constituents of the filament are driven off, nearly pure carbon remaining; by the second, the filament is coated with carbon from the dissociated vapor, the deposit assuming the silvery-gray luster so much desired for endurance.

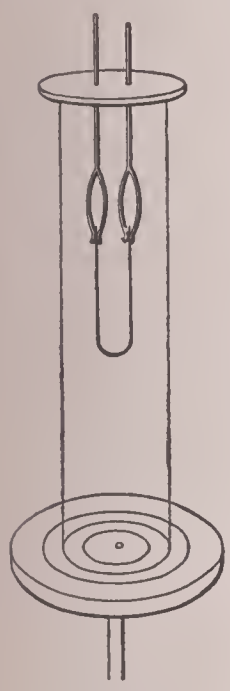


Fig. 4.

Filaments made from the bamboo by Edison's process are cut and shaped, bent round a form, and carbonized. These may be used without further treatment, but they are improved by the flashing process.

The Swan process in England consists in parchmentizing cotton thread by drawing it through sulphuric acid, which converts it into a substance called amyloid. It is then shaved down by pulling through a sharp-edged draw-plate, carbonized on a form which accommodates itself to the shrinkage of the thread during the heating, cut into the required lengths, subjected to the flashing process, and mounted in a glass globe.

Another process of treating cotton, resulting in practically the same substance, consists in dissolving cotton in a solution of zinc chloride, forcing the viscous solution through a small hole into a vessel containing alcohol, which hardens it. This produces an amyloid thread of such uniform cross-section that no shaving by a draw-plate is required.

In Weston's process the cotton is first converted into pyroxyline and then into celluloid. This is rolled into thin sheets and treated with ammonium sulphide, which converts it again into cellulose. The filaments are cut or stamped out of this flexible, transparent substance, and they are then carbonized in the usual way.

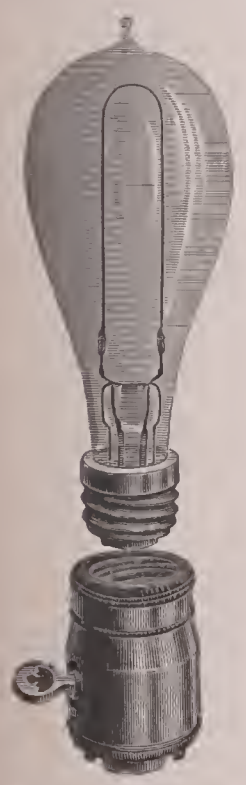


Fig. 5.—Sixteen-candle lamp.

When silk is used for making filaments it does not require the action of acid, but it may be carbonized without preliminary treatment. Special precautions must be taken with the temperature during the carbonization of animal substances.

The treatment required to give to the filaments the requisite thin coating of dense carbon is best applied before mounting, because of the brown deposit which appears on the glass envelope. The filament is mounted in a rarefied atmosphere of benzole or pentane (Fig. 4), and is kept at a bright-red heat by the electric current till it shows the desired resistance. This process reduces the resistance by thickening the filament, and at the same time reduces the emissivity. The filaments are attached to the in-leading platinum wires by a cemented or deposited carbon joint. This deposit is best made in a hydrocarbon liquid. The filament is so clamped to the wires that the cement which heats the joint passes through only a short length of the carbon near the platinum. A mixture of four parts of best kerosene and one part of turpentine gives a rapid and hard deposit, without danger to the operator. The filament near the joint is raised to a bright-red heat, and a hard joint may safely be made in the liquid in one minute.

The finished filament is finally mounted in a glass receiver, the air is exhausted as perfectly as possible, and the globe is then hermetically sealed. The globe is provided with two brass terminals (Fig. 5), connected electrically to the ends of the filament, and these serve to connect the lamp with the lighting mains by means of a screw or friction socket.

The diameter of a round filament may be expressed by the following formula:

$$d = ac^{\frac{2}{3}},$$

where a is a constant and c the current. The constant a is made up of two others, α and β, such that $a = \left(\frac{\beta}{\alpha}\right)^{\frac{1}{3}}$.

The following values of a for filaments flashed to give a definite ratio between their resistance cold and hot have been computed by G. S. Ram:

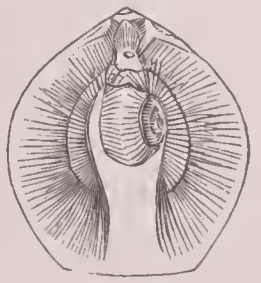
Cold resistance. / Hot resistance.	Conductivity of flashed filament (hot). / Conductivity of equal filament not flashed (hot).	α	β	a
1·6	1·167	1·43	1,715	10·62
1·7	1·362	1·43	1,469	10·09
1·8	1·6	1·43	1,250	9·52
1·9	1·9	1·43	1,053	9·02
2·0	2·28	1·43	876	8·46
2·1	2·83	1·43	707	7·91
2·2	3·52	1·43	568	7·35
2·3	4·62	1·43	433	6·72
2·4	6·44	1·43	311	6·01

An improvement in glow-lamps consists in filling the globe, after exhaustion of air, with a rarefied vapor, preferably one containing carbon. This vapor is not simply an inert gas to preserve the carbon from chemical attack, but it has a reparative function. By its means the waste of the carbon, due to the disintegrating action previously described, may be at least partially compensated, so that the efficieney of the lamp remains more nearly constant throughout its entire life. A filament overheated in such a vapor thickens and falls in resistanee, while one overheated in a vacuum increases in resistance.

For further details relating to the history and manufacture of incandescent lamps, reference may be made to *The Electric Light*, Alglave and Boulard; *The Incandescent Lamp and its Manufacture*, G. S. Ram.

Henry S. Carhart.

Lamp-shells: a name applied in a large sense to all the Brachiopoda (*q. v.*), but especially to those of the family Terebratulidæ (*q. v.*). The valves are united, and the pedicle for attachment passes out through a foramen of the projecting one, as the wick passed out of an ancient lamp; hence the name. Shells of several species of mollusks are also used as lamps (as the *Fusus antiquus* in Shetland).



Lamp-shell.

Lanarkshire, or **Clydesdale** [*Lanark* is from Cymric *Llaneret*, a forest glade]: from its manufactures and metallurgic industries and mineral wealth, the most important of Scottish counties; bounded on the N. by Dumbartonshire and Stirlingshire, on the S. by Dumfriesshire, on the W. by Ayrshire, Renfrewshire, and Dumbartonshire, and on the E. by Stirlingshire, Linlithgowshire, Midlothian, and Peeblesshire. Area, 882 sq. miles. The county is traversed by the Clyde, which, rising in the extreme south, flows generally N. and N. W., and falls into the Firth of Clyde at Dumbarton. The whole of the Clyde basin is occupied by a Carboniferous formation, with valuable beds of coal, iron-stone, and limestone. The surface rises from north to south up the valley of the Clyde, attaining an altitude of 2,403 feet above sea-level. The village of Leadhills (1,307 feet) is the highest inhabited land in Scotland.

Divisions.—Lanarkshire is governed by a lord-lieutenant and a county council. For administrative purposes it is divided into three wards, Upper, Middle, and Lower, of which Lanark, Hamilton, and Glasgow are respectively the capitals. For parliamentary purposes the county has six

divisions, each returning one member. Besides these, Glasgow returns seven members, one for each of its seven divisions. Lanark, Airdrie, and Hamilton are grouped with Falkirk in Stirlingshire and with Linlithgowshire to form the Falkirk boroughs, which return one member. One member is also returned by Glasgow University in conjunction with the University of Aberdeen.

Population and Principal Towns.—In 1831 the population of Lanarkshire was 316,819, which had become 904,412 in 1881, and, increasing 15·66 per cent. during the succeeding ten years, reached in 1891 1,046,040, and in 1901, 1,337,848, more than a fourth of the whole population of Scotland. In 1891 Glasgow had 656,946 inhabitants; in 1901, 760,423. The population in 1901 of the other large towns was as follows: Govan, 76,351; Partick, 54,274; Coatbridge, 36,981; Hamilton, 32,775; Motherwell, 30,423. Lanark, with a population in 1891 of 5,537, is the old county-town and a royal burgh. The weaving of winceys, shirtings, and druggets is its principal industry. Within 3 miles of Lanark are the three famous falls of the Clyde, and nearer it the manufacturing village of New Lanark, the scene for many years of Robert Owen's social-industrial experiments. Near Hamilton is Hamilton Palace, the seat of the Dukes of Hamilton, and Bothwell Bridge, where the Duke of Monmouth defeated the Covenanters in the engagement described in Sir Walter Scott's *Old Mortality*, and about 12 miles from Lanark are the remains of Douglas Castle, which was the scene of his *Castle Dangerous*.

Industries.—In 1891 10,382 persons, 8,179 of them females, were employed in cotton-manufactures, 39,820 in coal and other mines, and 32,391 in the iron-manufactures. Cotton-manufacture was introduced into Lanarkshire at the New Lanark Mills about 1785 by David Dale, the father-in-law of Robert Owen, and with calico-printing and kindred processes became a great industry. (See GLASGOW.) The production and smelting of iron ore in Lanarkshire was comparatively limited until the discovery of the blackband ironstone conjoined with the invention of the hot blast by Neilson, which enabled raw coal to be used in blast furnaces instead of coke, for the production of which the coal, abundant in Lanarkshire and elsewhere in Scotland, was not generally suited. In 1829, just after Neilson took out his patents, the total output of iron in Scotland was only 29,000 tons. In 1891 Lanarkshire alone turned out 473,013 tons of pig iron, in the production of which were used 1,093,465 tons of iron ore and 1,022,048 tons of coal. In the same year there were in the county 73 blast furnaces, of which 41 were in blast, and from the mines of Leadhills, which have been worked for ages, there were raised 2,084 tons of lead ore, yielding 1,544 tons of the dressed metal and 11,848 oz. of silver. In 1891 the output of coal in Lanarkshire amounted to 14,093,000 tons, being more than half the whole output of Scotland in that year, which was 25,420,161 tons. Large quantities of fire-clay, of oil-shale, of limestone, and of building-stone are also raised. Besides its manufactures, Clydesdale is celebrated for its fruit and for its breed of horses.

History.—Before the Roman invasion Lanarkshire belonged to the Damnii. The Roman occupation must have been mainly military, since no traces of permanent settlements are found. On the departure of the Romans, Lanarkshire was occupied by the old tribe then known as the Strathclyde Britons. After many vicissitudes it became part of the kingdom of Scotland under Malcolm Canmore. Afterward it was associated with the career of William Wallace, one of whose first exploits was to drive out the English. The men of Lanarkshire played a prominent part in resisting the persecution of the Presbyterians by Charles II. The subsequent history of Lanarkshire is merged in that of GLASGOW (*q. v.*). See Irving, *Upper Ward of Lanarkshire* (1864); Groome, *Ordnance Gazetteer of Scotland* (1884); parliamentary papers, etc.

F. ESPINASSE.

Lancashire, or **County of Lancaster**: a county in the northwest of England; bounded on the W. by the Irish Sea, on the E. by Yorkshire, on the N. by Cumberland and Westmoreland, and on the S. and S. E. by Cheshire. Area, 1,887 sq. miles. The physical aspects of Lancashire range from the flat country between the Mersey and the Liverpool and Manchester Railway, which was carried at an immense cost through a peaty and boggy district, to the eastern hills, which reach an elevation of 1,831 feet, and to those in Furness, of which the Old Man of Coniston is 2,633 feet above the sea-level. The district of Furness in the northwest is detached from the rest of the county, and includes Coniston Lake, while Windermere extends into it for several miles. Furness also contains some of the richest iron ore and most productive iron-works in the kingdom. The great Lancashire coal-field, some 217 miles in extent, irregularly lies between the two most important rivers in the county, the Ribble and the Mersey. Both rivers form estuaries as they flow into the Irish Sea.

Government and Parliamentary Representation.—Since the accession of Henry IV., Duke of Lancaster, to the throne, the duchy of Lancaster has been an appendage of the sovereigns of England, and the revenue derived from the crown lands in the duchy is part of the personal income of the sovereign. Unlike the revenues from the other crown lands, this does not become a part of the consolidated fund from which allowances are granted by Parliament, but passes directly to the sovereign. The annual net income from this source accruing to the Queen averages £50,000. There is a chancellor of the duchy, but his local duties are merely nominal. He is, however, a member of the Government, and frequently a cabinet minister. The duchy of Lancaster extends beyond the county, which is also a county palatine, with a court of chancery possessing a certain legal jurisdiction. The administrative body in Lancashire is, as in other counties, a county council, elected by the ratepayers; but fifteen large boroughs have been constituted administrative counties of themselves. Lancashire returns fifty-seven members to the House of Commons, or nearly an eighth of the members returned by England, exclusive of Wales. Of these, twenty-three are county members; the rest represent boroughs.

Population, etc.—At the census of 1891 the population of Lancashire was 3,957,906, one larger than that of any English county with the exception of the county of London. In 1881 it was 3,454,224. Lancaster, which gives its name to the county, is the county-town, but is comparatively insignificant; pop. (1891) 31,034. The following cities and towns have populations exceeding 100,000: Liverpool, 517,951; Manchester, 505,343; Salford, 198,136; Oldham, 131,463; Blackburn, 120,064; Bolton, 115,002; Preston, 107,573. Knowsley, near Prescot, is the seat of the Earls of Derby, and Worsley, near Manchester, is that of the Earls of Ellesmere, to whom it has descended from the last Duke of Bridgewater, the founder of British canal navigation. The remains of Furness Abbey are very fine examples of mediæval ecclesiastical architecture.

Communications.—Lancashire is traversed by railways in every direction, and to a less degree by canals. (For the Manchester Ship-canal, see MANCHESTER.) A new railway, the Lancashire, Derbyshire and East Coast line, is in course of construction to traverse England in a straight line, starting at Warrington, and having its terminus at Sutton, on the Lincolnshire coast.

Industries.—For more than a century the chief industry of Lancashire has been the manufacture of cotton goods, and the county is the center of the cotton-manufacture of the world. This pre-eminence is in great part due to the machinery invented by natives of the county. (See ARKWRIGHT, RICHARD; CROMPTON, SAMUEL; and HARGREAVES, JAMES.) Four-fifths of the cotton worked up in the mills of Manchester, Salford, Oldham, Blackburn, and Preston, and other places is supplied by the U. S. Between 1837 and 1886 the number of spindles increased from 18,000,000 to 43,000,000, and the number of looms from 100,000 to 600,000. The number of persons employed in cotton-factories in 1870 was 450,087; in 1885, 504,069. Of the population of Lancashire, about 528,000 persons are directly employed in cotton-manufacture, the females to the males in the proportion of 3 to 2. Of the whole number, 25,000 are employed in bleaching, dyeing, and printing calicoes. Among other industries is the manufacture of linen, which in 1891 employed some 17,000 persons, while the woolen and worsted manufacture employed 10,635; silk goods, 5,086; alkali-manufacture, 8,000; glass-making, 7,705; tanning and leather-manufacture, 43,780; machinery, especially that required for cotton-mills, 44,636. The output of coal by 79,546 miners was 22,722,618 tons. In iron mining and manufacture 64,100 persons were employed, and the total make of pig iron was 715,305 tons. Out of 48 blast furnaces 26 were in use.

History.—Lancashire was part of the province occupied by the Brigantes before it became part of Roman Britain, and after the departure of the Romans it became part of the Saxon kingdom. It had not attained the dignity of a county when the Doomsday survey was made, and it was only after there was a duchy of Lancaster that Lancashire was

created a county palatine of Edward III. At the Reformation many of the old families remained loyal to the Church of Rome, but the middle class became strongly Protestant, and with the triumph of Protestantism Lancashire was almost the only county which adopted the Presbyterian form of church government. The Jacobite rebellions of 1715 and 1745 found many adherents in Lancashire. Through the development of the cotton-manufacture Lancashire became not only populous and wealthy, but politically important. It was the headquarters of the ANTI-CORN-LAW LEAGUE (*q. v.*), which overthrew the corn-laws and with them protection. Since that achievement the principal incident in the history of Lancashire has been the cotton famine caused by the cessation of supplies of cotton during the civil war in the U. S.

The best work on Lancashire is the *History of the Duchy and County Palatine of Lancaster*, by Edward Baines (4 vols., 3d ed. 1886). The standard work on the cotton industry is *The History of the Cotton-manufacture*, by his son, Sir Edward Baines (1835). Of the development of the cotton-manufacture since 1835, there is an instructive sketch by J. Slagg, formerly M. P. for Manchester, in vol. ii. of Humphry Ward's *Reign of Victoria*. Also see F. Espinasse's *Lancashire Worthies* (2 series, 1874–77), which includes lives of the founders of Lancashire industrialism in the eighteenth and nineteenth centuries. F. ESPINASSE.

Lancaster, lang'kas-ter: the capital of Lancashire, England; on the Lune, near its mouth; 51½ miles N. N. W. of Manchester (see map of England, ref. 6–F). It is a neatly built town, with an old castle, a fine aqueduct, which carries the Lancaster Canal across the Lune, and manufactures of furniture, leather, and cast-iron work. Pop. (1891) 31,038.

Lancaster: town; capital of Coos co., N. H. (for location of county, see map of New Hampshire, ref. 3–F); on the Connecticut river, and the Concord and Mont. and the Me. Cent. railways; 137 miles N. of Concord. It has 5 churches, public library, an academy, several manufactories, and 2 weekly newspapers. Pop. (1880) 2,721; (1890) 3,373; (1900) 3,190. EDITOR "COOS COUNTY DEMOCRAT."

Lancaster: village; Erie co., N. Y. (for location of county, see map of New York, ref. 5–C); on the Del., Lack. and W. and the Lehigh Val. railways; 10 miles E. of Buffalo. It has manufactories of foundry products, glass, soap, brick, flour, and tanned leather, and a weekly newspaper. Pop. (1880) 1,602; (1890) 1,692; (1900) 3,750.

Lancaster: city; capital of Fairfield co., O. (for location of county, see map of Ohio, ref. 6–F); on the Hocking river and the Cin. and Musk. Val. and the Col., Hocking Val. and Toledo railways; 30 miles S. E. of Columbus. It is in an agricultural and natural-gas region; has a court-house that cost $150,000, several public schools, and 2 daily and 4 weekly newspapers; and manufactures flour, foundry products, shoes, glass, and agricultural implements. The State farm for the reformation of boys is in the suburbs. Pop. (1880) 6,803; (1890) 7,555; (1900) 8,991.
EDITOR OF "GAZETTE."

Lancaster: city (settled 1729, State capital 1799–1812, incorporated as a city 1818); capital of Lancaster co., Pa. (for location of county, see map of Pennsylvania, ref. 6–H); on Conestoga river, and the Penn. and the Phila. and Reading railways; 36 miles E. S. E. of Harrisburg, 68 miles W. of Philadelphia. It is in a rich wheat, tobacco, and limestone region, and is noted for its manufactures. The census returns of 1890 showed that 508 manufacturing establishments (representing 74 industries) reported. These had a combined capital of $7,389,952; employed 7,385 persons; paid $2,362,835 for wages and $5,815,765 for materials; and had products valued at $10,293,638. The manufactures included cotton goods (capital investment $1,953,100, value of products $1,336,384); cigars and cigarettes (capital $1,740,098, products $3,022,728); foundry and machine-shop products (capital $430,733); malt liquors (capital $279,000); carriages and wagons (capital $268,835); and confectionery (capital $231,535). The city is the seat of Franklin and Marshall College (German Reformed, organized 1852), which in 1900 had 26 professors and instructors, 332 students, nearly 35,000 volumes in its libraries, and an endowment of $345,000, and comprised a college of liberal arts, a preparatory academy, and a theological seminary. The city has an assessed valuation of over $15,000,000, 8 libraries of various kinds, 7 national banks with combined capital of $1,685,000, and 5 daily, 10 weekly, and 7 monthly periodicals. In 1777, during the occupation of Philadelphia by the British, the Continental Congress held its sessions in Lancaster, and in 1818–25 the city was the largest inland one in the U. S. Pop. (1880) 25,769; (1890) 32,011; (1900) 41,459.

Lancaster: town; capital of Lancaster co., S. C. (for location of county, see map of South Carolina, ref. 4–E); on the Rich. and Danv. and the Charleston, Cin. and Chi. railways; 72 miles N. of Columbia. It is in an agricultural region, and has 5 churches for white people and 3 for colored, graded schools, and 3 newspapers. Pop. (1880) 681; (1890) 1,094; (1900) 1,477. EDITOR OF "LEDGER."

Lancaster, JOSEPH: educator; a member of the Society of Friends; b. in London, Nov. 25, 1778; opened a school for children in Southwark in 1798 on the principle of mutual instruction, and having achieved a brilliant success, established numerous schools on the same plan in other cities, and devoted himself to the popularization of his method. In 1818 he removed to the U. S., where he had some success, and obtained from the Legislature of Canada a grant for the purpose of establishing his system of instruction. D. in New York, Oct. 23, 1838. His family removed to Mexico, where several of his grandchildren, under the name of Lancaster-Jones, have figured in politics, and where his system was received with much favor, and was supported by legislative grants under the management of a national Lancasterian society. The same system has been largely adopted in Colombia and other parts of South America.

Lancaster, Duchy of: a territorial division of England nearly corresponding to the county of Lancashire, but distinguished from it in law as a separate administrative entity. It derives its origin from a royal charter of Edward III., by which it was conferred upon Henry, Earl of Derby, Mar. 6, 1351, and on his death in 1362 it was granted to the king's son, John of Gaunt, and his heirs forever. It received a grant of a chancery and palatine privileges in 1377; became a crown possession on the accession of Henry IV. to the throne in 1399, at which time the order of succession to the duchy was declared to be independent of the succession of the crown, so that should the house of Lancaster lose the latter it might still retain the former. This expectation was not realized, for on the accession of the house of York in 1461 Edward IV. confiscated it to the crown, and in turn attempted to make it a private appanage of his descendants. To this Parliament gave its consent, but it was provided that it should be "held separately from all other hereditaments." As a result of this, the government of the duchy has been vested in the sovereign, not as King of England, but as Duke of Lancaster, and the revenues of the duchy are exempt from parliamentary control. (See LANCASHIRE.) Since 1873 the administration of justice has been assimilated to that of the rest of the country.

Lancaster, House of: See ENGLAND, JOHN OF GAUNT, HENRY IV., V., and VI.

Lancaster Sound: a body of water leading from Baffin's Bay to Barrow Strait, between the island of North Devon on its northern side and several minor islands on its southern. It is 250 miles long, forms the entrance to the northwestern passage, and was discovered in 1616 by Baffin.

Lance: a thrusting weapon, designed to be used in the hand, and not thrown as a dart or javelin. It derives its principal effect from the velocity of attack, and for this reason is used by mounted men only. It was the favorite weapon of the knights, and as used by them was sometimes 20 feet long and correspondingly heavy. The modern lance is usually from 10 to 12 feet long, the handle of hollow steel or tough wood, and the blade of steel about a foot long. A small flag or pennon is fixed on the handle near the head. The lance is not used in the U. S. or in Austria, and although the typical weapon of the Cossacks and other Eastern tribes, it has been in part replaced by the saber in the Russian Cossack regiments. On the other hand, it has been adopted in Germany as the principal arm of the cavalry, and is carried by all mounted troops. It is used to a greater or less extent by other European armies, and the tendency to its abandonment which was developed after the wars of 1870–71 and 1877–78 seems to have been somewhat checked by the action of Germany. The 5th, 9th, 12th, 16th, and 17th British light cavalry are lancers.

Lancefield, RICHARD THOMAS: See the Appendix.

Lancelet: See LEPTOCARDII.

Lancet Fishes: See ACANTHURIDÆ.

Lancet Window: a name applied to the long, narrow-pointed windows characteristic of the ecclesiastical architecture of England in the first half of the thirteenth century. With the introduction of the pointed arch early in that century, these tall and narrow windows, often without a single embellishment to their deep and flaring jambs, gradually took the place of the shorter and broader round-arched windows of the Norman style. They were used singly, in pairs, or in threes, except in a few cases where five are grouped together, as in the Five Sisters in York Cathedral. They mark an intermediate stage between the Norman window and the windows with bar-traceries of the fully developed Gothic or decorated style. They are not found in French architecture, where the corresponding stage is marked by the use of coupled windows separated by a single or clustered shaft, and spanned by a single discharging-arch or hood-mold. The name "lancet-pointed" has been sometimes applied to the English Gothic style of the early thirteenth century on account of the prevalence in it of lancet windows. A. D. F. Hamlin.

Lancewood: popular name of the wood of *Guatteria virgata* and *laurifolia*, used (especially the former) for carriage-shafts. The tree is tall and very straight. It is of the family *Anonaceæ*, and grows in the West Indies. Lancewood is also obtained from *Duguetia quitarensis*, of the same family, a Brazilian tree. Revised by L. H. Bailey.

Lanciani, lăăn-chaa'nĕĕ, Rodolfo Amedeo, Ph. D., LL. D., F. A. S.: archæologist; b. in Rome, Italy, Jan. 1, 1847; was educated at the Collegio Romano and University of Rome; in 1872 became secretary of the archæological committee of Rome; in 1875 vice-director of the Kircherian Museum; in 1877 director of excavations; and in 1878 Professor of Roman Topography in the University of Rome. He has received degrees from the universities of Rome, Harvard, Glasgow, and Würzburg; is a member of several scientific institutes and academies, and has been decorated by the governments of Italy, Prussia, Russia, and other countries. His published works number about 300, and include *La città di Porto Roma* (1870); *Sulle vicende edilizie di Roma* (Rome, 1878); *I commentarii di Frontino intorno le acque egli acquedotti* (Rome, 1880), a work crowned by the Royal Academy at Rome; *L'aula e gli Uffici del senato Romano* (Rome, 1883); *Ancient Rome in the Light of Recent Discoveries* (Boston, 1888); *Pagan and Christian Rome* (Boston, 1892); and *Archæological Maps of Ancient Rome* (Milan, 1893).

Lanciano, lăăn-chaa'nō (Lat. *Anxanum*): town of Southern Italy (see map of Italy, ref. 5–F). This is one of the most beautiful towns in the Abruzzi. It has many fine public buildings, among which the cathedral should be first named. This church, Our Lady of the Bridge, stands high above the river-valley on grand and lofty Roman bridges of the time of Diocletian, and from some points of view seems to be suspended in the air rather than resting on the earth. Its architecture, both external and internal, is striking. Lanciano is in railway communication with Ancona and with Naples, and good common roads connect it with the neighboring towns. It manufactures linen on a large scale; also silk, wool, and various chemical products. Pop. 8,234.

Lancret, lăăṅ'krā', Nicholas: painter; b. at Paris, 1690. His first master was Pierre d'Ulin, professor of the Academy, but a very poor painter. He afterward studied with Claude Gillot, a pupil of Watteau. Lancret emulated Watteau's style, so that his work was soon mistaken for the master's. He was elected member of the Academy in 1721 and in 1735 he received the title of counselor. D. in Paris, 1743. W. J. S.

Land: See Property.

Landau, lăn'dow: town of Rhenish Bavaria, on the river Queich; 17 miles S. W. of Spires (see map of German Empire, ref. 6–D). It was from olden times a fortress, but its fortifications were destroyed in 1871. In the Thirty Years' war it was taken eight times. It has a Gothic church built in 1285, and considerable tobacco manufactures. In 1684 it was fortified by Vauban, and was thought impregnable, but in 1702 Louis of Baden took it. Pop. 11,136.

Landau: See Carriages.

Land-crab: name of a large number of tropical crabs, remarkable as being gilled animals, which in the perfect state are air-breathers. In the U. S. the *Gelasimus vocans*, or fiddler—so called because one of its claws is thought to resemble a fiddle—distantly represents them. See Crab.

Lander, Louisa: sculptor; b. at Salem, Mass., Sept. 1, 1826; early manifested her genius for sculpture by modeling likenesses of members of her family and executing cameo heads; went to Rome in 1855; became a pupil of Crawford, and modeled two statues, *To-Day* and *Galatea*; also busts of Hawthorne and Gov. Gore of Massachusetts, statuettes of *Virginia Dare* and *Undine*, a life-size statue of *Virginia*, and a reclining figure of *Evangeline*.

Landes, lăăṅd: department of France, bounded N. by the Gironde, S. by the Basses-Pyrénées, and W. by the Bay of Biscay. Area, 3,599 sq. miles. The eastern and southern parts are hilly and fertile, and well adapted for agriculture; much excellent wine is produced. The western part, bordering on the ocean, consists only of desolate tracts (*landes*) of sand-banks, marshes, and swamps, covered with heath and dwarf shrubs, and inhabited by a few scattered families, whose members stalk along on stilts in the sand, herding sheep and swine. On the downs are forests of pine and cork trees, and these plantations afford some resources to the inhabitants in cork-cutting and charcoal-burning. Pop. (1896) 292,884. Capital, Mont-de-Marsan.

Land League: a popular organization for agrarian agitation in Ireland. The years 1877–79 were characterized by short crops and general agricultural depression throughout Great Britain and Ireland. Distress in the poorer regions of the latter island became very acute, and, as has always happened in such circumstances, the perennial friction between landlords and tenants increased in intensity. The number of evictions rose rapidly, with a corresponding multiplication of agrarian crimes and hostile encounters between populace and police. Michael Davitt, a well-known agitator, conceived in 1879 the plan of a general organization of the Irish tenant-farmers for the purpose of maintaining their interest in the existing contest and of agitating for a general settlement of the long-debated land question. In the autumn of that year Mr. Parnell, who was just assuming the leadership of the Home Rule party, became convinced of the utility of the project. Accordingly, on Oct. 21, 1879, a meeting of prominent Irishmen at the Imperial Hotel, in Dublin, resulted in the formal organization of the Irish National Land League. Its objects were declared to be, first, to effect a reduction of rack-rents; second, to promote the ownership of the land by the cultivators. Mr. Parnell was chosen president; Messrs. Kettle, Davitt, and Brennan, secretaries; and Messrs. Biggar, O'Sullivan, and Egan, treasurers. The executive committee included some sixty members, representing all parts of Ireland. For the development of the organization it was proposed to establish a branch of the league in every parish or group of parishes in Ireland, with a membership fee graduated according to the value of the tenant's holding. Each branch was to be under the immediate supervision of the central executive, and on the first of each month half of the funds in hand had to be forwarded by the local treasurer to the committee at Dublin. The plan of the leaders contemplated also the establishment of affiliated branches in Great Britain, the U. S., and wherever else the Irish spirit was strong. The money raised by the organization was to be devoted to the relief of distress among the farmers, and to furnishing them with legal counsel in resisting oppression by the landlords. An appeal to the Irish race was published, calling for financial and moral support in the organized effort to extirpate landlordism from the soil of Ireland. Confiscation of landlord's rights was not advocated; but the transference of those rights to the tenants with fair compensation, and the establishment thus of a peasant proprietary, were declared to be indispensable to the prosperity of the land. On the lines thus laid down the Land League soon became a formidable organization. Mr. Parnell visited America in the winter of 1879, addressing large audiences throughout the country, enlisting the co-operation of prominent men, and winning enthusiastic support for the enterprise. In Ireland itself branches of the league sprang up everywhere, and became centers of effective hostility, not only to oppressive landlords, but to landlords in general. The constitution of the league excluded from membership any one who took a farm from which another had been evicted for non-payment of unjust rent, or which had been surrendered on grounds of excessive rent, as well as any one who took part in any process of eviction, or who purchased stock or produce seized for non-payment of rack-rent. These provisions sufficiently indicate the line of the Land League's activity. It everywhere worked for the prevention of evictions and for the

reduction of rents, and as its membership grew it became the real arbiter of all questions between landlords and tenants. The agitation conducted by the league, and the real distress that was conspicuous in Ireland, led Mr. Gladstone's newly established government in the summer of 1880 to take up a bill which had been originally proposed by an Irish member, providing for a temporary suspension of evictions for non-payment of rent during the existing distress. The measure passed the Commons, but was rejected by the Lords by an overwhelming majority. This action was followed by a great increase in the agitation in Ireland. The league's membership and income greatly increased, and agrarian disturbances became more serious. In the autumn months the historic incident at Capt. Boycott's Mayo farm gave an enormous impetus to the practice which soon came to bear his name. Mr. Forster, the Irish secretary, found it practically impossible to enforce the laws in the face of the hostile influences which developed under cover of the league's authority. In Nov., 1880, the Government instituted a prosecution on charges of conspiracy against Parnell and other leaders of the league, but failed to secure a conviction. At the opening of Parliament in Jan., 1881, the cabinet announced a bill dealing with Irish land tenure, and at the same time coercion bills, based on the disturbed condition of Ireland. The coercion measures, after exciting and revolutionary scenes in the Commons, due to the Irish members' opposition, were passed by Mar. 1, and the administration was thus enabled to contend on rather more even terms, but with scarcely greater success, against the agrarian movement. As to the crime which was rife in Ireland, the chiefs of the Land League were sufficiently explicit in denunciation; but their influence was inadequate to control the passions which were aroused by the agitation. Where the boycotting of land-grabbers was authoritatively recommended, a more positive form of maltreatment might be expected to follow in many cases; where defraying the legal expenses of persons charged with agrarian crime was generally recognized as a relief of distress within the purview of the league's financial system, it could hardly occasion surprise if branches in the less enlightened regions made positive appropriations for the commission of crime; and where the avowed policy of the organization was to abolish unjust rents, it was not a long step in the tenants' thought to the conception that all rents were unjust. It was hoped by the Government that the passage of its Land Bill in Aug,, 1881, would cut the ground from under the agitation. The law, however, while immensely bettering the legal position of tenants, fell far short of the abolition of landlordism. While a part of the less extreme element in the Land League was disposed to accept gratefully the concessions obtained by the law, and to suspend the agitation, a convention of the organization at Dublin in September indorsed the policy recommended by Parnell, to test the utility of the act for getting reduced rents, but, until a favorable result from the test cases should be secured, to maintain the attitude of resistance to the landlords. This action sealed the doom of the Land League. Mr. Gladstone angrily denounced its proceedings as treasonable, and prepared to suppress the organization. Already the ticket of leave under which Davitt, a convicted Fenian, was at large had been revoked, Davitt, Dillon, Sexton, and other leaders had been arrested as suspects under the coercion acts, and the funds of the league had been removed by the treasurer, Patrick Egan, to Paris. On Oct. 13 Parnell was arrested and committed to Kilmainham prison, where in the next few days most of the other chiefs were sent. The prisoners promptly played their last card by issuing from the jail the famous manifesto calling upon their followers to refuse entirely the payment of rent to the landlords. As promptly followed the Government's proclamation, Oct. 18, declaring the Land League an unlawful body, and decreeing its suppression. After a stormy career of just two years the organization ceased to exist. Agrarian agitation continued in a less systematic form to disturb Ireland, and a year later the programme of the Land League, together with that of Home Rule, was incorporated in the constitution of the Irish National League, which, under Parnell's leadership, achieved many of the objects of the earlier association. See IRELAND. WILLIAM A. DUNNING.

Landlord and Tenant [*landlord* is from O. Eng. *landhlāford*, owner of land, ruler of a country. See LORD]: popularly, the owner of land and one who is, by agreement with the owner and subject to the latter's title, entitled to the temporary possession of the land. The term "owner" is used in a very relative sense, however, as any one who has an estate in lands, whether it be a fee simple, a life estate, or merely a leasehold, may be a landlord; the only requisite to the existence of the relation being that the landlord shall have some portion or fragment of his estate left after the termination of his tenant's estate. The estate or interest of the tenant is called a "term"; that which remains to the landlord is known as the "reversion," being that interest in, or remnant of, the estate which returns or "reverts" to him when the tenant's term comes to an end.

This conception of tenancy is all that survives of feudal tenure, as it prevailed under the earlier common law. By that system all lands were held of, and in subordination to, greater or lesser lords. This was true even of estates in fee simple, notwithstanding the fact that they might be alienated by the holder, or "tenant," and that, if he died seised or possessed of such an estate, it would descend to his heir. Such a tenant, whether in fee simple, or for life, or for years, or at will, was bound to make return for this "holding," or tenure, by rendering rent or other feudal services to his lord. If this tenant of the lands sold them to another, he would himself stand in the relation of a lord to the purchaser, and the latter would be the tenant of the seller and would be bound to render to him the rent or other services due. And so the process might go on, creating an indefinite number of lordships and tenancies intermediate between the original lord and the present tenant or owner of the lands. This process of *subinfeudation*, as it was called, was abolished by the statute *Quia Emptores* (18 Edw. I., A. D. 1290), which destroyed the relation of landlord and tenant in all cases except where the lord granted away only a part of his interest in the land, so as to leave a reversion in himself. This left the relation of tenure, or of landlord and tenant, intact only where the holder of the greater estate conveyed the lands to another for life, or for a term of years, or to be held at the will of either party, and these are the forms in which the relation has survived to this day.

Nature of the Relation.—The estate of the tenant was conceived of at common law as being a practical ownership of the property during his term. He was the "particular tenant," while his landlord, whose estate was postponed during the continuance of the term, was described as the "tenant in reversion." The particular tenant could convey his interest, whatever it might be, in whole or in part, without consulting the wishes of his landlord. The latter, however, having parted with the "particular" or present estate, had incapacitated himself from further conveying the property by any of the methods of alienation known to the common law. His estate in reversion was regarded as a mere future interest, an incorporeal right, not susceptible of seisin or of present conveyance, and he could transfer it only by a writing under seal, technically known as a "grant," and which did not become a complete conveyance even of such future interest until it was acquiesced in by the particular tenant. The consent of the latter was manifested by his "attorning" to the grantee of the reversion; that is to say, by making some formal acknowledgment of the newcomer as his landlord. This complex process, known as "grant and attornment," was the only possible method of conveyance to a stranger in all cases where the land was subject to a life estate or to a term of years. There was one other mode of alienation permitted to the landlord without waiting for the term, which postponed his enjoyment of the estate, to come to an end. He might, after the particular tenant had taken possession, or "entered" under his lease, convey his interest directly to the latter by a "release," as it was called, of his reversion. This release, like the "grant" above described, was also effected by a writing under seal, and it operated to vest in the particular tenant the greater but remote estate of his landlord, which, combining with the tenant's right of present possession, gave the latter the entire estate of freehold of which the landlord had originally been possessed. This result is technically called "merger," which signifies the merging or "drowning" of a lesser estate in a greater, when both become vested in one and the same person without the intervention of an intermediate estate. See MERGER.

There has been but little change in these relations of landlord and tenant, with the exception that the former may now convey his interest in the property to a stranger without the necessity of an attornment on the part of his tenant, and that the tenant may accept a release of his landlord's estate without having first made an actual entry upon the lands conveyed. Attornment was abolished in England

by statute while the American colonies were still young (4 Anne, c. 16, A. D. 1705), and the practice never went into extensive use in the colonies. Notwithstanding the fact that the principles governing the relations of landlord and tenant remain substantially as at common law, the modern point of view regarding these relations is very different from that which prevailed two or three centuries ago. We no longer regard the reversioner, or landlord, as having a mere future interest in lands, the present or particular estate in which is vested in another, but as the present and actual owner of the property, and the particular tenancy is regarded as in the nature of an incumbrance on the landlord's estate. He may sell the land without his tenant's consent, and the purchaser takes the property as present owner, subject only to the burden of the existing tenancy. This statement of the nature of the relation of landlord and tenant makes it clear that no act on the part of the former could in anywise affect the rights of the latter. Whether the landlord lives or dies, whether the estate devolves upon the heir or passes to a stranger, the tenancy goes on, unaffected by circumstances, until the term has expired. As has been said above, the common-law view of the relation of the parties to one another and to the land left no room for restrictions upon the tenant's right of alienation. As the particular tenant, or present owner, he might convey the lands in whole or in part, for the whole or a portion of his term, and such, in the absence of agreement to the contrary, is the law at the present time. In some portions of the country, however, especially in cities, it is customary to insert in leases a covenant or condition against alienation by the tenant without his landlord's permission. If the tenant alienates the whole of his estate the conveyance is termed an assignment, and the assignee steps into his shoes as the tenant of the particular estate. The relation of tenure, or "privity of estate," formerly subsisting between the landlord and tenant is destroyed by the assignment, but the transaction results in the creation of a new privity of estate between the landlord and the assignee. On the other hand, if the tenant alienates only a part of his estate in the premises—that is, conveys them for a shorter period of time than the whole remaining portion of his own estate, the process is described as a sub-letting, and results in the creation of a new or sub-tenancy. The old tenure, or privity of estate, remains unaffected, and a new one has been created, with the former tenant as landlord and the grantee as particular tenant. The new tenant has nothing to do directly with the original landlord, who continues to hold his immediate tenant to the obligations of their relation of tenure, entirely unaffected by the new relations which the latter has created. The privity of estate into which the sub-tenant has entered is a continuous chain, linking him, through every intermediate tenure, to the ultimate reversioner, or landlord, insomuch that the latter may, if his interests so require, ignore his immediate tenant and impose his authority directly on the sub-tenant in possession.

It has been noticed above that it was very easy at common law for the landlord, or reversioner, to convey his estate to the particular tenant by a *retease*, so as to vest the whole estate in the latter. Equally simple and direct was the process by which the tenant conveyed his estate back to the landlord. This was called a *surrender*, and it had the effect of vesting the whole estate in the landlord by the operation of the doctrine of merger, previously described. A surrender, which was in effect a dissolution of the relation of landlord and tenant by agreement of the parties, could be effected either by parol or by such conduct on their part as amounted virtually to a denial of the relationship. This latter was called surrender "by operation of law." It is best illustrated by taking the most familiar case of the making of a new lease between the parties before the expiration of the old one. The acceptance by the tenant of a new lease, even though for a much shorter term, was held to be an acknowledgment of the landlord's right to lease the premises, and therefore to be inconsistent with the continued existence of the former lease. The latter, therefore, was "by operation of law" deemed to have been surrendered. In this way, and quite irrespective of the actual intention of the parties, even an estate for life might be sacrificed by the acceptance from the landlord of a lease for a year, or even of a tenancy at will; although, in order to have this effect, it was essential that the new lease, whether long or short, should be a valid one. The only change which has been made in the law of surrenders, as above described, was effected by the Statute of Frauds, in requiring parol surrenders to be put in writing by the tenant, though the landlord might still signify his assent in any proper way. Surrenders usually are made by operation of law, and it would seem that, at the present time, any dealings between the parties, which may seem to the jury to indicate a mutual intention to bring the tenancy to an end, will be allowed to have that effect. Accordingly, the delivery by the tenant of the key of the premises and its acceptance by the landlord have in many instances been held to be good evidence of a surrender. It should be added that, although the effect of a surrender is to dissolve the relation of landlord and tenant, it will not be allowed to prejudice the previously acquired rights of third persons. An instance of the application of this rule is found in case the tenant has made a sub-lease of which the landlord is cognizant. The landlord could not accept a surrender so as to impair the rights of the under-tenant without the latter's consent.

As has been said above, the term "tenancy" is no longer appropriate to a tenure in fee, but it is still applicable to estates for life, as well as for years and at will. Whatever the particular mode prescribed by law for creating a tenancy, it is properly described as a *lease*, and the parties as *lessor* and *lessee* respectively. This is true of the creation of a life estate as well as of a leasehold proper. Although these surviving forms of tenure have thus much in common, they still differ widely in dignity and in the manner of their creation. A life estate, although created by lease, is not a leasehold, but a freehold, and as such is still regarded as of equal dignity with an estate in fee simple or fee tail. It can arise only by the most solemn form of conveyance. At common law, *feoffment*, with "livery of seisin," was necessary; to-day a deed is required, as in alienations in fee. The mode of creating other tenancies, however, has varied a good deal at different times, and still varies in different jurisdictions. At common law all leaseholds proper, no matter what their length, whether for a day or a thousand years, could be created by oral agreement; although, in order to consummate the relation of landlord and tenant, the agreement must be followed by the entry of the lessee upon the leased premises. Until such entry he had only a qualified interest or estate, called *interesse termini*. This interest bound both parties and was capable of alienation by the tenant, or, if he died without having entered, would descend as a part of his estate. By the Statute of Frauds (29 Car. II., c. 3, A. D. 1676) leases for a term of three years and upward are required to be in writing, and this enactment has, with some variations, been followed by similar legislation in all of the U. S. In this country, however, the statutes generally allow leases for only one year, or less, to be created by oral agreement, all others being required to be put in writing. In England and a few of the U. S. there is a further requirement that the writing shall be under seal—i. e. a deed. Tenancies at will may still, as at common law, be created by oral agreement, followed by the entry or occupancy of the tenant.

Rights and Obligations of the Parties.—The relation of landlord and tenant once constituted, a variety of reciprocal rights and obligations at once arises. These exist independently of any express agreement between the parties. The rights and obligations which spring out of this relation of tenure—that is to say, out of the "privity of estate"—may be and usually are supplemented by others created by express contract. This contract relation, described as "privity of contract," may survive, even though the relation of landlord and tenant has been brought to an end. Accordingly, although the tenant may assign his term to a third party, thus relieving himself of the obligations imposed by his tenure, he may nevertheless continue liable to his former landlord in consequence of the privity of contract created by the express agreement between them.

Of course, the new tenant has ordinarily nothing to do with the contract between his predecessor in the estate and the landlord. That is a matter which lies exclusively between the contracting parties, and can affect no one else. There is, nevertheless, a class of contract obligations which not only continue, as in the case supposed, to bind the contracting parties themselves, but which become attached, as it were, to the land itself, like an easement or other burden, and which accordingly bind any one, whether assignee or heir, into whose hands the estate may come. These obligations, known as "covenants running with the land," are few in number, and are not favored by the law, as they tend to restrict the alienation of estates. No novel or unusual cove-

nants of this kind can be created, and only such as directly affect the use and enjoyment of the land have been allowed to "run with" it. Covenants to pay rent and to keep premises insured are familiar covenants of this kind. Whether the covenant be one which runs with the land or not, the lessee, in any event, remains liable during the entire tenancy, or until the contract between the parties has wholly spent its force. The assignee, on the other hand, being liable to the lessor only on the ground of his relation to the estate, may terminate all responsibility to him by making an assignment to a second assignee. There may thus be an indefinite series of assignees, any one of whom will be liable for a breach of covenant occurring during his ownership, but not for any occurring after he has parted with his estate.

The obligations which spring naturally out of the relation of landlord and tenant, without express agreement, "implied covenants" as they are called, may be briefly considered. The principal ones are, on the part of the landlord, to secure the tenant in the quiet enjoyment of the premises; on the part of the tenant, (1) to pay rent, (2) to commit no waste, (3) to keep the premises in repair, and (4) to render up possession at the end of the term. The only one of these which requires further notice in this place is the landlord's implied covenant. In every lease under seal, there is an implied "covenant for quiet enjoyment." This does not mean that the landlord guarantees his tenant against all wrongful disturbance of his possession, but only against all acts of the landlord himself, or those claiming under him (as his heir or grantee), or of any person asserting a paramount title. A disturbance of the tenant's possession by any one of these persons is an "eviction," and entitles the tenant to consider the tenancy at an end. An eviction may either be partial or total. The former does not necessarily discharge the tenant absolutely. He may still be liable to perform in part the obligations of the lease. Thus if a landlord should lease two houses for a gross rent, and the tenant should be evicted from one of them by a person having a better title, rent would still be due for that portion of the premises actually enjoyed by the tenant. This rule does not apply to a partial eviction by the wrongful act of the landlord. In this case the entire rent is suspended while the eviction continues, as he is guilty of a breach of his portion of the contract. The doctrine of "constructive eviction" should be referred to. This is a modern principle, allowing the tenant, in case the landlord renders the occupation of the premises practically valueless by his own wrongful act, to abandon them, and make use of this theoretical eviction as a defense to the payment of the rent. This ground can not be taken unless the tenant vacates the premises. The mere deterioration of the premises in value is no eviction. Accordingly, if one hires a house and lot, and the building is accidentally destroyed by fire, the tenant can not, by the rules of the common law, leave the premises and cease to pay rent. The land still remains, and by legal theory the rent is indivisible and can not be apportioned. There may be a clause inserted in the lease that on the buildings becoming untenantable the tenant may abandon the premises and be relieved from liability. The same result is attained in some of the States by statute modifying the common law. The rule itself is not to be extended to the case where the subject-matter of the lease has wholly ceased to exist. This is not properly a case of eviction, but rather of a want of material for the contract of the parties to operate upon.

The tenant's obligation to pay rent may be enforced by "distress." The right to distrain for rent in arrear is a necessary incident of the relation of lessor and lessee. Whatever movable things are upon the demised premises, whether belonging to the lessee or not, are, with a few trifling exceptions, liable to distress. In New York and many other States, however, this time-honored method of enforcing the landlord's claim for rent has been abolished by statute.

It is not by virtue of any covenant, expressed or implied, but as a necessary consequence of the relation of landlord and tenant, that each party is estopped from denying the interest or title of the other. As will readily be seen, there could be no such thing as a tenure, or tenancy, if this doctrine of "estoppel" did not forbid the landlord to deny the validity of his lease and prevent the tenant from denying the lessor's right to make the lease. Practically the rule amounts to this, that so long as a tenant remains in undisturbed possession he can not set up as a defense to an action for rent by his landlord that the latter has no title. On similar principles, all encroachments made by the tenant on the land of others enure to the benefit of the landlord as between him and the tenant. In other words, the latter is not permitted to deny that he was acting for his landlord. The rule ceases to prevail as soon as the tenant is evicted by some person having a superior title. So, if he be threatened with an eviction by such a person, he may yield the possession to him or become his tenant, and set up these facts as a defense to any action by his lessor. It may be further stated that the tenant, while he can not deny his landlord's original title, may show that it has expired or has been subverted. Thus if the lessor has fallen in debt, and his estate is sold on an execution, the tenant may purchase it and himself become owner. See ESTOPPEL.

A covenant being merely a contract, collateral to the main transaction of creating an estate in lands, its breach will ordinarily have no effect on the tenancy, but will simply give the injured party an action at law for the damages sustained by him. Nevertheless, a covenant may, by reason of its subject-matter or the form in which it is cast, have the force of a condition subsequent, and the effect of a breach of condition is the forfeiture of the estate. This is true of all of the implied covenants, so called, and the express stipulations of a lease are usually so expressed as to give them the effect either of conditions or of covenants, as the injured party may elect. It is, however, not quite accurate to describe the result of a breach of condition by a tenant as a forfeiture, as its real effect is only to give the landlord the right to enter and terminate the tenancy if he chooses to do so. The tenancy continues as before until such entry, and the landlord may waive the breach and thus deprive himself of the right to enter. The doctrine of waiver is readily applied, and the courts infer that a forfeiture is waived by any act on the landlord's part inconsistent with the forfeiture of the estate; such, for example, as acceptance of rent with knowledge of the breach of condition.

The foregoing account of the nature of the relation of landlord and tenant is applicable generally to all of the forms of that relation. It remains only to call attention to the leading differences between the several forms. It has already been observed that the only forms of feudal tenure which have survived from the earliest period of the common law are estates for life and for years and tenancies at will. To these, in order to make the modern record complete, must be added tenancies from year to year, and at sufferance.

Life Estates.—The distinguishing characteristic of life estates is their uncertainty; for, as an early writer expressed it, "although nothing can be more certain than death, nothing is more uncertain than the hour of death." The estate may be for the life of the tenant, or for that of the lessor or any third person. In the latter case it is described as an estate *pur autre vie*, and the person upon whose life the estate depends is called *cestui que vie*. If the tenant should die before the latter, there will remain an unexpired fraction of the estate (to continue until the death of the *cestui que vie*), which would at common law have been open to the first comer to seize and occupy as "general occupant," or which would go to any one designated in the deed as "special occupant." An estate for life not being an estate of inheritance, it would of course not go to the tenant's heir. By statute in England and most of the U. S. this remnant of an estate *pur autre vie* is now disposed of by making it a part of the estate of the deceased tenant, to descend with his personal property to his next of kin.

Of course, the termination of the life estate puts an end to any interest or tenancy dependent upon it. Thus if a person having a life estate in land should purport to lease it for twenty-one years, and should die within a few days afterward, the lease would terminate at the moment of his death. Owing to this fact life tenants are frequently unable to make advantageous leases. To remedy this defect it is not uncommon for one who creates a life estate to confer upon the life tenant a *power* (see POWERS) or authority to create a lease commencing during his tenancy, and continuing for a moderate period—viz., twenty-one years. If this power is executed the result is that while the life tenant lives the rent is payable to him; after his death, to the next owner (or so-called reversioner). The ordinary life estate, as above described, arises by act of the parties, i. e. by agreement or conveyance. There are some life estates, however, which arise without intervention of the parties, solely by operation of law. The most important of these are the estates of *dower* and *curtesy*. See ESTATE and DOWER.

Estates for Years.—These have, as their distinguishing characteristic, certainty and definiteness of extent. The

length of the term is immaterial—whether it be for twenty-four hours or for 1,000 years—provided the period of time be definite and certain, it is equally an estate for years. The humble origin of this estate, dating, as it does, from a time when no estate less than an estate for life was deemed worthy of a freeman, combined with the circumstance that a term of years was formerly regarded as a mere contract right and not an estate in lands, has impressed on it a peculiar character. Although it is now a recognized estate, it is not a freehold, but a leasehold interest, and it is not *real* but *personal* property. Accordingly, if a tenant dies leaving a part of his term unexpired, it will not descend to his heirs as land, but to his executor or administrator as a chattel. The interest of a tenant for years is called a "term," and the tenant is sometimes called a "termor." The lease creating a term of years is properly termed a "demise." Of course, no notice is required to terminate an estate for years. It comes to an end definitely by lapse of the term.

Tenancy at Will.—This can arise only by agreement of both parties, and it may be terminated at the pleasure of either. Any occupation of land by the owner's permission and without expressed limitation of a term creates a tenancy at will. Accordingly, an entry by a tenant under a void lease or under a mere agreement for a lease will give rise to a tenancy at will. Originally at common law a tenant at will was, in the absence of special agreement, under no obligation to pay rent, but he is now generally held liable to pay a reasonable rent for use and occupation of the premises. So, too, at common law the tenancy could be terminated by either party without previous notice to the other, and in case of a pure tenancy at will this is the general rule to-day. In New York, however, and a few others of the U. S., the landlord is compelled by statute to give the tenant at will a reasonable notice of his intention to terminate the tenancy.

Tenancy from Year to Year.—This is a modern estate developed out of tenancy at will. It is, in fact, a tenancy at will which has by operation of law acquired certain qualities of permanency and security. It arises where the payment of rent at regular periods, with or without other circumstances, raises the inference that it was the intention of the parties that the tenant should not be disturbed from month to month or from one year to another. This fact being established, the "will" to terminate the tenancy could be exercised only at the expiration of the current month, or quarter, or year, according as the tenancy was deemed to be from month to month, from quarter to quarter, or from year to year. Even to terminate it at its regular period, notice must be given to the tenant of the landlord's intention to put an end to the tenancy. This notice, excepting where the common-law rule has been altered by statute, must be six months for a tenancy from year to year, one month for a tenancy from month to month, etc. Where such notice is not given the tenant may, if he desires, continue in possession for another full period of his tenancy, and if he stays over into a new period he will be liable for rent to the end of it.

Tenancy at Sufferance.—This so-called tenancy is a legal fiction to describe the forbearance of the land-owner toward one who, having come rightfully upon the land, remains in possession wrongfully. It arises most frequently by the holding over of a tenant for years or at will, whose term or tenancy has expired. The landlord may in such cases treat the hold-over as a trespasser, and eject him accordingly. If he forbears to do this the trespass is condoned, and the wrongdoer acquires a certain legal status. If the landlord acquiesces in the possession of the tenant, the latter becomes a tenant at will. If he accepts rent at regular intervals, or by other acts recognizes the tenant's right to periods of occupancy, the latter becomes a tenant from year to year, or from month to month, as the case may be. Although the landlord may elect whether to eject a hold-over tenant or deal with him as a tenant at will, or from year to year, the tenant has no such option. He is deemed to have made his election by holding over. From the first day of his wrongful occupation of the premises the tenant is held to all the consequences of his choice. He can not stop short of a tenancy from year to year if his landlord chooses to hold him to it. In such cases the terms of the new tenancy are usually determined by the terms of the expired lease. See also EMBLEMENTS, FIXTURES, and WASTE. Consult also the following works: Leake's *Digest of Law of Real Property*; Pollock's *Law of Land*; Washburne, *Real Property*; and Taylor's *Landlord and Tenant*.

GEORGE W. KIRCHWEY.

Landois, lăăn'dwăă', LEONARD CHRISTIAN CLEMENS AUGUST, M. D.: physiologist; b. in Münster, Germany, Dec. 1, 1837; was educated at the University of Greifswald; was tutor in Greifswald 1863–72; has been Professor of Physiology and director of the Physiological Institute there since 1872. He has published *Die Lehre vom Arterienpuls* (1872); *Die Transfusion des Bluts* (1875); *Graphische Untersuchungen über den Herzschlag* (1876); *Die Uraemie* (2d ed. 1891); *Lehrbuch der Physiologie des Menschen* (8th ed. 1893; English, French, Italian, Russian, and Spanish translations).

C. H. THURBER.

Landolt, EDMUND, M. D.: ophthalmologist; b. in Aarau, Switzerland, in 1846; pursued his professional studies in the Universities of Heidelberg, Vienna, Berlin, Utrecht, and Zurich, graduating M. D. at the latter in 1869; then worked more than a year as Horner's assistant in the Zurich clinic for eye diseases; in 1874 he established himself in Paris as an ophthalmologist. His investigations in his specialty have been distinguished by their originality. In 1880 he became coeditor of the *Archives d'ophthalmologie*. Among his more important works are *Le diagnostic des maladies des yeux* (Paris, 1877); *Manuel d'ophthalmoscopie* (Paris, 1878); *Traité complet d'ophthalmologie* (Paris, 1886).

S. T. ARMSTRONG.

Landon, LETITIA ELIZABETH: See MACLEAN.

Landor, WALTER SAVAGE: author; b. at Ipsley Court, Warwickshire, England, Jan. 30, 1775. Being the son of wealthy parents he was intended for the army; received a careful early training from private tutors and at Rugby School (1785); entered Trinity College, Oxford, in 1793; was rusticated in the summer of 1794 for a breach of discipline, and never returned; printed in 1795 a small volume of poems, which attracted no attention; studied law, though never called to the bar, and issued in 1798 a poem (*Gebir*) of considerable length, which in 1802 he published in a Latin translation (*Gebirus*). Landor visited Paris in 1802, succeeded soon after to his patrimonial estates, spent immense sums in improving them, in buying others in Monmouthshire, and in building a palatial mansion; and in 1806, in a moment of irritation, sold all his lands, ordered his magnificent house to be torn down, and prepared to live abroad. In 1808 he raised a body of troops at his own expense, joined the Spanish general Blake in defending the Peninsula against the French invasion, and contributed a large sum to the Spanish military treasury, receiving the thanks of the supreme junta and a commission as colonel. Landor married in 1811; resigned his commission on the return of Ferdinand VII. to Spain, and in 1815 settled in Florence, Italy, where for seven years he occupied the palace of the Medicis, and afterward bought the celebrated villa Gherardesca at Fiesole. In 1812 he published *Count Julian, a Tragedy*; in 1820 *Idyllia Heroica*, in Latin (published at Pisa); in 1824 another volume of *Latin Poems*, and in the same year the first series (2 vols.) of his most celebrated work, *Imaginary Conversations of Literary Men and Statesmen*, of which the second series appeared in 1829. A passionate enemy of conventionalism and of tyranny, whether political or social, he indulged in startling paradoxes, defending Tiberius and Nero, and advising the Greeks in their struggle with the Turks to discard firearms and employ only the weapons of their classical forefathers. After thirty years' residence in Italy Landor took up his residence at Bath in 1835, published in 1836 one of his best works, *Pericles and Aspasia*, followed by *A Satire on Satirists* (1836), *Pentameron and Pentalogue* (1837), and the dramas *Andrea of Hungary* and *Giovanni of Naples*, all written in Italy; *The Hellenics* (1847), *Popery, British and Foreign* (1851), *The Last Fruit of an Old Tree* (1853), *Antony and Octavius* (1856), and *Dry Sticks Fagoted* (1858), besides some minor works. D. in Florence, Sept. 17, 1864. A collective edition of his works appeared in 1846 (2 vols.), and a complete edition, in 7 vols., was begun in 1874. His biography was written by John Forster (1869; new ed. 1874). Landor's writings have never been popular, but they all contain unmistakable evidence of a high order of genius, which is best appreciated by the "fit audience though few" of poets possessing kindred gifts.

Revised by H. A. BEERS.

Landouzy, LOUIS, M. D.: neurologist; b. at Rheims, France, in 1850; graduated M. D. from the Paris School of Medicine in 1876, his thesis being *Contribution à l'étude des convulsions et paralysies liées aux méningo-encéphalites fronto-pariétales*. He continued his studies in nervous diseases, and for his monograph *Des paralysies dans les mala-*

dies aiguës, in the *concours* of 1880, he was appointed associate professor in the Paris Faculty of Medicine and physician to the hospitals. In 1881 he was appointed physician to Tenon Hospital, and in 1890 to Laënnec Hospital. In 1893 he became full professor. He has been one of the editors of the *Revue de médecine* since 1881, and is the author of monographs on nervous disorders. S. T. ARMSTRONG.

Land-rail: See CORN-CRAKE.

Landry, AUGUSTE C. P. R.: See the Appendix.

Landscape: a tract or stretch of country as seen at one time from one point, and so called with reference to its appearance to the eye, as in Milton's lines—

> Straight mine eye hath caught new pleasures
> Whilst the landscape round it measures.

Also visible inanimate nature in general, what one sees out of doors, and especially in the country—hills and groves and streams, with the sky; and the study or examination of such aspects of nature, as in Ruskin's phrase "We will examine, in detail, not the landscape of literature, but that of painting." Also a representation in art of such aspects of nature as "a fine landscape"—that is to say, a fine painting or drawing of a landscape.

Landscape in fine art has this peculiarity, that in most epochs and among most people known to us it has been subordinate to figure-subjects, and yet has been a principal subject under very different circumstances. Thus in China a splendid school of landscape-painting existed in the twelfth century A. D., and its influence has been felt ever since in China, and also in Japan, so that there has been an almost continuous series of artists who have made landscape their chief study. In Europe the great development of landscape art did not take place until the seventeenth century, and the Dutchmen Ruysdael, Hobbema, and their fellows, together with the Lorrainer Claude Gelée, were the beginners of a system of painting which has been steadily kept in force ever since. These are the greatest instances of large movements in art especially directed toward landscape as a principal subject. The sculptured slabs of the Assyrian palaces show a decided feeling for landscape beauty in their backgrounds, and in the later Greek bas-reliefs an extraordinary pictorial effect is obtained by the free use of tree-form, distant peeps of hill, and battlemented wall and the like, behind the principal figures. In like manner in the well-known Ghiberti gates of the Florence baptistery—those of the east doorway, modeled about 1425—landscape is brought into the sculptured composition with remarkable effectiveness, for, however one may dispute the artistic propriety of forcing sculpture to a task not natural and easy for it, it is certain that the composition of these ten panels, each containing figures in vigorous action, buildings, trees, craggy rocks, and distant mountains—all in bronze relief—is a very noticeable phenomenon in decorative and expressional art. To be compared with these are the curious carvings in wood of the Chinese and the Japanese, where the incidents of pilgrimage to a mountain-shrine are worked out in minute detail, their little figures scaling the steep paths, their boats moored at the mountain's foot, the trees growing among broken rocks, and the combined human and unconscious natural interest forming one and a very powerful design. As a matter of course, it is in painting and drawing that landscape art is most often seen, both as principal subject and as background and setting for scenes of human action. See PAINTING. RUSSELL STURGIS.

Landscape-gardening, or **Landscape Architecture**: the art of making such changes in the character of the scenery of a given field, and of so bringing it under contemplation from innumerable points, that the pleasure of the beholder is increased. To this end artificial objects, such as houses, monuments, bridges, and roads, are to be so fashioned and disposed in connection with and in relation to natural objects—as, for example, masses of foliage, hills, dales, rocks, and waters—that the mind will be drawn from materialistic toward poetic moods. Landscape has effects on men which vary in degree and in kind according to the character of that which is contemplated and the conditions under which it is contemplated. The scenery of a given field may be enjoyed either from fixed points such as a landscape painter would select for an effective picture, or from the points of view of one moving here and there within the field in question.

The term landscape-gardening was introduced late in the eighteenth century to denote the application of gardening operations to the purpose which has thus been explained. But this purpose, then a novel one, being much misunderstood, the term was soon popularly much misused. In time it came often to be applied to operations in the direction of which there was no purpose of landscape; still oftener to operations in which, if a landscape purpose entered at all, it was confused with purposes of an inconsistent and discordant character. Coming to be associated with such operations, a confusion of ideas resulted that is yet common. The term landscape architecture as a substitute for landscape-gardening is growing in favor, the word architecture being taken in that sense in which it was used by Milton when referring to the Almighty as the architect of the world.

There are two branches of horticulture which in ordinary practice are often confounded with landscape-gardening. One of them is the cultivation of plants with special regard to interest in their distinctive individual qualities. The other is the cultivation of plants with a view to the production of effects on the principles commonly studied in the arrangement of precious stones, enamel, and gold in an elaborate piece of jewelry, or of flowers when sorted by colors and arranged for the decoration of a head-dress, a dinner-table, or a terrace.

The adoption of a landscape purpose does not require that on a given piece of ground to be dealt with there shall be no garden, using that word in its ancient and not yet wholly lost sense of a treasury of choice plants. It only requires that such a treasury shall be so situated and so planned with reference to its surroundings that it will not be a discordant feature in the general scenery of the neighborhood. It may be observed that the best writers of the time when the term landscape-gardening was coming into vogue sometimes used the word scenery as it has here been used—interchangeably with the word landscape.

Origin and Development of the Art.—In the minds of our savage ancestors any confused, undefined scene was suggestive of hidden dangers, hence was unfavorable to a tranquil state of mind, and this mental attitude toward most forms of natural scenery was transmitted to their more civilized descendants as a slowly lessening inheritance. Even toward the end of the Middle Ages, as Ruskin observes, mankind still looked with aversion upon all scenery that was intricate and obscure. They especially wanted everything coming under view from their dwellings to appear clearly defined. Paradise was pictured in the churches as a plain divided into squares by straight walks and canals bordered with rows of trees, each tree so trimmed and trained that its individual mass of foliage would have a distinct outline, no part of it blending or intermingling with the foliage of an adjoining tree. This habit of mind, wherever it prevailed, established certain principles of design for gardening. The ancient formal style of gardening continued to be practiced in Italy during the period of the Renaissance, and was maintained in other parts of Europe. Characteristic examples of grounds laid out in geometric style, as it is sometimes called, are yet to be found at Rome, where the great gardens of the nobility were arranged by the architects of the villas to which the grounds were attached. Groves, clipped hedges, parterres, fountains, grottoes, staircases, terraces—all bore "a direct relation to the house." Another example of this style is that at Fontainebleau, France, where a garden of several acres has its parterres arranged in rectangular form surrounding a central basin of water.

With progress in civilization exceptions to the general sentiment in regard to natural scenery begin to be more or less apparent in literature. At length Milton is found imagining the Garden of Eden to have been charming, not because of its orderly, artificial character, but because of its natural landscape. The literature of the early parts of the eighteenth century shows that a keen enjoyment of natural scenery had come to be not uncommon with the more cultivated men of the time, and that a disposition was growing to speak slightingly of the beauty of gardens when compared with the beauty of certain passages of natural scenery. At length, under advice of one William Kent, who had returned from a study of the pictured landscapes of old masters in Italy, with their vistas often realistically treated, an English nobleman had the walls of his garden razed, its geometric lines obliterated, its stiff trees felled, and a stretch of partially wooded pastoral scenery laid open to view from his windows, the composition being improved by planting here and felling there. The result was so highly praised that it proved to be the setting of a fashion, and this fashion rapidly spread. Kent was not a gardener in the old and then still usual sense of the word, having previously

been a painter and sculptor, and lastly an architect, and in gardening, so far as this word can apply at all to his work, he was skilled only as a designer. What he aimed at was a result, not merely of a different kind, but of an opposite kind from that of gardening, using this word as it had before been used. Nevertheless, in order to advance his object, he wisely employed men skilled in the manual operations of gardening, such as digging and planting. To distinguish the new art from the old art of "gardening" it was for a time referred to as the "new gardening," and the first treatise printed upon it bore the title, *Modern Gardening*. After a time the poet Shenstone, seeking a prefix that would be expressive, suggested that of "landscape." A few years later the leading practitioner of the new art, Humphrey Repton (1752–1818), assumed "landscape-gardener" as his professional title, but this attempt to unite the idea attached to the word landscape with the old idea attached to the word garden was found to be perplexing. Sir Walter Scott was one of those who realized this fact, but he failed to propose a more fitting term, and his protest had no appreciable effect in checking the tendency, which he deplored, toward a confusion under the name of landscape-gardening of purposes that could not be amalgamated.

Landscape-gardening Applied to Small Plots.—There are many situations in which plant-beauty is desired where the area to be operated upon is so limited, or so shaped and circumstanced, that the depth and breadth of landscape scenery must be considered impracticable of attainment. In the U. S. gardening is required for the improvement of places of this class many thousand times for one in which such restraining conditions are not encountered; and the question may be asked whether they must all be excluded from the field of landscape-gardening, and if not, what, in these cases, can be the significance of the prefix "landscape"? As a general rule, probably, so many purposes require to be served, and so many diverse conditions to be reconciled, that the only rule of art that can be consistently applied is that of architecture, which would prescribe that every plant, as well as every molding, shall bear its part in the "adornment of a service." To this end, parterre and specimen gardening are more available than landscape-gardening; but it may happen that in a space where, with due regard to considerations of health and convenience, there would be scant room for more than two or three middle-sized trees to grow, a thoughtful man may, with careful study, by a judicious treatment of the materials at hand, succeed in producing effects to which the term landscape is applicable.

As an example, suppose a common village dooryard, in which are found a dozen trees of different sorts planted twenty years before, and that among them there is one, standing a little way from the center, a linden (*Tilia*). Trampled under by ruder and greedier neighbors, and half starved, youth and a good constitution may yet have left it in such condition that, all the rest being rooted out, sunlight given it on all sides, shortened in, balanced, watered, drained, stimulated, its branches will grow low and trailing, and, regaining its birthright, it will also acquire a stateliness of carriage unusual in a tree of its age and stature. If landscape-gardening is for the time to take its order from this tree, and all about it made becoming with its state, the original level surface of the ground need be but slightly modified, yet it may perceptibly fall away from near the trunk of the tree, dipping in a long and very gentle wave to rise again with a varying double curve on all sides. There can not, then, be too much pains taken to spread over it turf uniform in color and quality. Looking upon this from the house, it should seem to be margined on all sides by a rich, thick bank, generally low in front and rising as it recedes, of shrubs and flowering plants, the preparation for which may have required for years a clean-lined border, curve playing into curve, all the way round. A very few plants of delicate and refined character may stand out in advance, but such interruptions of the quiet of the turf must be made very cautiously. Of furniture or artificial ornaments there must be none, or next to none. The rear rank of shrubs will need to stand so far back that there will be no room to cultivate a suitable hedge against the street. The fence may be a wall of cut stone, with decorated gate-piers; or with a base of stone it may be of wrought iron, or there may be used a wooden construction of less cost, in which there is a reflection, with variety, of the style of the house if that is of wood also. The gateway being formed in a symmetrical recess of the fence nearly opposite the tree, the house-door being on the side, the approach to it should bend, with a moderate double curve, in such a way as to seem to give place to the tree, and at the same time allow the greatest expanse of unbroken lawn-surface. Near the gateway, and again near the corner farthest from it, there may be a small tree or a cluster of small trees or large shrubs, forming low, broad heads, the tops of which, playing into that of the loftier linden on the right, will in time show to those sitting at the bay-window of the living-room a flowing sky-line, depressed and apparently receding along the middle.

Suppose, on the other hand, that it is an aged beech that has been found on the place, badly used in its middle age as the linden in its youth—storm-bent, and one-sided, its trunk furrowed and scarred, and spreading far out to its knotted roots. If a dressy door-yard had been desired, this interesting object would have been cut away though it were the last tree within a mile. Accepting it, nothing would be more common, and nothing less like landscape-gardening, than to attempt to make a smooth and even surface under it. Let it be acknowledged that fitness and propriety require that in front of the house there should be some place of repose for the eye, and that nowhere in the little property should there be a dusty or a muddy surface. Starting from the corner nearest the tree, and running broader and deeper after it has passed it and before the house, let there be a swale (a gentle waterway) of well-kept turf. Now, to carry this fine turf right up over the exposed roots of the beech would be a great mistake; to let it come near, but cut a clean circle out about the tree, would be a barbarism. What is required is a very nice management, under which the turf in rising from the lower and presumably more humid ground shall become gradually thinner and looser, and at length be mixed with moss, and finally patched with plants that on the linden's lawn would be a sin. Tufts of clover, even plantain and sorrel, may appear. The surface of the ground may continue rising, but with a broken swell toward the tree, and, in deference to its bent form, hold rising for a space on the other side; but nowhere should its superior roots be fully covered.

Suppose that the owner of this house is to come to it three times out of four from the side opposite that in which the beech stands; his path then should strike in well over on that opposite side and diagonally to the line of the road; there may be a little branch from it leading toward and lost near the tree (the children's path), while the main stem bends short away toward a broad porch facing the road at the corner nearest the gate. There may be nothing in front to prevent a hedge, but must that mean a poor pretense of a wall in leafage? Perhaps it must have that character for a few years till it has become thick and strong enough at bottom. It should always be moderately trim on the roadside, but its bushes should not be all of one sort, and in good time they will become bushes in earnest, with loose and feathery tops, sometimes 10 feet high. Yet to one looking from the house, let part of their height be lost behind an under and out growth of brake and bind-weed, dog-rose, and golden-rod, asters, gentians, buttercups, poppies, and irises, and growing irregularly beneath them let spring up chickweed, catnip, cinquefoil, wild strawberry, hepatica, and lilies-of-the-valley, and still farther out plant crocuses and daffodils. Near the gate the hedge may well be a little overrun and the gateposts overhung and lost in sweet clematis; nay, as the gate must be set-in a little, because the path enters sidewise, let there be a strong bit of lattice over it, and on the other side plant a honeysuckle to re-enforce the clematis. Inside the gate, by the pathside, and again down by the porch, there may be cockscombs, marigolds, pinks, and pansies; but avoid using plants tied to the stake and priggish little spruces and arbor-vitæs. Any common woodside or fence-row bushes of the vicinity may be set near the edge of the property to put out of sight the prim, conventionally arranged trees and shrubs that may satisfy one's neighbors; or if an evergreen (conifer) will befit the place, a short, shock-headed mountain-pine, with two or three low savins and a prostrate juniper at their feet. Finally, let the roadside be managed as before. Then if the gate be left open not much will be lost even if a cow comes in; yet from the porch, the window beyond, or a seat under the tree there will be nothing under view that is raw or rude or vulgar; on the contrary, there will be a scene of much refinement as well as of much beauty.

The Treatment of Large Areas.—Where more extended areas are dealt with, as in parks or on large estates, often de-

fects in the landscape are to be obscured by screening plantations. To form these, in some cases choice is made of bushes by which, when fully grown, the objectionable detail will be hidden, but other consistent and harmonious elements of landscape, lying beyond, left unobscured. Suppose that, at another point, high-growing trees are planted because bushes or low-spreading trees would not have sufficient elevation to fully accomplish a similar object. In the choice of these high-growing trees such are taken as will, through the darker tint and stronger texture of their foliage, cause other foliage beyond to appear relatively lighter and its detail less distinct, thus making it apparently more distant than it actually is. There are many methods for making landscape more effective, the general nature of which has been thus suggested.

In the possibility, not of making a perfect copy of any charming natural landscape, or of any parts or elements of it, but of leading to the production, where it does not exist under required conditions and restrictions, of some degree of the poetic beauty of all natural landscapes, will be found not only the special function and the justification of the term landscape-gardening, but also the first object of study for the landscape-gardener, and the standard by which alone his work is to be fairly judged.

Nature acts both happily and unhappily in producing her landscape effects, and a landscape-gardener must take measures to secure the happy action. He need not wait for the slow and uncertain process by which in nature a certain position would be adapted for a certain tree. He may make the soil fertile at once. He need not take the chance that a certain thick growth of saplings will be so thinned by the operation of what are called natural causes that a few of them may yet have a chance to become vigorous, long-lived trees. Knowing that a very few of these will be more valuable in the situation, with the adjoining turf holding green under their canopy, than the thousands that for years may otherwise occupy it, struggling with one another and barring out the light which is the life of all beneath them, he may make sure of what is best by using ax and bill-hook. The ultimate result is not less natural or beautiful when he has done so than it would have been if at the same time the same trees had been eaten out by worms or taken away by disease.

Limitations of the Landscape-gardener.—There are several considerations, neglect of which is apt to cause too much to be asked of landscape-gardening, and sometimes perhaps too much to be professed and attempted. The common comparison of the work of a landscape-gardener with that of a landscape-painter, for example, easily becomes a very unjust one. The artist in landscape-gardening can never have, like the landscape-painter, a clean canvas to work upon. Always there will be conditions of local topography, soil, and climate by which his operations must be limited. He can not whenever it suits him introduce the ocean or a snow-capped mountain into his background. He can not illuminate his picture with constant sunshine nor soften it by a perpetual Indian summer. Commonly, he is allowed only to modify the elements of scenery, or perhaps to bring about unity and distinctness of expression and suggestion in a locality where elements of beautiful landscape already abound but are partly obscured or seen in awkward, confusing, and contradicting associations. This is especially likely to be the case in undulating and partially wooded localities, such as in the U. S. are oftenest chosen for rural homes. Again, the artist in landscape-gardening can not determine precisely the form and color of the details of his work, because each species of plant will grow up with features which can not be exactly foreknown in its seed or in its sapling condition. Thus he can see his designed and imaginary landscape only as one may see an existing and tangible landscape with half-closed eyes, its finer details not being wholly lost, yet nowhere perfectly definable. Still, again, it is to be remembered that works in landscape-gardening have, as a general rule, to be seen from many points of view. The trees which form the background, still oftener those which form the middle distance, of one view must be in the foreground of another. Thus the working out of one motive must be limited by the necessities of the working out of others on the same ground, and, to a greater or less degree, with the same materials. Finally, conditions of health and convenience in connection with a dwelling are incompatible with various forms of captivating landscape beauty. A house may be placed in a lovely situation, therefore, and the end of long and costly labors of improvement about it prove comparatively dull, formal, and uninteresting. What is lost is a part of the price of health and convenience of dwelling. The landscape-gardener may have made the best of the case under the conditions prescribed to him.

The merit of landscape-gardening works consists largely in the degree in which their designer has been inspired by a spirit congenial to elements of locality and occasion which are not, strictly speaking, gardening elements. The grounds of an ordinary, modest home, for instance, may desirably be designed to give the house, gardens, and offices an aspect of retirement and seclusion, as if these had nestled cozily down together among the trees in escape from the outside world. The grounds of a great public building will, on the other hand, be desirably as large in scale, as open, simple, and broad in spaces of turf and masses of foliage as convenience of approach will allow, and every tree arranged in subordination to, and support of, the building. The grounds of a church and of an inn, of a cottage and of an arsenal, of a burying-place and of a place of amusement, will thus differ, in each case correspondingly to their primary purpose. Realizing this, it will be recognized that the choice of the site, of the elevation, aspect, entrances, and outlooks of a building for no purpose can be judiciously determined except in connection with a study of the leading features of a plan of its approaches and grounds; also, that in the design of roads, walks, lakes, and bridges; in the method of dealing with various natural circumstances, as standing wood, rocks, and water; in a determination of what is possible and desirable in respect to drainage, water-supply, distant prospects to be opened or shut out, the avoidance of malaria and other evils —all these and many other duties are necessarily intimately associated with those of gardening (or the cultivation of plants) with a view to landscape effects. See Repton, *Observations on the Theory and Practice of Landscape-gardening* (London, 1803; new ed. 1840); Gilpin, *Practical Hints upon Landscape-gardening* (London, 2d ed. 1835); Downing, *Treatise and Practice of Landscape-gardening* (New York, 1841). See Fine Arts, Floriculture, and Horticulture.

Frederick Law Olmsted.

Landseer, Charles: painter; son of John and brother of Sir Edwin H. Landseer; b. in 1799; studied in the schools of the Royal Academy, and exhibited in 1828; was chosen an associate in 1837, an academician in 1845, and keeper in 1851. He painted historical pieces. His *Plundering of Basing House*, an incident of the civil war in England, is well known. Other pictures are *Clarissa Harlowe in Prison*, *The Departure of Charles II. in Disguise*, *The Monks of Melrose*, and *The Return of the Dove to the Ark*. D. July 22, 1879.

Landseer, Sir Edwin Henry: painter; son of John Landseer, line-engraver; b. in London, Mar. 7, 1802; excelled while a boy in the painting of animals; became a student of the Academy in 1816. Landseer was the most popular and admired animal-painter of his time; his pictures have great vigor of treatment and power of characterization. Some of the best may be seen in the Vernon collection (National Gallery), as *Dignity and Impudence* and *Spaniels of King Charles's Breed*; others in the Sheepshanks collection at South Kensington, as *The Old Shepherd's Chief Mourner*, *A Jack in Office*, and *A Highland Breakfast*. Edwin Landseer was elected an associate of the Royal Academy in 1826, and an academician in 1831. In 1850 he was knighted by the Queen. On the death of Sir Charles Eastlake in 1866 he was elected president of the Royal Academy, but declined the honor. D. Oct. 1, 1873.

Revised by Russell Sturgis.

Landseer, John: line-engraver; b. in Lincoln, England, in 1761; was the son of a jeweler; received his earliest instruction from William Byrne. His first productions were vignettes for Maclin's Bible and Bowyer's *History of England* (1793); in 1799 was engaged on a series of views for J. M. W. Turner and J. C. Ibbetson; in 1806 gave lectures on engraving at the Royal Institute, which were published; in 1807 was chosen associate engraver by the Academy; in 1814 began a series of line-engravings illustrating the antiquities of Dacca (British India), twenty plates; in 1834 a catalogue, descriptive, explanatory, and critical, of the earliest pictures in the National Gallery. As late as 1851 he exhibited at the Royal Academy views of Druidical temples in Guernsey and Jersey. D. in London, Feb. 29, 1852.

Revised by Russell Sturgis.

Landseer, Thomas: line-engraver; b. in London in 1795; elder brother of Sir Edwin Henry, an engraver of ability

and repute. His best-known work is the reproduction of his brother's pictures, which he executed with spirit and delicacy. The plate of Rosa Bonheur's *Horse Fair*, published in 1861, gave him celebrity. He wrote the *Life of William Bewick* (artist, 1871); was made an associate of the Royal Academy in 1868. D. Jan. 20, 1880.

Land's End: See CORNWALL.

Landshut, laants'hoot [Germ., liter., land's defense; *land*, country + *hut*, defense, protection]: capital of the district of Lower Bavaria; on the Isar; 44 miles by rail N. E. of Munich (see map of German Empire, ref. 7–F). It is the seat of the district government, and is well provided with educational and charitable institutions. It has large breweries and manufactures of tobacco, and many interesting buildings, among which are St. Martin's church, built in 1450, with a tower 454 feet high; the old castle, built in 1232, of which a part was put in splendid repair by the King of Bavaria 1873–74; a royal palace with beautiful frescoes. From 1800 to 1826 it was the seat of a university, previously located at Ingolstadt, and subsequently removed to Munich. It was the capital of the duchy of Bavaria-Landshut 1255–1503. The city is often called the *Dreihelm Stadt* because it has three helmets in its arms. Pop. (1890) 18,862.

Landskrona, laands-kroo'naa: town in the province of Malmö, Sweden; on the Sound; 16 miles N. N. E. from Copenhagen (see map of Norway and Sweden, ref. 14–D). It has a good harbor, some manufactures of leather and tobacco, and a steadily increasing trade. It is connected by a branch line with the railway system of Sweden, and by a line of steamers with Lübeck. The great battle of Landskrona, which saved Sweden from the Danish invaders, was fought near here in 1676. On the island of Hven, a mile distant, were the residence and the observatory of Tycho Brahe, the celebrated astronomer, of which nothing remains. The island is now a mere hunting-ground. Pop. (1896) 13,519.

Landslip: a sort of avalanche of earth and rocks from the side of a mountain or hill. Earthquakes, frost, and especially the action of water, are frequent causes. Soils resting on inclined planes of smooth rock, or masses of earth or rock resting on beds of clay, are liable to slide *en masse* during long-continued rains. Elevated peat-swamps have been known to absorb so much water as to burst and deluge lower regions with torrents of mud. Underlying strata of clay may become liquefied and gush out, leaving the surface to topple in. A remarkable landslide occurred near Nice, France, when the castle and village of Roccabruna, surrounded by orange and lemon groves, moved for some distance down the mountain without disturbing the houses. One of the most famous landslides was that in which Goldau in Switzerland was destroyed. In 1826 there was an extensive landslide 2 miles from the Notch in the White Mountains of New Hampshire, which choked up the Saco river, and flooded the surrounding country.

Revised by G. K. GILBERT.

Land Tax: a revenue derived by a government from an assessment on land. See TAXATION and SINGLE-TAX.

Land Tenures: See FEUDAL SYSTEM and FOLC-LAND.

Lane, EDWARD WILLIAM, Ph. D.: Arabic scholar; b. at Hereford, England, Sept. 17, 1801; was educated for the Church, but never took orders; went to Egypt in 1825, and resided there three years, studying the Arabic language and literature, and making two voyages up the Nile; again spent two years there (1833–35), preparing, at the request of the Society for the Diffusion of Useful Knowledge, his popular and entertaining work on the *Manners and Customs of the Modern Egyptians*, which was published in 1836; made a translation of *The Arabian Nights*, with notes (1838–40); went to Egypt for the third time in 1842, and afterward resided in Cairo, principally engaged in the preparation of an Arabic lexicon, under the patronage of the Duke of Northumberland, and after the death of that nobleman with the support of the British Government. The first part appeared in 1863, four others before the author's death, and three have since been published under the editorship of Stanley Lane-Poole. Mr. Lane also published *Selections from the Kur-an* (1843); was in 1864 made corresponding member of the Institute of France, and in Feb., 1875, received the degrees of master of philosophy and doctor of literature from the University of Leyden. D. Aug. 10, 1876.

Lane, GEORGE MARTIN: See the Appendix.

Lane, JOSEPH: soldier; b. in Buncombe co., N. C., Dec. 14, 1801; removed in youth to Indiana, where he engaged in business and in politics; served as colonel of the Second Indiana Volunteers in the Mexican war, and was made a brigadier and brevet major-general for gallantry at Buena Vista and in many minor actions; became in 1848, and again in 1853, Governor of Oregon Territory; was a delegate in 1851–59; U. S. Senator 1859–61; and in 1860 was nominated for Vice-President on the Breckinridge ticket. D. in Wake co., N. C., Apr. 19, 1881.

Lane-Poole, STANLEY: author and numismatist; b. in London, Dec. 18, 1854; took the degree of B. A. at Oxford in 1878; prepared the official catalogue of the Oriental coins in the British Museum (8 vols., 1875–83); he was crowned by the French Institute; on the death of his great-uncle, Edward William Lane, he undertook the completion of his Arabic lexicon, and brought out the sixth, seventh, and most of the eighth volumes, 1877–89. Among his other principal works are *Life of Edward William Lane* (1877); *Life of Stratford Canning, Viscount Stratford de Redcliffe* (2 vols., 1888); *Essays in Oriental Numismatics* (2 series, 1872–77); *Arabian Society in the Middle Ages* (1883); *Social Life in Egypt* (1883); *The Moors in Spain* (1886); *Turkey* (1888); *The Barbary Corsairs* (1890), the last three in the Story of the Nations Series; and, with F. V. Dickins, *The Life of Sir Harry Parkes* (2 vols., 1894).

Lanfranc: b. at Pavia, Italy, about 1005; was for many years a popular Professor of Jurisprudence in that city; removed to France, taught with success at Avranches, and in 1042, from motives of piety, entered the abbey of Bec in Normandy, where his school was visited by a great many scholars, among others by Anselm of Lucca, afterward Pope Alexander II., and where he sustained a controversy with Berengarius, whom he tried in vain to convince of his heresy. In 1063 he became abbot of St. Stephen, and in 1070, contrary to his own wishes, Archbishop of Canterbury. As Prior of Bec, Lanfranc had opposed the Norman duke William in the matter of an illicit marriage, which was afterward legalized by Rome through the help of Lanfranc himself. In the administration of his Church Lanfranc was a most devoted and prudent bishop, succeeding even in vindicating its titles to lands usurped under the conquerors. He rebuilt the Cathedral of Canterbury and founded two opulent hospitals outside the city. He employed his influence, which was very great, with the Conqueror in the support of justice and the protection of the natives, though, for the rest, he ably seconded William in the line of action which resulted in the subordination of York to Canterbury, and in the gradual but canonical removal from power of all English prelates and abbots, and their replacement by foreigners of good repute, but devoted to the new order. Lanfranc was a man of great political prudence, and fully conscious that only the strong hand of the Conqueror could preserve peace in the island; hence he was careful in his dealings, aiming to preserve harmony between the king and the pope, yielding to the one when he enacted a legislation of a very Gallican character, and furthering with prudence the decrees of the other against simony and the married clergy. In the latter case he tempered the Gregorian legislation so far as to allow their wives to those clerics who had married in good faith, being priests, but in the future, no one, monk or canon, was to be ordained deacon or priest if actually married. Lafranc was always on the best terms with Gregory VII., but knew the political situation in England better than the pope. When the latter complained of the conduct of William in ecclesiastical matters, Lanfranc replied to him among other things: "Pray God that he may live, for while he remains we have some manner of peace. After his death we can not count on its prolongation." Again he writes to the pope that he has tried to dissuade the king from certain acts unfavorable to the Roman see, but has failed in his efforts. Died at Canterbury, May 24, 1089. His extant works are not numerous. In his *Epistolarum Liber* there are fifty-five letters from his hand. The *Elucidarium sive dialogus de summa totius Christianæ theologiæ* is probably not his, though said to be an adequate sketch of the scholastic theology in its earlier stages. His works were edited in one folio volume by the Benedictine d'Achery (1648), and by Giles (Oxford, 1844, 2 vols. 8vo). See Migne, *Patrologia Latina*. *The Chronicle of Bec* and the *Lives of the Abbots of Bec* are the sources for his life, with the *Ecclesiastical History of Ordericus Vitalis*. See Hook's *Lives of the Archbishops of Canterbury* (vol. ii.); Freeman's *Norman Conquest* (vols. ii.–v.); Lingard's *History of England* (vol. i.); *Revue des Questions Historiques* (vol. xxx.,

1881); and Chevalier, *Répertoire des Sources Historiques du Moyen Âge*, s. v. Lanfranc. JOHN J. KEANE.

Lanfranco, laăn-fraan'kō, GIOVANNI: painter; b. in Parma in 1581. He studied with Agostino Caracci, and, after his death, with Annibale Caracci, who intrusted him with the cartoons for the Farnese Palace in Rome. He also etched the greater part of the Loggie of the Vatican. After the death of Annibale Caracci he returned to Parma and Piacenza, where he developed an individual style of painting. His most famous oil-paintings are *St. Andrea Avellino* at Rome, the *Dead Christ* at Bologna, and *St. Roch* and *St. Conrad* at Piacenza. He painted the cupola of St. Andrea della Valle at Rome, destined for his rival Domenichino, and finished the latter's work in the treasury of St. Gennaro at Naples. He also painted the cupola of the Church of Jesus at Rome. The grandeur of his architectural inventions, and the effective, rapid style of painting he adopted makes Lanfranco one of the most successful fresco-painters of his time. D. at Rome, 1647. W. J. STILLMAN.

Lanfrey, laăn'frā', PIERRE: French historian; b. at Chambéry, Savoy, then a part of the kingdom of Sardinia, Oct. 26, 1828. His father was a Frenchman who had been a military officer under the empire. Pierre entered the Jesuit college at Chambéry, but left on account of having written a pamphlet against his reverend instructors, and completed his studies at the Collège Bourbon in Paris, where he qualified for the bar, but afterward turned his attention to philosophical and historical studies. His first work, *The Church and the Philosophers of the Eighteenth Century* (1855), made a considerable sensation, which was deepened by *An Essay on the French Revolution* (1858); *The Political History of the Popes* (1860); *Political Studies and Portraits* (1863); and *The Restoration of Poland* (1863). In 1867 M. Lanfrey began the publication of his most important work, a *History of Napoleon I.*, of which the fifth volume (to the organization of the army for the invasion of Russia) appeared in 1874, the ablest and most complete arraignment of the first empire at the bar of history that has appeared. Lanfrey served in the *mobiles* of Savoy during the Franco-German war, was elected to the National Assembly in Feb., 1871, and in October of that year was appointed by Thiers minister to Switzerland, resigning in 1873; elected life senator in 1875. D. at Pau, Nov. 16, 1877.

Lang, ANDREW: author; b. at Selkirk, Scotland, Mar. 31, 1844. He was educated at the Universities of St. Andrews and Oxford, and was chosen fellow of Merton College in 1868. He has published many volumes in verse and prose, and excels especially in translation, in *vers de société*, and in clever half-humorous essays. Among his books are *Ballads and Lyrics of Old France* (1872); the *Odyssey* (trans. with Prof. Butcher, 1879); *Ballades in Blue China* (1880); *Theocritus, Bion, and Moschus* (trans. 1880); the *Iliad* (trans. with Leaf and Myers, 1883); *Custom and Myth* (1884); *Rhymes à la Mode* (1884); *Letters to Dead Authors* (1886; new ed. 1893); *Books and Bookmen* (1886; new ed. 1887); *Myth, Ritual, and Religion* (2 vols., 1887); *Grass of Parnassus* (1888); *Letters on Literature* (1889); *Life and Letters and Diaries of Sir Stafford Northcote* (2 vols., 1890); *Essays in Little* (1891); *St. Andrews* (1893).

Lang, BENJAMIN J.: See the Appendix.

Lang, CARL, Ph. D.: director of the Bavarian meteorological service; b. at Regensburg, Bavaria, Oct. 10, 1849; was educated at the Regensburg gymnasium and in the Technical High School and University of Munich. He was assistant in Physics from 1870 to 1878, then adjunct to the Royal Meteorological Central Station until 1885, when he became director of it, and has continued in this position to the present. In combination with Prof. von Bezold and Dr. Erk he has compiled and published the fourteen annual quarto volumes of the Bavarian meteorological service. He has, besides, published very many papers on thunderstorms, climatology, and practical meteorology, in meteorological and other journals. D. Sept., 1893.
MARK W. HARRINGTON.

Lang, JOHN MARSHALL, D. D.: minister of the Church of Scotland; b. in Glasford, Lanarkshire, May 14, 1834; graduated with honors from the University of Glasgow 1856; minister of the East parish, Aberdeen, 1856; of the parish of Fyvie, Aberdeenshire, 1858; of Anderston church, Glasgow, 1865; of Morningside parish, Edinburgh, 1868; of the Barony parish, Glasgow, 1873. In 1872 he represented the Church of Scotland before the General Assembly of the Presbyterian Church in the U. S. of America. He has been prominent in the councils of the alliance of the Reformed Churches, and is chairman of the western section of the alliance. In 1890 he was chairman of the commission of the Church of Scotland on the religious condition of the people, and in 1893 was moderator. He has published *Gnostic Sects and Heresies* (1873); *Heaven and Home* (1875); *The Last Supper of our Lord* (1881); *Life: is it Worth Living?* (1883); *Ancient Religions of Central America* (1882, St. Giles's Lectures); *The Church of England* (1884, St. Giles's Lectures); *Gideon and the Judges* (1890, Men of the Bible Series); *The Church and the People* (1893).

Lang, LOUIS: See the Appendix.

Lang, MARGARET RUTHVEN: See the Appendix.

Langdale, Sir MARMADUKE: soldier; b. in Yorkshire, England, about 1598; was sheriff of that county in 1642; embraced the royalist cause, and became one of the most valiant generals of Charles I., defeating the Scotch at Corbridge, and raising the siege of Pontefract Castle (1645); commanded at the battle of Naseby, June 14, 1645, which was lost through the imprudence of Prince Rupert; joined Montrose; was defeated; escaped to the Isle of Man; went thence to the Continent; joined the Scotch royalist army in 1648; took Berwick by surprise (April); was defeated by Cromwell at Preston (Aug. 17); captured and imprisoned in Nottingham Castle; escaped to Flanders; was made baron by Charles II.; was lord-lieutenant of Yorkshire on the Restoration in 1660. D. at Holme, in Yorkshire, Aug. 5, 1661. Clarendon in his *History of the Rebellion* gives Langdale a high reputation for courage and skill.

Langdon, JOHN, LL. D.: Governor of New Hampshire; b. at Portsmouth, N. H., June 25, 1741; became a successful merchant of that town. In 1774 he assisted in securing for the colonies the ordnance stores in the fort near Portsmouth. In 1775 he was sent to the Continental Congress. In 1776 he became navy agent, Speaker of the New Hampshire Assembly, and judge of the common pleas. He gave the money with which Gen. Stark's famous brigade was equipped, and in person commanded a company at Bennington, Saratoga, and elsewhere. In 1779 he was president of the New Hampshire convention and Continental agent. In 1783 he was sent to Congress, and was afterward more than once Speaker in the New Hampshire Legislature. He was president of New Hampshire in 1785, and in 1787 was in the convention which drafted the Federal Constitution. In 1788 he was Governor, and again in 1805–09 and 1810–12. He was a U. S. Senator 1789–1801, and declined the secretaryship of the Navy and the vice-presidency of the U. S. D. at Portsmouth, Sept. 18, 1819.

Lange, laang'e, ALBERT FRIEDRICH: philosopher and philologist; b. in Solingen, Germany, Sept. 28, 1828; studied at Zurich and Bonn Universities; was gymnasium teacher in Cologne 1870–72, and was appointed Professor of Philosophy in Zurich University in 1872. D. in Marburg in 1875. His principal works are *Geschichte der Materialismus* (2 vols., 1866; 3d ed. 1876); *Grundlegung der Mathematischen Psychologie* (1865); and *J. St. Mills Ansichten über die soziale Fragen* (1865). J. M. B.

Lange, laang'e, JOHANN PETER: theologian; b. at Sonnborn, near Elberfeld, in Rhenish Prussia, Apr. 10, 1802, in humble circumstances; acquired his first education by his own energy; attended for a year and a half the gymnasium of Düsseldorf; studied theology at Bonn 1822–25; preached in several places, and was appointed Professor of Theology at Zurich in 1841, and in 1854 at Bonn. His *Leben Jesu nach der Evangelien* (3 vols., Heidelberg, 1844–47), translated into English by Sophia Taylor and J. E. Ryland (6 vols., Edinburgh, 1864; new ed. Philadelphia, 1872), *Christliche Dogmatik* (3 vols., 1849–52), and *Apostolische Zeitalter* (2 vols., Frankfort-on-the-Main, 1853–54) exercised a widespread and highly beneficial influence; of his *Theologisch-homiletische Bibelwerk*, a commentary upon the entire Bible, edited and partly written by him, an English edition has been prepared, *Lange's Commentary*, by Philip Schaff, in collaboration with numerous translators and editors, and published at New York (1864–74, 24 vols., with an original volume by E. C. Bissell on the *Apocrypha*, 1880). It was one of the most successful of commentaries, especially from a publisher's standpoint, both in its German and English form. D. at Bonn, July 8, 1884.

Lange, THOMAS: novelist; b. in Copenhagen, Denmark, 1829; took the theological examination in 1857, but devoted

himself entirely to literature. His first work, *I Ungdommen, Skildringer* (In Youth, Portraitures, 1858), is of slight value, and was followed by similar volumes. *Eventyrets Land* (Wonderland, 1863), the scene of which is laid in Western Jutland, marks the beginning of his studies of nature and its mystical relations to the soul of man. It was followed by *Aaen og Havet* (The Brook and the Sea, 1870), his chief work; *Romantiske Skildringer* (Romantic Portraitures, 1872); *De lyse Nætter* (Light Nights, 1875); *Et Symposion* (1877); and *Nyt Liv* (New Life, 1879). D. Aug. 25, 1887. D. K. Dodge.

Lange, Thor: Danish writer; has lived for many years in Moscow, where he is Danish consul. Among his works may be mentioned *Fra Rusland, Skildringer og Stemninger* (From Russia, Descriptions and Moods); *Wesnà, Skildringer fra den russiske Literatur* (Wesnà, Descriptions from Russian Literature, 1886); *En maaned i Orienten, Flygtize Skizzer* (A Month in the East, Fleeting Sketches, 1887); and *Skitser og Phantasier* (Sketches and Fantasies, 1890). He has also made an admirable translation of Longfellow's *Golden Legend* (ed. iii., 1891). He possesses great descriptive powers and a delicate fancy. D. K. Dodge.

Langebek, laang'*e*-bek, Jacob: historian; b. in Skjoldborg, Denmark, Jan. 23, 1710. In 1745 he founded Selskabet for Fædrelandets Historie og Sprog, and as its president edited and chiefly wrote the first six volumes of *Danske Magazin*. He also revised the material collected by Rostgaard, which forms a portion of the sources of the great dictionary of the scientific society. His chief work, of which only three volumes were published, is *Scriptores rerum Danicarum medii ævi* (1772–74). D. in Copenhagen, Aug. 16, 1775. D. K. D.

Langelier, laăⁿzh'li-ā', François Charles Stanislas, Q. C., LL. D.: professor; b. at Ste. Rosalie, Province of Quebec, Canada, Dec. 26, 1838; graduated at Laval University in 1861, and, after filling the chair of Roman Law, was appointed Professor of Civil Law and Political Economy in that institution in 1876. He has been twice president of the Institut Canadien; was mayor of Quebec 1882–90; is president of the Council of Arts and Manufactures, and a member of the Council of Public Instruction for the Province of Quebec. He has held the offices of commissioner of crown lands and treasurer of the Province of Quebec; has been a member of the Dominion Parliament since 1887.—His brother Charles, b. at Ste. Rosalie, Aug. 23, 1853, graduated at Laval University, and was admitted to the bar in 1875. He was a member of the Parliament of Canada 1886–90, when he became provincial secretary in the government of the Province of Quebec. Neil Macdonald.

Langenbeck, Bernhard Rudolf Konrad, von, M. D.: surgeon; b. in Horneburg, Germany, Nov. 9, 1810; entered the University of Göttingen, where he graduated M. D. in 1835; visited France and England, and returned to Göttingen, where he became a privat docent. His graduating thesis, *De retinæ structura penitiore*, was elaborated into a volume, *De retina observationes anatomico-pathologicæ* (Göttingen, 1836). In 1842 he was called to the University of Kiel as Professor of Surgery and director of the Friedrichs Hospital. In the war with Denmark in 1848 he was general field surgeon of the army; in the same year he went to Berlin to take the chair, vacated by Dieffenbach's death, as director of the Clinical Institute for Surgery and Ophthalmology. For his services as surgeon-general in the war with Denmark in 1864 he was ennobled. He was in active service in the campaigns of 1866, 1870, and 1871. He was made Geheimer Mediciner Rath, and subsequently Geheimer Ober-Mediciner Rath after the Franco-German war. He was coeditor of the *Archiv für klinische Chirurgie* in 1860. He has written a number of papers on surgical topics, especially those pertaining to military surgery. D. in Wiesbaden, Sept. 30, 1887. S. T. Armstrong.

Langenbielau, laang'*e*n-bee'low: collective name of a number of villages in Silesia, Prussia, which together form a town extending more than 4 miles along the banks of the Biela (see map of German Empire, ref. 5–I). It has important cotton and woolen mills and sugar-refineries. Pop. (1890) 15,860.

Langendijk, Pieter: poet and playwright; b. at Haarlem, Holland, July 25, 1683; d. in 1756. His father, a prosperous mason, died when he was a child, leaving him to the care of an extravagant and incompetent mother. The latter soon removed to The Hague, where Langendijk was obliged to forego further education and become a designer in a damask-factory. By this trade he lived to the end, first at The Hague, then in Amsterdam, and finally (after 1722) in Haarlem. He was unhappy in his mother, in his wife, and in his own poor management of his affairs: yet he wrote steadily, and, as a maker of farces and comedies, came near greatness. His failure actually to attain this was perhaps due to the period in which he lived and to the particular influences felt by him. At the age of seventeen he had written a comedy, *Don Quichot*, which was not produced, however, till 1711, after his removal to Amsterdam. Here he had come into relations with members of that ambitious and self-satisfied group of persons styling itself "Nil Volentibus Arduum," which, taking the French Academy for its model, had assumed the charge of regulating and disciplining both the Dutch tongue and the forms of Dutch poetry. Here all was mediocrity, and it must be said to Langendijk's credit that he succeeded in lifting himself much above his instructors and models. He felt to the end, however, their admiration for things French, and his genius was impeded by the ideals they were trying to establish. This is particularly the case with his earlier pieces: *De Zwetser* (1712); *Het wederzydsch Huwlyksbedrog* (1712); *Krelis Louwen* (1715); *De Wiskonstenaars* (1715); *Quincampoix of de windhandelaars* (1720); *Arlequyn Actionist* (1720). For some reason a period of nearly twenty years intervened between this group of pieces and his later comedies. When he took up his pen again it was with the intention of producing comedies of manners, like Molière's, instead of mere farces. The first of the new group was *Xantippe of het booze wyf des filozoofs Sokrates beteugeld*—only too clearly suggested by his own experience as a husband. This was followed by *Papirius of het oproer der vrouwen binnen Romen*, not a success; and by the best of all his comedies, though not quite completed by his own hand, *Spiegel der vaderlandsche Kooplieden*. Even the latter, however, lacks the freshness and directness of the work of Brederoo. Besides his dramatic pieces, Langendijk wrote many occasional poems of slight value. These, with the plays, are printed in the collected edition of his works, *Gedichten* (Haarlem, 1760). Some of his farces are still played on the Dutch stage, and a separate edition of them appeared in 1851. A. R. Marsh.

Langensalza, laang'*e*n-zaal'tsă: town of Prussia, province of Saxony; 13 miles by rail N. by W. of Gotha (see map of German Empire, ref. 5–E). Pop. (1890) 11,501. It was several times the theater of battles. On Feb. 15, 1761, the allied Prussians and British, under Sydow and Spöreken, defeated the German imperial army under Steinville; Apr. 17, 1813, the Prussians defeated the Bavarians; June 27, 1866, a bloody contest took place between the Prussians and the Hanoverians, in which the latter were victorious, but suffered so heavily that a few days after they were forced to surrender to the Prussians, who were strengthened by re-enforcements.

Langevin, laăⁿzh'văⁿ, Sir Hector Louis: statesman; b. in the city of Quebec, Canada, Aug. 26, 1826; was educated at the seminary there, and admitted to the bar in 1850. He was a member of the executive council of Canada 1864–67, and after the union of the provinces was appointed Secretary of State of the Dominion, a portfolio which he retained until 1869, when he became Minister of Public Works. He was Postmaster-General from Oct. 19, 1878, until May 20, 1879, when he again became Minister of Public Works. During the absence of Sir John Macdonald in 1885–86, Langevin, as senior minister in the House of Commons, acted as leader of the Government. In 1891 the discovery of various irregularities in his department led to his retirement, though he, personally, was not directly implicated. He was a delegate to the Charlottetown union conference in 1864, to that in Quebec the same year, and to the London colonial conference 1866–67, to complete the terms of the union of the British North American provinces. In 1871, at the desire of the privy council, he visited British Columbia with a view of acquiring a knowledge of that province in relation to the Pacific Railway, and in 1879 proceeded to London to lay before the imperial Government the views of the Canadian ministry in connection with the proposed dismissal of M. Letellier de Saint-Just, the Lieutenant-Governor of the Province of Quebec. In 1873 he was elected Conservative leader in the Province of Quebec. He was created a Companion of the Bath in 1868, Knight Commander of the Roman Order of St. Gregory the Great in 1870, and Knight Commander of the Order of St. Michael

and St. George in 1881. He edited *Mélanges Religieux* (Montreal, 1847–49); in 1857 *Courrier du Canada* (Quebec); and is author of *La Canada, ses Institutions* (Quebec, 1855); and *Droit Administratif, ou Manuel des Paroisses et Fabriques* (1862). NEIL MACDONALD.

Langevin, lăăñzh'văñ, JEAN FRANÇOIS PIERRE LA FORCE: Roman Catholic bishop; brother of Sir Hector Louis Langevin; b. in Quebec, Sept. 22, 1821; educated at the Seminary of Quebec; was ordained a priest in 1844, and consecrated Bishop of St.-Germain de Rimouski in 1867, and was also titular Archbishop of Leontopolis. He was Professor of Higher Mathematics in the Seminary of Quebec 1840–49; principal of Laval Normal School 1858–69; founded the College of Rimouski in 1870, L'Hospice des Sœurs de la Charité in 1872, and Les Sœurs des petites écoles in 1874. In 1886 Bishop Langevin was constituted a Roman count, and an assistant to the apostolic throne. D. Jan. 26, 1892. Among his works are *Traité de Calcul différentiel* (Quebec, 1848); *Histoire du Canada en tableaux* (1860); *Cours de pédagogie* (1865). NEIL MACDONALD.

Langham, SIMON: cardinal; b. at Langham, Rutlandshire, England, about 1310; became a monk in Westminster in 1335, prior and abbot in the same year, 1349, high treasurer of England 1360, Bishop of Ely 1362, chancellor 1363, and Archbishop of Canterbury by papal provision July 24, 1366. His most noted action was the removal of Wiclif from the headship of Canterbury Hall, Oxford, in which he was supported by Pope Urban V., who signalized his approval by making Langham a cardinal-presbyter (1368), while the king, Edward III., was favorable to the Reformer. The new cardinal was forced to resign his archbishopric (Nov. 27, 1368), and retired to Avignon, where he became a trusted counselor of Pope Gregory XI.; made cardinal-bishop (1373), and died July 22, 1376. After the accession of Richard II. his remains were removed with great pomp to Westminster Abbey in 1379.

Langland, Langelande, or **Longland**, WILLIAM: author; b. probably at Cleobury Mortimer, Shropshire, England, about 1332; was educated at Oxford; became a fellow of Oriel College, and a tonsured clerk at Malvern. His *Vision of Piers Plowman*, in alliterative verse, written about 1362, was a religious and moral allegory, containing much satire upon ecclesiastical corruption and the social abuses of the time. It was originally in eight divisions, or "passus," to which was added a continuation in three parts, *Vita Do Wel, Do Bet and Do Best*. About 1377 the whole was greatly enlarged by the author. The best edition is that of W. W. Skeat (four parts with glossary 1867–84; another edition in 2 vols., 1886). Langland died about 1400.
Revised by H. A. BEERS.

Langlès, lăăng'les', LOUIS MATHIEU: Orientalist; b. at Perenne, Haute-Loire, France, Aug. 23, 1763; studied Oriental languages at Paris, and attracted considerable attention in 1787 by his translation into French from the Persian of Tamerlane's *Institutes*. In 1789–90 he edited Amyot's Manchu-French dictionary, and in 1795 he induced the French republican government to establish a special school of Oriental languages, of which he himself became the first administrator and Professor of Persian. Through this school, and through the Geographical Society of Paris, of which he also was the founder, he exercised a great and beneficial influence. He was also the author of numerous works relating to Oriental languages and literature. D. in Paris, Jan. 28, 1824. BENJ. IDE WHEELER.

Langley, JAMES WILBERFORCE, M. A., Q. C.: journalist; b. in Paradise, Annapolis County, Nova Scotia, Jan. 4, 1849; graduated at Acadia College 1871; was admitted to the bar 1875; and in 1882 was appointed a commissioner for revising and consolidating the statutes of Nova Scotia. He was elected to the Legislature in 1882; became member of the Government in 1884; Attorney-General 1886; has taken an active part in creating the policy of unrestricted reciprocity between Canada and the U. S. He edited *The Acadian Recorder* 1872–87, *The Morning Chronicle* 1887–91, and has contributed extensively to British and U. S. magazines.
NEIL MACDONALD.

Langley, JOHN NEWPORT, M. A., F. R. S.: physiologist; b. at Newbury, Berkshire, England, Nov. 10, 1852; was educated at Exeter Grammar School and at Trinity College, Cambridge, of which he became a fellow in 1877. In 1883 he was elected a fellow of the Royal Society; in 1884 was appointed a lecturer in Natural Sciences in Trinity College and a lecturer on Histology in the university; in 1892 was awarded one of the medals of the Royal Society. His published papers include *On the Salivary Glands* (*Journal of Physiology*, 1879, *Proc. Roy. Soc.*, 1886, *Journ. Physiol.*, 1889); *On the Liver* (*Proc. Roy. Soc.*, 1882 and 1885); *Ferments in Alimentary Canal* (*Journ. Physiol.*, 1882); *Secretory and Vaso-motor Fibers to the Foot* (*Journ. Physiol.*, 1891); *Arrangement of the Sympathetic System* (*Proc. Roy. Soc. and Journ. Physiol.*, 1893). He also has written many papers in conjunction with other specialists; among these are *Gastric Glands* (with Dr. Sewall, *Journal of Physiology*, 1879); *Pepsinogen and Pepsin* (with Dr. Edkins, *Journal of Physiology*, 1886); papers on the action of poisons (with Dr. Dickinson, *Trans. Royal Society*, 1888); *Secondary Degeneration* (with Mr. Grünbaum, *Journal of Physiology*, 1890); *Movements of the Iris* (with Dr. Anderson, *Journal of Physiology*, 1892).

Langley, SAMUEL PIERPONT: astronomer; b. at Roxbury, Mass., Aug. 22, 1834. In 1865 he was appointed assistant professor in the U. S. Naval Academy, and in 1867 became director of the observatory at Allegheny. He devoted himself principally to observations on the sun, especially to the measurement of the heat of the sun and moon. He is the inventor of the bolometer, one of the most delicate instruments known for the measurement of radiant heat. In 1881 he organized an expedition to occupy the summit of Mt. Whitney, Cal., in order to study the sun's rays before they reached the lower strata of the atmosphere. In 1876 he was elected a member of the National Academy of Sciences. He has received the gold medal of the Royal Astronomical Society of London and the Rumford medal both from the Royal Society and from the American Academy of Arts and Sciences. In 1887 he succeeded Prof. Baird as secretary of the Smithsonian Institution. He has published several investigations into the dynamics of the atmosphere and the flight of birds, with especial reference to the possibility of aërial locomotion. S. NEWCOMB.

Langlois, lăăñ'glwăă', VICTOR: Orientalist; b. at Dieppe, France, Mar. 20, 1829; studied Oriental languages and traveled in 1852–53 in Cilicia and Armenia, where he discovered over eighty new Greek inscriptions, and undertook excavations at Tarsus, from which he removed many interesting antiquities to Paris. (See his *Voyage en Cilicie et dans les Montagnes du Taurus.*) In 1867 he published *Le Mont Athos et ses Monastères*, containing a photo-lithographic reproduction of the geographical work of Ptolemy. In 1868 he began the publication of *Collections des Historiens anciens et modernes de l'Arménie*, which was unfinished when he died, May 14, 1869. Revised by J. R. S. STERRETT.

Langres, laañgr: town; in the department of Haute-Marne, France; situated on the left bank of the Marne, on a plateau at an elevation of 1,460 feet. It is 184 miles E. S. E. of Paris by rail (see map of France, ref. 4–H). It is an old town, with a cathedral of the eleventh century, a college and a theological seminary, a large trade in grain and cattle, and a manufacture of fine cutlery. Pop. (1896) 10,330.

Lang-Son: a city of Tonquin; 100 miles N. E. of Hanoi, and only 12 miles from the Chinese frontier; capital of a district of the same name; lat. 21° 57′ N., lon. 106° 57′ E. Its occupation in 1885 by the French followed the bloody battles of Lac-nanh and Song-thuong. It is an ancient city, well fortified, a center for trade in opium, oil of anise, and coarse cotton cloths. M. W. H.

Langston, JOHN MERCER, LL. D.: educator; b. at Louisa Court-house, Louisa co., Va., Dec. 14, 1829. He was born a slave, but was emancipated when six years old; was educated at Oberlin College, where he graduated in 1849, and from the theological department of the same college in 1853; studied law, being admitted to the Ohio bar in 1854; pursued his profession for thirteen years in Ohio, when he was called to a professorship in the law department of the Howard University at Washington, D. C.; became dean of the faculty, and in 1873 vice-president and acting president of the university. He was appointed in 1871, by the President, a member of the board of health of the District of Columbia, of which in 1875 he was elected secretary. From 1875 till 1885 he was U. S. minister and consul-general in Haiti; in 1885 was appointed president of the Virginia Normal and Collegiate Institute in Petersburg. He published a volume of addresses entitled *Freedom and Citizenship* (1883). D. in Washington, Nov. 15, 1897.

Langtoft, Peter: Anglo-Norman writer; d. about 1307. He seems to have been a native of the parish of Langtoft in Yorkshire, and to have received his name from it. He was a canon of the order of St. Augustine at Bridlington in Yorkshire. He wrote in bungling French verse a *Chronicle of England* from the siege of Troy down to the death of Edward I. His authority for the early mythical period was Geoffroy of Monmouth; then he followed various writers until he reached the period contemporary with his own life. The *Chronicle* was translated in large part into English by Robert Mannyng of Bourn in Lincolnshire (commonly known as Robert de Brunne). The historical part of this translation was published by Hearne in 1725, the mythical part by Dr. Furnivall in the Rolls Series in 1887. The original French was edited by Thorpe in the Rolls Series (1866–68), with an introduction by Wright, giving all the reliable facts of Langtoft's life. Besides the *Chronicle*, Leland attributed to Langtoft a French version of Herbert de Bosham's *Life of Thomas à Becket*, but Wright has shown that this is in a purer and earlier French than Langtoft was capable of, and also that the work itself distinctly states that it was done by a certain Frere Benet. See also P. Meyer in *Revue Critique* (1867, ii., p. 198); *id.*, *Bulletin de la Soc. des Anc. Textes franç.* (1878); *Romania* (xv., p. 313).

A. R. Marsh.

Langton, Stephen: cardinal; b. in Devonshire, Lincolnshire, or Sussex, England, about 1160; was educated at Paris, taking degrees in philosophy and theology; became a professor and chancellor of the university and canon of Notre Dame; was a fellow student with Lothario Conti, who became pope in 1198, and was named in the same year a member of the papal household. In 1206 Langton, while on a visit to Rome, was made a cardinal, and in December of the same year was by express order of the pope elected Archbishop of Canterbury in opposition to the will of King John. Though consecrated by the pope at Viterbo in June, 1207, Langton was not permitted to take possession of his see until the submission of King John to the papacy in 1213, when he immediately joined the insurgent barons in their conflict with that monarch, assisted them at Bury St. Edmunds (Nov. 20, 1214) in drawing up the basis of Magna Charta, and headed the list of baronial signers of that instrument at Runnymede (June 15, 1215). For this conduct he incurred the censure of the pope, and notwithstanding a visit to Rome was suspended from his archiepiscopal functions in December of that year, but restored Feb., 1216. He returned to England in 1218; crowned Henry III. in 1220; presided at the Council of Osney in 1222, which drew up a code of canon law; watched over the observance of Magna Charta, and in 1223 again placed himself at the head of the barons to demand its confirmation from Henry III. The division of the Bible into chapters has been commonly attributed to him. He is represented as having been a man of great learning and author of numerous theological works, none of which, however, is extant. D. at Slindon, Sussex, July 9, 1228. See Hook's *Archbishops of Canterbury*; *Chronicle of Roger of Wendover*; Pearson's *History of England*; Lappenberg's *Geschichte von England*, vol. iii.; and Lingard's *History of England*, ii., ch. 5.

Revised by John J. Keane.

Langtry, Emelie Charlotte (*Lillie*): actress; b. at St. Helier's, island of Jersey, in 1853. Her father, Rev. W. C. le Breton, was the dean of the Anglican church of the island. She became noted for her beauty, being known as the Jersey Lily, and married Edward Langtry, of Belfast, who derived his income from landed property in Ireland. Irish political troubles depreciated the value of the estate, and she determined to adopt the stage as a profession. She first appeared as an amateur at Twickenham, London, Nov. 19, 1881, as the Young Widow in *A Fair Encounter*. Her professional *début* was made at the Haymarket theater, London, as Miss Hardcastle in *She Stoops to Conquer*. In 1882 Mrs. Langtry went to the U. S. under Henry Abbey's management, and appeared at Wallack's as Hester Grazebrook in *An Unequal Match*. Subsequently she played Rosalind in *As You Like It*, and Juliana in *The Honeymoon*. She then made a tour through the principal cities. It was successful financially, more on account of the curiosity of the audiences than excellence of her acting. She returned to London, playing, in 1885, in *La Princesse Georges* and *The School for Scandal*. In 1886 she appeared in *Enemies*, and in the same year in *The Lady of Lyons*. In 1886 she reappeared in New York at the Fifth Avenue theater in *The Lady of Lyons*, and in 1887 produced *As in a Looking-glass*. In Sept., 1892, she created the part of *The Queen of Manoa* in London.

B. B. Vallentine.

Language [(with *u*, originally not pronounced, inserted by analogy of Fr. *langue* and Lat. *lin'gua*) < M. Eng. *langage*, from O. Fr. *langage* < Lat. *lingua*, tongue, language. See Tongue]: primarily, utterance by the tongue, that being the most active and essential of the articulating organs. It is in accordance with this that we use the word; it denotes articulate utterance for the expression of thought; but this also in two ways. First, we mean by *language* the general power or faculty of expression of thought by articulate utterance, a power possessed and exercised by all normally constituted and circumstanced human beings (not by the deaf nor by the solitary); in this sense, speech is its common synonym. Second, we mean a particular body of articulate utterances, signs for thought, used in some definite community, present or past, as their means of expression; intelligible between members of that community, but not to outsiders. It is of the highest importance to hold these two senses clearly apart, for upon their confusion depends no small part of the false views of language more or less commonly held.

We shall begin by considering the external body of language, the audible sounds. These are produced by an apparatus located in the throat and mouth, supplied with material by the lungs. That branch of linguistics which concerns itself with the physical character of alphabetic sounds, as dependent on the voluntary movements of the organs, is called phonetics or phonology; it involves something of acoustics and something of anatomy, but is quite distinct from either. A brief consideration of its leading principles will be all that is needed here.

The number of distinct articulations capable of being produced by the organs of utterance is indefinitely great. Nearly 300 have been represented separately by Ellis in his "Palæotype" (first chapter of *Early English Pronunciation*); but many of these are variations, hardly perceptible to any but skilled and observant ears, of what is practically the same sound; and no single language uses for purposes of speech more than a fraction of this number. The most important division of the system is into vowels and consonants. The vowels are the opener sounds, those in which the modifying action of the mouth-organs on the intonated currents of breath is least; the consonants are the closer sounds, those in which the element of oral action prevails more or less over that of tone. Upon the antithesis of vowel and consonant, the succession of alternately opener and closer sounds, depends what we call the *articulate* character of our utterance; the stream of audible sound, consisting especially of the vowels, is narrowed or cut off from point to point by the consonants, and so broken into *articuli*, "joints," being thus made both distinct and flexible to a degree that would be attainable in no other way. There is a class of consonants—*p*, *b*, *k*, *g*, *t*, *d*—in which the interference of the mouth-organs with the stream of breath is carried to the extreme of complete stoppage: these are called mutes (stops, checks). There is another in which the organs are so closely approached that a rustling or buzzing is heard at the orifice, and is the conspicuous element in the sound produced: these are called fricatives; they are conveniently divided into sibilants—such as *s z*, *sh zh* (of *azure*)—and spirants—such as *f v*, the two *th*-sounds (*thin*, *then*), and the German *ch*. Another very distinct class is that of the nasals or resonants; in these there is a complete closure of the mouth-organs at the same points as in the utterance of the mutes, but the nasal passage is unclosed, so that the sounds are sonorous and continuable—as *m*, *n*, *ng* (in *singing*): in the nasal vowels (c. g. of French) there is an unclosure of the nasal passage along with ordinary vowel utterance, giving an added twang to the product. One more class of consonants remains, the semi-vowels *y*, *w*, *l*, *r*—sounds which stand on the line between vowel and consonant, *y* being only infinitesimally different from the *i* of *pique* (the *ee*-sound), and *w* from the *u* of *rule* (the *oo*-sound); and *l* and *r* being convertible, and by many languages converted, to vowel uses.

In English, and in the majority of other languages, there are in the mouth three places of complete closure, producing mutes—a front, or labial, at the lips, giving *p* and *b*; a back, or palatal, between the back of the tongue and the soft palate, giving *k* and *g*: and an intermediate, or lingual, between the tip or front part of the tongue and the roof of

the mouth at or back of the upper front teeth, giving *t* and *d*. The last two pairs may vary in character according to the place on the palate and the parts of the tongue used; and different *t's* and *k's* are sometimes found side by side in the same language. Usually there is, as in English, a corresponding nasal to each mute closure; but the other consonants also tend toward the same organs of production: thus the *f* and *v* and *w* are more labial; the *th*, the *s* and *z*, and the *r* and *l* are lingual; and the *ch*, the *sh* and *zh*, and the *y* are more palatal. Even the vowels show the same tendency: from the *a*-sound of *far*, which is the purest alphabetic tone, least modified by the mouth-organs, the tongue approaches the palate, toward the *k*-position, more and more in the *a* of *pan*, the *e* of *pen*, and the *i* of *pin*, giving thus a palatal series of vowels; and the lips are more and more rounded and approached in the *a* of *all*, the *o* of *pole*, and the *u* of *rule*, giving a labial series.

There is one more principle of relationship to be noted: that of sonant to non-sonant or surd (or voiced to breathed) sounds. The *s* and *z*, for example, are uttered with the same articulating positions of the mouth-organs, but the former with simple breath, the other with intonated breath or sound; the former a hiss, the latter a buzz; and the difference of *t* and *d* is the same, sound beginning in the former only immediately after the breach of mute contact, which is made with breath alone, but in the latter before the breach, by forcing air enough to support for a moment the sonant vibration of the vocal cords up into the closed cavity of the mouth. Thus the mutes and fricatives go usually in pairs, of surd and sonant; but in the opener positions the mere breath is not sufficiently characterized to give an alphabetic constituent for each position, and we throw all the different products together as *h*.

The principles, then, which determine the system of the alphabet are: (1) the degree of approach of the organs, between the absolute openness of *a* (*far*) and the absolute closure of *k*, *t*, *p*; (2) the particular organs or parts of the mouth brought toward or against one another; and (3) the kind of material furnished to the mouth-organs by the throat, whether breath or sound. Annexed is a sample alphabet thus arranged, containing (with neglect of some minor distinctions) the simple sounds of the English language:

	palatal series.	lingual series.	labial series.	
sonant.	*a* *æ* *ʌ* *e* *ə* *o* *i* *u*			vowels.
	y	*r*, *l*	*w*	semi-vowels.
	ng	*n*	*m*	nasals.
surd.	*h*			aspiration.
sonant.	*zh*	*z*		sibilants. (fricatives.)
surd.	*sh*	*s*		sibilants. (fricatives.)
sonant.		*dh*	*v*	spirants. (fricatives.)
surd.		*th*	*f*	spirants. (fricatives.)
sonant.	*g*	*d*	*b*	mutes. (consonants.)
surd.	*k*	*t*	*p*	mutes. (consonants.)

In this scheme *æ* represents the *ă*-sound in *pan*, *ʌ* the sound in *all*, and *ə* the "neutral" vowel-sound in *hut*, *hurt*. See PHONETICS.

The spoken alphabet of every language may be reduced to a systematic form more or less resembling this. Alphabets are, however, of very different character as regards both the number and the identity of the sounds composing them. Languages differ not only in their sounds, but in the combinations of sounds allowed in forming syllables, and in the combinations of syllables allowed in forming words. Some have hardly more than a dozen articulations, all told, while the Sanskrit and English each possess near fifty; some allow only one consonant in a syllable, and that always before the vowel, while the English makes such intricate and difficult combinations as *strands*, *twelfths*; some (as Chinese) admit only words of one syllable, while American Indian languages sometimes count the syllables of a word by the score. As they differ in these respects, so also, and far more, in the combinations of sounds by which they represent any given conception; whence the diversity and mutual unintelligibility of human languages. This diversity, which is very different from what we might antecedently expect, considering the fundamental unity of the human mind and its operations, is one of the problems which the science of language has to explain.

We have said that articulate sounds are produced by the voluntary action of their utterers. Of course this does not imply that the speaker understands at all the mechanism which he sets in motion, or commands it otherwise than as he commands the mechanism of locomotion or of gesture. Each human organ is capable of making all the sounds that are found in any human alphabet, and a great many more; and (apart from special individual disabilities) any sound is equally easy at the outset, before habits are formed, to all human beings; there is nothing characteristic of race in the alphabets of different races; but each person grows up to produce by imitation just those sounds which he hears others make about him. Some sounds, however, are easier and sooner learned than others; the norm in every language is given by the practiced adult speakers, and the child, beginning by reproducing only imperfectly what he hears, gradually acquires the same facility and accuracy as his fellows possess. Just so, every well-endowed child is capable of gaining the skill of eye and hand required for any one of an indefinite number of trades; and he actually gains that to which he is made to apply himself. Without such application he would learn none; and so he would acquire no language if he were not taught it. There are, we may say, a thousand different languages in the world, and each of them has a different word for hand, or green, or run; there is no reason why any human being uses one of these thousand words instead of another for a given purpose except that he hears it used by others, and then himself learns to reproduce it by imitation, and to associate it with the same idea which it represents in their use. There is no such relation between the articulating apparatus and the apparatus of mental action, of perceiving, and comparing, and judging, that anywhere in the world a human being produces a series of articulate sounds by an internal and natural impulse as representative of a certain conception. The relation of uttered signs for ideas is precisely what that of acted signs would be; the hands and arms are capable of making an infinity of combinations of motions, and, as the experience of the deaf-mute shows us, a person is capable of associating conceptions with these motions to such an extent as to make them a full apparatus for the expression of thought. We see clearly enough that the tie between such signs and the movements of the mind is an external and artificial one; but it is not less the case with our own signs. That is to say, every uttered word is an arbitrary and conventional sign—arbitrary, because any other could have been made (and a great number of others are made) to answer the same purpose; conventional, because the selection of this one has its sole ground in the accordant usage of a community. It was learned by the direct instruction or from the example of others who used it already; it has no tie with its inner content or meaning save that of a mental association. He who has acquired and learned to use one set of signs may add another and another, and use them also with readiness, even forgetting, if the shift be made early enough, his first acquired set, or "native language," in their favor.

We see, then, clearly, what the "gift of language" is to man. It is a general power of expression. It consists in such gifts of mind and of body, and in such command over them, that any human being can possess himself of any of the systems of expression established and current in the world, and make use of it, more or less perfectly, for communication and for the operations of his thought. It places all existing languages within his reach, but puts none into his possession; he can learn to speak anything, but can speak nothing without learning; but the power to use implies also, to a certain extent, the power to produce. If there could be such a thing started as a speechless community of human beings, it would, by the exercise of its gift, make a beginning of supplying itself a language, which would become increased and extended and perfected until, after generations enough had made their contributions to it, it would compare with some of those now current. Of what kind the beginnings would be we shall see better after considering the main facts relating to the life and growth of existing tongues.

Men are, even now and everywhere, makers as well as learners and users of language. If the whole life of language consisted in simple teaching and learning, every language would continue the same from age to age; but not one does in fact continue the same: all are changing, some more and some less rapidly. The English has changed so that the form of a thousand years ago, which we call Anglo-Saxon, is as a wholly strange tongue to us. Latin changed into Old French, and this into modern French; Old High German changed into Middle, and this into New; and so on. This is simply the effect of the collective mind of

the speaking community working underneath its apparatus of expression, and adapting the latter to its changing needs and shifting preferences. Nothing is plainer than that whatever new knowledge and altered conceptions may arise in a community must somehow find expression in its speech; that the passing out of mind of old conceptions is accompanied by the oblivion of their signs (if not transferred to new uses); and then there is, besides, a kind of wear and tear of words, by which they change shape or disappear, and a constant production of new material to take the place of what is lost, and to extend and improve the means of expression. To understand these changes is to understand the growth of language; and in order to be understood, in themselves and in their causes, they need to be studied in their detail; the general effect is only the sum of an infinite number of details, each of which has its own history and occasion.

The changes of language may be best grouped under three heads—(1) alterations of old material; (2) loss of material; (3) additions of new material. Alterations of old material, again, are made either in the external audible form of words or in their internal content, their meaning. Each kind of alteration is independent of the other; and for the reason that the tie between form and meaning is, as pointed out above, only one of the convenience of use; otherwise the two could not be divorced. Each is determined by the requirements of the convenience of the users; and this, so far as alteration of outward form is concerned, makes chiefly toward ease of utterance, economy of the muscular effort of enunciation. The principle of ease shows itself most obviously in the constant abridgment which words undergo by the loss of initial, and especially of final, sounds and syllables, and the omission or contraction of interior elements. Thus *bear* in "we bear" is from *bharamasi*, *bore* in "we bore" from *babharmasi*, *had* in "had we" from *habaidedeima*; *alms* is from *eleémosuné*; and so on. We may follow the gradual reduction of a word like *bharamasi* through such forms as *pheromes* (dial. Greek) and *ferimus* (Lat.), and *bairam* (Goth.); and so in innumerable similar cases. By this means especially the endings which once showed the grammatical forms of words are worn out and lost. As is well known, few languages show the results of this abbreviating process in such a degree as the English; the monosyllables which form two-thirds to three-quarters of our language as spoken or written were all of them words of two or three or more syllables in its earlier condition. The constituent elements of words that are spared also become variously altered. The character and extent of the spoken alphabet are all the time slowly changing. Old sounds go out of use; new ones are introduced; both vowels and consonants are shifted to other places and modes of utterance. Thus the old Indo-European aspirates (mutes with a puff of *flatus*, a kind of *h*, following the breach of their contact) have long since disappeared in Europe, becoming variously altered; the root *bhar*, instanced above, is in ancient Greek *pher* (*p'h*), but in modern Greek, as in Latin, *fer* (the *f* a sound not found at all in the original alphabet); in Germanic, *ber*; and so on. All such transitions of sound are more or less strictly reducible to rule, being governed by the physical relations of sounds and by the general tendencies of language, as modified by the special tendencies and habits of each particular community. To trace them out, and, so far as is possible, explain them, is the task of phonetic science. Assimilation is the head under which the larger part of them fall; both on the smaller scale, making difficult combinations more pronounceable, and on the larger scale, approximating the whole vowel and consonant systems to one another, making the vowels closer and the consonants opener, and thus filling up the alphabetic system with intermediate, more slightly differentiated sounds. There are examples of the opposite principle, dissimilation, and more difficult and anomalous cases: of which the most noted and intricate is the so-called Grimm's law of the rotation of mutes in Germanic language, whereby, of the original surd, aspirate, and sonant mutes (in this order) each is by the majority of Germanic dialects pushed around one step, and in the High German two steps; thus Sanskr. *tad*, Eng. *that*, Ger. *das* (the sibilant replacing the aspirate).

The changes of internal content or meaning of words are as various as those of form, and even more irreducible to systematic order. There is hardly a conceivable transfer of use which may not be found exemplified in the history of words. The greater part of them may be rudely classified under two great heads—restriction and extension. By restriction or specialization is meant the taking of a general word expressive of quality or action, and making of it the specific appellation of some thing or class of things possessing that along with other qualities. Thus the *sun* is named from its "shining," the *moon* from her "measuring" of time; a *planet* from its "wandering" motion; the *electric* force from its displaying itself in "amber" (when rubbed); a *crescent* from the shape of the "growing" moon; and so on. This is one of the earliest, most constant, and most fruitful methods by which names of things have been won. A name, once won, becomes the appellation of a class of related things, and the limits of classes are constantly shifting and spreading by direct and indirect means. Even *sun* and *moon* become class-names when the progress of astronomy discloses other bodies of analogous character with them; *planet* is, by the same means, both changed in application (made to exclude *sun* and include *earth*) and widened (to take in Uranus and Neptune and the asteroids). Not ties of scientific classification alone; ties of analogy, of every kind and degree, are used to extend the sphere of application of words. *Board* is made to signify the "table," and then the food set on it, and the body of men that sit round it (*board* of directors, etc.). *Post*, literally "put, placed," gets a whole scheme of meanings, seemingly of utter diversity, although each is really fastened to some one of the others by a traceable tie of association. Thus a great part of our words come to have a variety of senses more or less remote from one another—senses which it is the office of the lexicographer to place in their right mutual relations, but which the ordinary speaker would often be puzzled to explain. There are two special departments of this change which require a word of notice. In the first place, all our expressions for intellectual and moral conceptions and relations are obtained thus from terms originally indicative of what is physical and sensible; thus *right* is "straight," and *wrong* is "wrung" or "twisted"; *understand* is "stand in the midst" of anything; *imply* is "fold in," *apply* is "fold to," *reply* is "bend back," *comply* is "bend along with"; *develop* is "unwrap"; *occur* is "run against"; *apprehend* is "take hold"; and so on. In the second place, words indicative of relation, form-words, connectives, auxiliaries, are made from words formerly of more definite and material meaning, by a gradual extension so wide that it results in a complete effacement, by attenuation, of that meaning. Thus the verb *be*, the copula between subject and predicate, is made up of roots signifying originally "grow," "dwell," "sit," "stand," and the like. The auxiliary *have*, now a sign of past time (*I have done*), of future obligation (*I have to go*), and so on, is from a root meaning "seize, grasp"; *will* comes from "inclose," *shall* from "offend," *may* from "be strong." The articles are from demonstratives and numerals; relatives, from demonstratives and interrogatives; conjunctions, from adverbs and other parts of speech.

By both these methods the material of a growing and cultivating language is constantly undergoing conversion to finer, more formal, more conceptual uses, and this is perhaps the grandest general movement that goes on in it. There are minor movements of every kind, many of which are made the subject of exposition and illustration in such works as Trench's *Study of Words* and *English Past and Present*: there is no space to dwell upon them here.

The second general division of linguistic change is that of loss. It is a comparatively simple subject. As language is maintained and kept in existence only by use, disuse causes disappearance of any of its elements. A word is lost when the conception for which it stood dies out of men's knowledge and remembrance; so, for example, the phraseology of ancient religion and ancient arts, when these are superseded by new—unless, indeed, some of the old words should take on new and changed meanings; then we have only that minor kind of loss which consists in the disappearance of an internal content. Words are also crowded out of use by the uprisal of new terms which come into fashion and make them dispensable. When, for example, the flood of words of Latin origin was brought in upon English, it caused the obsolescence of many an equally good term of Saxon origin; and sporadic cases are always liable to happen of words being allowed by carelessness, as it were, to die out, which we afterward regret.

A more important department of loss consists in the disappearance of the signs of grammatical distinctions, and with these of the consciousness of the distinctions them-

selves, chiefly as a result of the wearing-out processes of phonetic decay. As already noted, no modern language offers more abundant exemplification of this than our English. Thus the seven original cases of our family have been reduced to two (in certain pronouns, three); the five original tenses, to two; the agreement of the adjective with its noun, in two forms of declension, is entirely lost; the scheme of artificial or grammatical gender is obliterated; the subjunctive mood is nearly gone. The same is true in less degree of all the languages akin with ours, and of all others which have any grammatical structure at all. The law of abbreviation is inexorable in its working, and, along with what can well enough be spared, takes away what is valuable.

The third division of change includes additions to the material of language. Of the addition of new meanings to old words, sufficient notice has already been taken; and it is evident that by this means the resources of expression of a language may be very much increased without any corresponding outside show. It is possible also to pile away the results of new knowledge in the old words: however much we may come to know more than of old about the *sun*, *heat*, *rising*, and *falling*, and innumerable other subjects, it does not disturb our employment of the traditional names. These are just as real parts of the growth of language, produced by the same forces and for the same purposes, as the more external additions. External additions are of two kinds—those made by borrowing from abroad, and those made by the development of native material. Borrowing is a well-nigh universal process of language-making; there is hardly one unmixed tongue in the world, unless here and there a dialect which never comes into contact with any other. Only those languages borrow on a large scale of which the speakers have derived to a large extent their culture, knowledge, institutions, from other communities. The Persian in this way gets material of expression indefinitely from the Arabic; the Turkish, from the Persian and Arabic; the modern dialects of India, from the Sanskrit; the Japanese, from the Chinese. So also all the peoples who inherit Greek and Roman civilization have taken abundantly from the Greek and Latin vocabularies. English has borrowed more than any other language that is not descended directly from the Latin: partly because the forcible fusion of a Germanic and a Romanic dialect which was the result of the Norman conquest opened the door to such borrowing and made it easy; and partly because the native processes of composition and derivation in English had become so inactive that not much growth could be accomplished by their aid. As our vocabulary presents itself in the dictionaries, about five-sevenths of it are of classical origin. Of course, in actual use, in speaking or writing, the proportion is very different, because the core of the language, embracing the words of most frequent use, is almost exclusively Germanic; the Germanic part is 60 to 90 per cent. Names of things are most easily and directly borrowed, connectives least easily, grammatical apparatus, endings of derivation and inflection, almost not at all. The foreign material is stripped of its native grammatical form, and often shaped over a little to assimilate it to the native stock of the borrowing language; and it is prepared for free practical use by means of the grammatical apparatus of the latter, each borrowed element thus often becoming the nucleus of a little family of derived and inflected words. What thus comes into a language is to a very great extent only words of learned use, employed almost exclusively by those who know it as of foreign origin and recognize its source; but more or less of it, according to circumstances, works its way down into popular use, and is then in no way distinguishable from that which is of ultimately native growth: the mass of speakers use their words simply because they are in use, neither knowing nor caring whence they came.

For obtaining new resources of expression out of the old material of a language, the methods can not, of course, be very various. In the course of the phonetic changes of language a single word sometimes divides into two or even more forms, which then go on to lead an independent life; so Anglo-Saxon *of* has separated into *of* and *off*, Anglo-Saxon *ân* into *one* and *an* or *a*, *ealswa* into *also* and *as*; and we have such doublets as *minúte* and *minute*, *cónduct* and *conduct*, *gentle* and *genteel* and *gentile*, and so on; but such a method operates only on a very restricted scale. A process of much wider reach and greater importanec is that of the formation of compound words, which is very extensively and fruitfully resorted to by all the tongues of our family, although much more by some than by others. We have in English, for example, combinations of every grade —from such loose ones as *book-cover*, *chair-back*, through closer, like *tablecloth*, *inkstand*, *homestead*, *railway*, *steamboat*, to such as have been so far altered in pronunciation or meaning, or both, that we do not ordinarily think of them as compound at all, like *breakfast*, *forehead*, *boatswain*, or such as have their origin wholly concealed from all but learned eyes, like *such* and *which* (from *so-like* and *who-like*). Many a seemingly simple word of ours is proved by historical inquiry to be put together, not far back, from two or more others; for we are always ready to forget the origin of the terms we use when they are once made and put to use; and then the processes of phonetic change seize upon them and alter and disguise them past recognition.

Very frequently these processes act only upon one, the latter, of two members of a compound, converting it into a dependent addition to the other. Thus our *ly* in *godly*, *manly*, *homely*, etc., is to us a mere suffix, forming adjectives from the nouns *god*, *man*, *home*; or, in other words, as *freely*, *truly*, it makes adverbs from adjectives; but in Anglo-Saxon it was an appended adjective, *lic*, *líce*, our *like*. The *d* which makes the past tense of our "regular" verbs is similarly traceable to the verb *did*, added as an auxiliary in early German language to some verbal word. The *ai* of French *chanterai* is an auxiliary—*j'ai*, "I have." The *bam*, *bo*, and *vi* of Latin verbs are of the same origin; so is the *σω* (*sô*) of the Greek future. These are but examples of a large number of endings or suffixes which come demonstrably from independent words, at first compounded with other words, then disguised in form, and finally coming to be felt as mere modificatory appendages, and extended in use in that office. No other method of producing such elements of expression is known through all the historical epochs of language. It is true that by no means all suffixes admit of this explanation; but that is because the evidence which would constitute an explanation is no longer attainable. The facts in our language which seem to make against it—especially the instances of internal change like *man men*, *lead led*, *give gave*—are capable of easy explanation as inorganic or accidental results of phonetic change, and traceable to original external addition like the rest. In short, we have here a method of linguistic growth which is in complete accordance with the facts and tendencies of known linguistic history, and which, in the opinion of the best modern students of language, is capable of having produced the whole structure of speech. It works very slowly, indeed, as compared with wholesale borrowing, but its effects are infinitely deeper and more important.

All these methods of change are carried on, it will be observed, in the interest of convenient expression. There is new knowledge of every kind to be provided for—new facts, new classifications, abstractions, deductions; and there are, not so indispensable, but as inevitable, changes of the instrument of expression itself in its uttered form, in its apparatus of connection and relation. As a whole, the process seems a highly intricate one, but in its details it is perfectly intelligible. It is a constant name-making, a never-ending satisfaction of the individual needs of expression, as suggested by and built upon the already subsisting uses of a language, as governed in the mode of satisfaction by the existing habits of speech, and by the circumstances of the case. The idea being conceived, the mind reaches after the means of its signification, and finds this wherever it lies most ready at hand. The mind is easily content: no nicely adapted sign, essentially bodying forth the conception, is required; only a representative which shall be henceforth associated with the conception, and one having such relation to antecedent expression that it shall commend itself to the acceptance of the community; for this is an ordeal which everything in language must pass. Nothing is language until it is adopted by a community as its means of communication. Though every individual change proceeds from individual action, and has its own time and place and occasion of origination, the common action is equally a factor in its history.

It is easy to find, in the antithesis of individual action and that of the community, the explanation of dialectic variation. Every language is all the time changing; it changes by specific items, which begin with individuals and spread by communication, by imitation, through the whole mass of the community. So long as they do thus spread, the language of the community, however rapidly it may change, remains homogeneous throughout its whole terri-

tory, with the exception of those minor local and class differences which prevail within the limits of every existing tongue without disparagement to its unity, because those who speak it can all understand one another in reference to the most necessary subjects. If the parts A and B and C, and so on, become separated from one another, so that the changes initiated in A do not spread into B and C, nor those made in B or C into the rest, then the local differences begin at once to be multiplied and deepened; mutual intelligence becomes more and more difficult, and finally impossible; and different languages are the result. All, then, that makes for unity of community represses dialectic growth; and the forces of culture are those which work most efficiently toward this result. A literature, writing, instruction, tend to check the rate of change of a language, and to efface local and class differences already existing. Ignorance and barbarism both encourage rapid alteration, and, by favoring the isolated and antagonistic position of districts and tribes, make for divarication also. The maintenance of wide-extended unity of speech, along with wide unity of other institutions, is possible only under civilized conditions.

The state of language throughout the earth is precisely what the principles here laid down would lead us to expect. The world is full of dialects, some closely and obviously akin with one another, others having resemblances discoverable upon closer examination, others apparently unrelated. If speech began to exist with a single race or a limited number of races of human beings, and spread with them from land to land and from continent to continent, ever altering and divaricating dialectically with every new division of a race or community, the result would finally be what we see it to be. In the long ages of barbarism the growth of dialects was the prevailing tendency; since civilization has become the overwhelming force in the history of the world, the tendency is the other way: the cultivated dialects of the leading nations are extending, and crowding out diversity, and men may look forward to a time when one or two or a few languages shall prevail universally.

Such being the case, it is evidently one of the first objects to be aimed at by the students of language to make a classification of all human dialects according to their relationship and its degrees: only thus can the way be prepared for the historical research of language in general. This work has been accomplished, so far as the assemblage of materials has made it possible—provisionally, that is to say, and with full acknowledgment of the probability of amendment and improvement hereafter. In imitation of genealogical phraseology, the dialects regarded as demonstrably descended from a common ancestor are called a "family," each family being then divided into branches, sub-branches, etc., as may be found convenient.

Indo-European or Aryan Family.—This is also called by the Germans Indo-Germanic. It is the family to which our own tongue belongs, with most of the other languages of Europe, and with those of Southwestern Asia; and it is by far the most important of all. It is divided into seven principal branches. There is (1) the *Indian*, or Sanskritic, an intruder into India from the northwest, perhaps not more than 2000 to 3000 years B. C., and gradually filling all the northern country, with a part of the southern peninsula, the Dekhan; the rest remaining in possession of the more aboriginal Dravidian tribes. Its oldest language is the Sanskrit, the earliest parts of the literature of which, the hymns of the Veda, go back probably to near 2000 B. C., the remotest date anywhere reached among Indo-European records. The language is also less altered, by changes either of form or of meaning, from the original common speech than is any other; and hence the Sanskrit takes the leading place in all researches into the oldest language-history of the whole family. The great groups of varying dialects known as Hindî, Bengâlî, Mahrattî, are the modern representatives of the branch; and between them and the Sanskrit lie the Prâkrit dialects and the Pâli, the sacred language of Southern Buddhism. (See SANSKRIT.) (2) The *Iranian* branch, occupying the great Iranian plateau between the borders of Mesopotamia and of India. It is nearly akin with the Indian, and the two are often, and very properly, combined together into a single "Aryan" branch; their oldest dialects are hardly more unlike than, for example, some of the Germanic languages are unlike one another. The oldest records of the branch of definite date are the cuneiform inscriptions of Darius and his successors (from about 500 B. C.); in part, probably, older is the Bible of the Zoroastrian religion, the Avesta; its language is called the Zend, or Avestan, or Old Bactrian. Of considerably later date is the problematical Huzvâresh, or Pehlevî; and the Pârsî but little precedes the Modern Persian, which has a great and valuable literature, beginning from about 1000 A. D. To this branch belong also the Kurdish, the Ossetic in the Caucasus, and probably the Afghan; also the Armenian, which has a literature going back to the fifth century of our era. (See IRANIAN LANGUAGES.) (3) The *Greek* branch. Of this the history is too well known to require more than a word here. It has in the poems of Homer the oldest monuments of the family outside of India. What were the relations, to it and to the family, of the languages on the N., and of those on the E., in Asia Minor, is very uncertain, and will perhaps never be determined. The present Albanian, or Skipetar, regarded as modern representative of the ancient Illyrian, is of disputed character, but more probably Indo-European. (See GREEK LANGUAGE.) (4) The *Italic* branch. This included a considerable number of the languages of Italy; and of some of them, especially the Oscan and the Umbrian, considerable remains are left; of others, as Volscian and Sabine, the merest fragments. All were wiped out by the Latin dialect of Rome, which also extended itself, along with Roman dominion and institutions, in both directions through Southern Europe, giving rise to the modern group of the Romanic languages, embracing as its principal members the Italian, French, Provençal, Spanish and Portuguese, Rumansh, and Wallachian, each including a great variety of dialects. The literatures of these modern languages commence between the tenth and thirteenth centuries; fragments of Latin come down from the third century B. C. (See ITALIC LANGUAGES and LATIN LANGUAGE.) (5) The *Celtic* branch. The Celtic languages formerly occupied a very broad space in Europe, but they have been continually encroached upon by both Romanic and Germanic, until now they survive only on the farthest western edges of their old territory. The Welsh, the Cornish (extinct since the end of the eighteenth century), and the Armorican of Brittany constitute the Cymric division of the extant dialects; the Gadhelic includes the Irish, the Gaelic of Scotland, and the Manx of the Isle of Man. Irish and Welsh monuments go back to the eighth and ninth centuries. (See CELTIC LANGUAGE.) (6) The *Slavonic*, or *Slavo-Lettic* branch. The seat of the Slavonic languages is in Eastern Europe. The important members of the eastern subdivision are Russian, Bulgarian, and Servian; of the western, Polish and Bohemian. The earliest Slavonic record is a Bible version made in the ninth century. The branch is a double one, in virtue of being made to include the more remotely but still specially kindred Lettish dialects—namely, the Lithuanic, Livonian, and (extinct) Old Prussian. These have no records older than the sixteenth century, but the Lithuanian especially is distinguished by the primitiveness of some of its forms. (See SLAVIC LANGUAGES.) (7) The *Germanic* (or *Teutonic*) branch. This is divided into four sub-branches. The Mœso-Gothic, or dialect of the Goths of Mœsia, is long since extinct, and is represented only by parts of a Bible version made by Ulfilas in the fourth century. It occupies, as both oldest in time and most primitive in structure, much such a position in the branch as the Sanskrit occupies in the family. The Scandinavian sub-branch fills Denmark, Sweden, Norway, and Iceland. It has its oldest living representative in the Icelandic, and its oldest and most original monuments also come from Iceland in manuscripts of the twelfth and thirteenth centuries. The more proper German is divided into the High German of the central and southern region, and the Low German of the northern lowlands. The High German begins its Old period in the eighth century, its Middle in the twelfth, and its New in the sixteenth; what we call the German language is its only cultivated dialect. A great part of the Low German territory in Germany now acknowledges the supremacy of the literary High German; but the Netherlandish or Dutch has an independent culture and literature, and the English is its colony, brought to Britain by the Angles and Saxons in the fifth century and later. The oldest Anglo-Saxon remains are from the seventh century. See TEUTONIC LANGUAGES.

Respecting all this great and important body of languages is to be held, in conformity with the principles laid down above, that they are descended from the tongue of a single community which lived somewhere, within narrow limits, at some remote period, and by spread and emigration broke up, over and over again, into separate parts, with the inevitable consequence of the breaking up of its

speech into dialects. Where and when that original community lived it is impossible to determine from any evidences as yet brought to light; certainly language does not give, and can not be expected ever to give, any definite information about it. The question of the time depends wholly upon the grander question of the antiquity of man on the earth; the historical linguist will only say that he does not know how to compress all the events of the Indo-European language-history into the brief space of 6,000 years, and will welcome an extension of the period; but what extension to ask for he does not know. As for the place, the facts of language admit of being reconciled with almost any theory that can be suggested. While language is thus silent as to place and time, it gives some definite information respecting the condition of the primitive community, showing it to have been not merely nomadic, but of settled and agricultural life, with well-developed family organization, with domesticated animals, with some of the arts of life, and with knowledge of a metal or two. See INDO-EUROPEANS and INDO-EUROPEAN LANGUAGES.

The history of development of Indo-European language is better understood than that of any other family, the materials being exceptionally abundant, and having received an amount of study which has been bestowed upon no other; its main features are pretty clear, though there remains abundance of obscurity in its details. The language began in a condition of "roots" (analogous with those of which, for example, the Chinese language is even down to the present time composed), utterances which were neither noun nor verb, but were as ready to turn to the uses of one as of another. They were of two classes—verbal roots, expressing material or sensible act or quality; and a small number of pronominal or demonstrative roots, indicating position and direction. That the distinction of these classes is primitive is not to be assumed; but it is at any rate earlier than the growth of Indo-European structure. The first important step of growth, it seems, was the making of a predicative or assertive form—a verb; it was done by combining verbal with pronominal elements, and restricting the combination to assertive uses. Thus were made the three persons of a verbal form, in three numbers, singular, dual, and plural; and the addition of a preterit tense with augment, a reduplicated preterit or perfect, and a future, left to this simpler form the character of a present. More or less of an imperative, optative, and subjunctive, and of a middle or reflexive voice, also were products of the original tongue before the separation of the branches. The establishment of a verb left the remainder of the linguistic material in the condition of noun, noun substantive, and noun adjective; for these two parts of speech were at first identical. A system of inflection was by similar means created for these also, indicating case, number, and gender. The pronouns are a class of words inflected like nouns and adjectives, but coming from pronominal instead of verbal roots. From the same roots come naturally the principal adverbial words, indicators of position and direction; adverbs are a part of, or closely akin to, the case-formation of nouns; the other particles, prepositions and conjunctions, are yet later to arise. The interjection is no "*part* of speech," but rather an unanalyzed, holophrastic utterance, analogous with the undeveloped root. Thus by combination of element with element, and the assignment of the combinations to specific uses in definite connections, this language arose from a mere indefinite intimation of meaning—intended but not yet constructed sentences—such as our exclamations give, to orderly and distinct statement: first in single clauses, then in elaborate combinations of clauses, in periods. How much time the process occupied it is impossible to say, but it must have been a long time; and before the separation of the branches took place a height of synthetic development was reached from which, although every branch has more recent synthetic formations to show, there has been on the whole a recession, by the substitution of more "analytic" means of expression of relation, of form-words and auxiliaries. See INDO-EUROPEAN LANGUAGES and SYNTAX.

The importance to us of the study of Indo-European language lies partly in the fact that it is our own family, and that also to which belong the tongues of the founders and leading representatives of our civilization, so that the study is connected in its bearings with a variety of other inquiries in which we are especially interested. It has also been the principal foundation, and almost the initial phase, of the general science of language, because there was nowhere else in the world so large and varied a body of related linguistic phenomena, by the examination of which the general laws of linguistic life could be deduced, and methods of research worked out which might be fruitfully applied where the material was less abundant, and exhibited a less length of development. Hence, and not from any overestimate of this language, as alone worthy of investigation, or as furnishing the norm of human speech, comes the conspicuous absorption of linguistic students thus far in Indo-European studies. At the present time the profounder comparative study of other families also is well prepared for, is becoming more and more urgent, and is engaging more and more labor; although none has yet received anything like the same degree of comprehensive and penetrating examination as the Indo-European family. We shall, accordingly, review the others much more briefly.

The Ural-Altaic or Scythian Family.—This group of languages, widely coterminous with the Indo-European, is often also called the Turanian, and is generally reckoned to contain five great branches: (1) The Finno-Hungarian, chiefly European in locality, including, besides Finnish and Hungarian or Magyar, the Lappish and the dialects of a host of unimportant tribes stretching through Northern and Eastern Europe across the Ural chain. (2) The Samoyed, along the shores of Siberia, from the White Sea to the Yenisei, and up that river to the Altai Mountains, probably its original seat. (3) The Turkish, recent occupants of Asia Minor, and overlapping the border of Europe, extending over a vast tract of Central Asia, and having an important branch, the Yakut, even on the Lena, to its mouth. (4) The Mongolian, yet farther East, but nowhere reaching the ocean. (5) The Tungusic or (from the name of the principal people) Manchu, beyond in the northeastern end of Asia, save its peninsulas and islands: the Manchus have also held China in their grasp during the past two centuries. The languages of the first or westernmost branch do not differ remarkably in their general character from the Indo-European, but have more of what is called the "agglutinative" type: that is to say, root or theme and ending are less intimately united, rather "stuck together" than fused together, the ending retaining a more independent character; this results in both a greater regularity and a greater intricacy of formation. The two easternmost members are of a much less developed and more jejune character, verging on the stiff inexpressiveness of monosyllabism; and this, in connection with other peculiarities, linguistic and physical, casts some doubt on the coherence of the family. There is neither abundance nor antiquity of literary productiveness among the Scythian races; their main part in history has been war and devastation; the wild and curious mythic popular poetry of the Finns (the *Kalevala*) is their most original work—unless, indeed, it shall turn out to be true, as is claimed of late, that the "Accadian" people, who laid the foundation of Mesopotamian civilization, and invented the cuneiform writing which was afterward borrowed and adopted by both Semitic and Indo-European peoples, was Scythian, of the Ugrian branch. This would carry the antiquity of Scythian language back to a point fully as remote as that reached by either Indo-European or Semitic. The question is not yet settled.

Of the various and diverse languages of the Northeastern Asiatic waters, the *Japanese* is the only one that deserves mention. It is, though highly polysyllabic, of an exceedingly simple structure, phonetically and grammatically, much like the Mongol and Manchu, and may perhaps yet be proved of one family with them. Its culture is derived from China.

The southeast of Asia is filled with languages which have monosyllabism as their distinctive characteristic. The *Chinese* is by far the most prominent and important among them. This is a language in the highest degree remarkable for the paucity of its resources and the exceeding deftness with which they are used, so as to perform the duties of a highly cultivated speech during an unprecedently long period. The Chinese literary monuments go back to nearly 2000 B. C., and are of great variety, extent, and merit. The language is composed of only some 500 different words, as we should write them; but their number is raised to about 1,500 by the tones of utterance, this element having been pressed into the service of intellectual distinction in the scanty monosyllabic tongues, both Chinese and Farther Indian. The means of formal distinction are in part form-words, particles and auxiliaries, and in part position in the sentence. The intelligibility of the literary language is much aided by the mode of writing, which is to a great

extent indicative of meaning, instead of pronounced form. The popular dialects are numerous, and so diverse as to be like so many independent languages. Some of them are said to make a degree of approach to an agglutinative structure.

The only tie to connect the Farther Indian and the Himalayan (at least in part) with the Chinese dialects is their common monosyllabic structure. The Burmese, Siamese, etc., have literatures of no great antiquity founded on that of India, whence comes their religion (Buddhism) also; and nearly the same is the case with the Tibetan. A vast deal has still to be done to make clear the character and relations of this great and perplexing confusion of little-known and unimportant dialects.

Off this corner of Asia lies the vast and scattered array of the isles of the Pacific. They are occupied by at least three independent and wholly insular races and language-families. Australia and Tasmania are the home of one, the *Australian*. New Guinea, part of Borneo, and the more inaccessible parts of several other islands and groups, are inhabited by a black race with frizzled hair, the *Papuan* or Negrito; its dialects are very little known, but are believed to be unrelated with any others. The great islands nearest Malacca (and Malacca itself by recent immigration), and the shores of the others just mentioned, and the scattered groups within the limits marked by Formosa and New Zealand, by Madagascar and Easter island, are the home of an immense and well-defined family, the *Malay-Polynesian*, in three branches—Malay, Melanesian, and Polynesian. Several of the dialects of the Malay branch have literary culture, derived from the mainland; that of Java and Bali, coming from India, has records going back even to the first centuries of our era. The Malay has adopted Islam, and with it the Arabic alphabet. These languages, though not monosyllabic, are nearly bare of structural development, not having even a clear distinction of noun and verb, nor anything that could fairly be called inflection. Their phonetic form is also simpler than that of any other known tongues.

The *Dravidian* group of languages of Southern India is of an agglutinative type, somewhat resembling the Ural-Altaic, and some linguistic scholars have been overhasty to pronounce it a branch of that family. Its principal members are the Tamil, Canarese, and Telugu. They have literatures of some antiquity, founded on the Sanskrit, their culture being derived from the Aryan races of the North.

The Caucasus region is filled with a medley of peculiar dialects, apparently akin with no others in the world, and not traceably related even with one another.

The Semitic Family.—This is the only Asiatic family remaining to be considered. Its home is in the great but barren and thinly populated peninsula of Arabia, with its border lands—Palestine and Syria on the N. W., Mesopotamia on the N. E.—and with an outlier in Africa, across the Straits of Babelmandeb. It is divided into two branches, northern and southern, the former composed of the Canaanitic or Palestinian, the Aramaic or Syrian, and the Assyrian, the latter of the Arabian and Ethiopian languages. The Canaanitic subdivision includes the Hebrew with any other related dialects in Palestine, and the Phœnician with its African colony, the Punic of Carthage. The sole surviving literature of the Hebrew written during the life of the language (it became extinct as a vernacular two to four centuries before Christ) is our Old Testament; its oldest parts come from near the middle of the second thousand years B. C. Neither Phœnicia nor Carthage has left any literature; their language, very closely like the Hebrew, is known only from inscriptions, from 600 to 400 B. C. Of the Moabitic, a remarkable monument, from 900 B. C., was discovered a few years ago; the language was almost pure Hebrew. The Hebrew has been kept in artificial learned existence, like the Latin, and has an immense literature as such. The Aramaic of Syria, spreading into Palestine and displacing there the Hebrew, and coming to occupy also most of Assyria, is represented by inscriptions, by passages in Ezra and Daniel (often, but improperly, called Chaldee), by the Targums, etc.; then, soon after Christ, springs up at Edessa a considerable "Syriac" literature; later the whole branch, save very scanty fragments, is overwhelmed by the Arabic. The Assyrian or Babylonian, a language only of inscriptions on alabaster and on clay tablets, has been brought to light but recently, and is now engaging a large share of the attention of Semitic scholars; the mass of its records dates from 1000–500 B. C., but some are claimed to come from more than 3000 B. C. The Arabic proper makes its appearance only recently, possessing but few records which are older than Mohammed (seventh century); but there are in the southwestern corner of the peninsula remains of a wholly independent and much older civilization, and of dialects, called Sabæan (less correctly Himyaritic), very different from the classical Arabic. The Semitic dialects of Abyssinia are a colony from these, and nearly akin with them; the Ethiopic, or Geëz, has a Christian literature dating from the fourth century; the Amharic, which has crowded the other out of cultivated use, does not appear until the twelfth or thirteenth. This is the ancient distribution of Semitic dialects; since the rise of Mohammedanism the Bedouin Arabic has spread itself over nearly the whole Semitic territory, extinguishing the other dialects, has taken possession of Egypt, now its main seat of literary cultivation, and of the northern border of Africa, and has influenced, and more or less filled with its material, the Persian, Turkish, and Hindustani, and even the widely sundered Spanish and Malay, thus winning a sway comparable to that of the Latin, though falling far short of the Latin in the importance of the derived languages to which it has given birth.

The Semitic race has played a far greater part in history than any other, save only the Indo-European, and its languages possess a corresponding degree of importance. Their range of dialectic differences is much less than that prevailing in our family; they are closely kindred forms of speech. Not, apparently, because they have been more recently separated than the Indo-European dialects, but because their structure has been especially rigid and unchanging. The typical Semitic structure is more peculiar and problematical than that of any other family of languages. Its striking characteristics are its tri-consonantal roots and its internal flexion. The roots, namely, have not, like the Indo-European, each a constant vowel, which is, even if more variable than the consonants, an integral part of it; the vowel or vowels in Semitic have a formative value, are indicative of relation, not less than the vowels of *man* and *men*, of *bind* and *bound* and *band* and *bond*. And (with minor exceptions) the radical consonants are three. Suffixes and prefixes—and even infixes, elements inserted within the body of the root—are not unknown, but the sphere of their application is limited, because so much of what is done in Indo-European by affixes is here accomplished by internal change of vowel. Thus, for example (in Arabic, which is by far the most regular and transparent in its structure of all the dialects), all that we can call the root corresponding to "kill" is *q-t-l*: *qatala* is a third person singular, meaning "he killed," and *qutila* its passive, "he was killed," *aqtala* its causative, "he caused to kill," *qâtala* its conative, "he tried to kill," *inqatala* its reflexive, "he killed himself," and so on. Then *(u)qtul* is imperative, "kill!" and a second set of verbal persons (hardly to be called a tense) has this form of the root: *yaqtulu*, *taqtulu*, *aqtulu*, and so on. The active participle is *qâtil*, "killing," the intensive *iqtâl*, "causing to kill," the passive *maqtûl*, "killed." The infinitive or verbal noun is *qatl*, "act of killing," and *qitl*, "enemy," and *qutl*, "murderous," are specimens of derivative words. These examples are sufficient to set forth the remarkable features of Semitic speech. We have paralleled above the internal flexion with the Germanic *ablaut* of *bind* and *bound* and their like; but the essential difference between the two cases is that what in Indo-European is rather a sporadic phenomenon, and capable of easy explanation as the *quasi*-accidental result of phonetic change consequent upon external additions, is in Semitic the very life and soul of the language, irreducible to anything different. It is, however, the prevailing belief among linguists that this condition of Semitic language must be the result of a very peculiar history of development out of beginnings more analogous with those found in other families of speech; and attempts are constantly making to penetrate the secret of the development, but as yet without any considerable measure of success. It is very certain, meanwhile, that there can be no proof of any relationship between the Semitic and any other family until the attempts prove successful. It is a favorite subject of effort with some philologists to demonstrate the primitive unity of the Semitic and Indo-European races; and there are many indications outside of language which favor the conclusion; but thus far, at any rate, the language is an impassable barrier.

The other peculiarities of Semitic structure are of small account as compared with those already noticed. The verb

tends more to conjugational distinctions, such as have been illustrated, than to distinctions of tense and mood. It marks the difference of gender in its personal inflection. The noun is almost destitute of case-variation: it and the verb have the three numbers found in early Indo-European. Secondary derivation, or the forming of derivative from derivative, is almost unknown, as is also the formation of compounds. Connectives of clauses are few and simple. See SEMITIC LANGUAGES.

Among the languages of Africa, those nearest to Asia, grouped together as the *Hamitic family*, are often claimed, but on grounds which must be pronounced thus far insufficient, to be akin with the Semitic. The family is reckoned to comprehend three branches—the Egyptian, the Libyan or Berber, and the Ethiopian; the most conspicuous members of the last are the Galla and Somali. The Egyptian of the modern period is the Coptic, which has a Christian literature beginning early in our era; it was overpowered by the Arabic, and became extinct several centuries ago. The ancient Egyptian is the language of the hieroglyphs, and has older records perhaps than any other form of human speech, reaching, in scanty measure, probably into the fourth millennium before Christ. The Egyptian is a tongue of the simplest possible structure, with deficient distinction of its parts of speech, and with very little flexion; so entirely lacking the characteristic features of Semitic that, in spite of apparent coincidences in their pronouns and elsewhere, the two can not well be brought together until the riddle of Semitic structure is solved.

The extreme south of Africa is occupied by the Hottentot and Bushman dialects, which have been claimed, though probably without good reason, to be connected with the Hamitic family. N. of them, and up to the equator, are found the branches of a well-defined family, the *South African* (or Bantu, Kaffir). The marked peculiarity of its structure is its use of prefixes, instead of suffixes, as principal inflectional apparatus. Those of its languages which border upon the Hottentot share with the latter (from whom they are believed to have derived the peculiarity) the possession of clicks, or smacking and clucking sounds, in their alphabetic system.

Between the South African languages and the Great Desert lies a perfect babel of languages and races, into the little understood classification and characterization of which we can not here enter. Even the best authorities are greatly discordant in their treatment of it. See AFRICAN LANGUAGES.

The ancient Etruscan of Northern Italy, and the Basque, on the border between France and Spain, by the Bay of Biscay, are the only other languages of the Old World which call for mention. Both seem unrelated with anything else in the world, and the Basque is perhaps a relic of a family which occupied at least some part of Western Europe before the intrusion of the Indo-European peoples. It is of an intricately agglutinative structure, commonly styled polysynthetic. See BASQUE LANGUAGE.

The same polysynthetic structure characterizes the languages of the New World, in the main, and is the only tie by which, if at all, they are to be connected together as a single family. See INDIANS OF NORTH AMERICA, INDIANS OF CENTRAL AMERICA, and INDIANS OF SOUTH AMERICA.

The classification here given is strictly a linguistic one, making no account of the ethnological division of human races. Between the two there is not a necessary accordance. Every language, as we have seen, is an institution, kept in existence, like all the other parts of our acquired and accumulated culture, by a process of teaching and learning; it does not go down by descent. Just as any individual can, if circumstances favor or require, learn as his first language or "native tongue" a dialect which is not that of his ancestors, so a community—which in this respect is only an aggregate of individuals—can do the same. Such cases have occurred, over and over again, in the history of the world. Like the useful arts, the sciences, art, religions, a language may be abandoned by a race which had produced it, or assumed by one which had no part in its production, because nature makes all men capable of speech, but prescribes to no one what speech he shall use. Yet, while a language is a traditional institution, it is the most clinging and persistent of institutions, and also the one running out into the greatest infinity of detail and possessing the most notably objective character. Words, sentences, grammatical structure, can be recorded and turned over and compared almost as if they were real substances, like fossils or archæological remains. These qualities make language, beyond any other human product, of value in tracing out the relations of the different sections of the human race anterior to the epoch where trustworthy historical record begins. Its evidence yields no certainty, but only a probability. Human communities have been influencing one another since the beginning of time; and it is not possible to say absolutely of any race on earth that it has not obtained its speech somewhat as the French got their Romanic, or the Normans their French, or the Irish their English. It is only the forces of civilization that give a language the power to propagate itself widely beyond its natural limits—that enable a minority of a mixed community to determine the speech of the whole; the ruder the people, the greater the probability that its linguistic relations represent its ties of blood. Hence the trustworthiness of linguistic evidence is greatest where it is most desired—among wild and primitive races, as to whom recorded history is silent. The ethnological problem is doubtless too difficult to be ever completely solved by us; the mutual encroachments and superpositions of races, with consequent mixture of blood and of speech in every degree, the dwindling and disappearance of one race and the expansion of another to greatness, form a web so intricate that it will never be unraveled. In the present condition of ethnology, language is the richest and most reliable source of information. There are ultimate questions which it can not decide, and as to which zoölogy and biology will probably some day show a higher authority. Such, for example, is that of the unity or variety of the human race; here linguistic science can only say that there are, on the one hand, no differences between human languages which might not be the result of later divergence from a common nucleus; and that, on the other hand, there are a great many languages so unlike that they can never be proved descended from the same ancestor, since they show no correspondences which might not be the result of accident. Linguistic material is not, like physical, analyzable to its minutest elements; creation, annihilation, transmutation, are the commonest of processes within it; it yields its results only to historical methods of investigation. Thus far, it has been found possible even to unite into families only languages which had the bond of a common structure; correspondences of material, of radical elements, anterior to the growth of structure, have not been available; and although it need not be declared impossible that they may yet be found available between certain families, it is absolutely impossible that they should be so between all. Root-comparisons, among families of unrelated structure, are in the very highest degree precarious; none yet made are to be approved as sound.

The question of the origin of language has assumed an entirely new aspect in consequence of the recent progress of linguistic science. It is clearly seen that language as a concrete possession, a stock of words and phrases used for the communication and elaboration of thought, is in no proper sense of the word a gift, a natural capacity, a faculty, but rather an accumulated acquisition, the outcome of certain faculties and tendencies which belong to man and are a characteristic part of him. To maintain the divine origin of language now is simply to hold that man was endowed by his Creator with those faculties and tendencies, with the foreseen and intended purpose that he work them out to the possession of language: as, in a different but still essentially similar way, with the capacities that have brought him to the possession of his other institutions—of regulated society, of art, of the arts of life. To hold that he was put in possession at his birth of a developed speech is analogous to holding that he was provided with houses and clothes and instruments and machines. The formal structure of language, even the more formal part of its vocabulary, we see to have been developed by degrees out of a simple body of formless roots, indicative of external, sensible acts and qualities—in the same manner, and for the same reason, that instruments and machines have been developed out of simple sticks and stones and flakes of flint, that architecture began with caves and huts, and dress with skins of animals and fig-leaves. To investigate the origin of language is to inquire how these rudiments of speech were produced. The inquiry is not a part of the historical science of language, because history brings us only to the recognition of these, and to the recognition of them only in their kind, not in their concrete identity as such and such utterances. It is an essential and prominent part of linguistic philosophy as

a branch of anthropology, and can only be properly treated by one who understands the facts of later language-history, and can read their meaning.

To express himself is natural to man, and he has for that purpose a variety of instrumentalities—namely, gesture, grimace, and utterance. All are capable of being put to use, apart from anything conventional, between human beings anxious to understand one another; and all are, under determining circumstances, so put to use. That any one of them should be employed with the intent to communicate is enough to constitute an act of language-making. It is by the addition of this intent that they pass over from the condition of natural to that of conventional expression. The sphere of natural, instinctive expression is limited to the feelings or emotions of the expresser; it is purely subjective, and, so far as the action of the voice is concerned, it extends only to tones; it does not include articulations, specific combinations of vowel and consonant. There is nowhere, in the whole domain of language, anything going to show that a sound or combination of sounds is ever produced as the natural representative of an act of the intellect, a conception or a judgment. While human expression remains instinctive and emotional, it is not language, any more than that of the lower animals, with which it is analogous. When, for instance, a cry which was at first the direct outburst of pain or pleasure or disgust or warning is repeated or imitated for the purpose of giving to another an intimation of pain, etc., then the making of language is begun. The lower animals, some of them, are able to make a beginning here; if a dog stands at a door, and scratches or barks in order to attract attention and be let in, waiting for the opener who, he knows, will answer his call, that is an act of language-making, as genuine and perhaps as good as the earliest attempts of a human being would be. There is, to be sure, an essential difference between the two cases; but it lies only in this: the dog, with his limited powers, can go no further; he is incapable of a continuous progressive development; but the man sees and appreciates what is gained by his linguistic act, and tries it again, and tries others; and so, by a gradual process of accumulation, he arrives at a body of expressions which use by and by renders conventional; and by manipulation he comes to linguistic structure, and finally, in races more gifted or more favored by circumstances, to vocabularies and grammars like our own. Then, by a process of development showing the most striking analogies with that just described, he adds the art of writing, a mode of record of speech which continues and completes its value both to the individual and to the race.

This exposition shows the true ground on which the different relation of men and of the lower animals to language is to be put and argued. Usually the great and ruinous error is committed of assuming that at the beginning certain combinations of sounds must have naturally signified something to man, and then of searching anxiously for similar phenomena among the animals also. This can never lead to any valuable result. The true point for the attention of naturalists is this: What signs are to be discovered in animals below man (like that quoted above of the dog) of the power to adapt means to ends in the way of expression, with more or less of free consciousness and intelligence? That their power is extremely limited is clear enough from the fact that no race or community of animals, so far as we know or have reason to suspect, possesses any conventional language kept up by teaching and learning. It is here just as in the case of instruments: the power to use a stick or a stone as tool or weapon can not be absolutely denied to certain animals; and men began with nothing better; but, except in man, it is not a growing and developing power. With the animals it remains a natural gift; with man it becomes by degrees an institution, and leads to the possession of ships and steam-engines and cannon. To ascribe the lack of language in animals to the want of some specific mental power is an error, like the error of ascribing its possession by man to the addition of some specific mental power, some linguistic faculty or language-sense. The lack and the possession are both alike the results and indications of a whole cast and grade of mental capacity, of combinations of faculties which show themselves abundantly also in other ways. No animal below man has any accumulated results of the exercise of his natural powers, any institutions—any civilization, in short. To make language dependent on a power of forming general ideas or concepts is least of all to be approved; for it is past all reasonable question that the lower animals do form such, in their degree and within their limits; nothing like intelligence is possible otherwise. The power of the dog in this respect is not sensibly different from that of the wholly undeveloped and speechless man; but the acquisition of language, impossible to the dog, trains and equips the power in man, and makes it capable of vastly higher and more abundant work.

The prominence in existing language everywhere of the voice as means of expression has its ground, not in any especial nearness of the organs of utterance to the movements of the soul, but only in a kind of natural selection and survival of the fittest. The voice is, for obvious reasons, the most available instrumentality, in the infinite variety and rapidity of its apprehensible combinations, in the small expenditure of muscular effort which they cost, in their power to command attention from any direction and in the dark as well as in the light, and in the liberty afforded the hands for other work at the same time. Experience brought all this to light, even as it has brought to light the various availabilities of wood and stone and metal. That we find every part of the human race, at the very beginning of our knowledge of it, in possession of a spoken language, a more or less complete system of vocal signs for ideas and their relations, means no more than that the whole race had lived long enough to have worked out its natural gifts to their necessary and intended results. It by no means proves that there was not a time when gesture, more than utterance, was the principal means of expression, or even that for a period, of duration impossible to determine, men may have had no expression different from or higher than that of the animals next beneath them in the scale of creation. The natural (as distinguished from the conventional) means of expression still continue most important auxiliaries to language; for anything but the driest scientific statement, tone and gesture and posture and facial expression are requisite; they are the subjective means whereby the personality of the speaker is impressed upon the hearer—whereby he moves, excites, persuades. Their power is greater and their aid more indispensable the lower the grade of the language and of those who use it. In the highest elaboration of speech, and with those trained to employ and interpret it with the keenest sensibility, even the written page shows the reader the very tone and action of the writer—seems to smile or scowl or weep or excite.

Out of the leading part assumed by the voice grows the importance of onomatopœia, or the vocal imitative principle, in the earliest history of language. The intent being to make an intelligible sign, and the voice the instrument, audible sounds are the matters most easily signified. This is just as natural and necessary as that in a written system of signs the outlines of visible objects are most easily, and therefore earliest, signified. A hieroglyphic mode of writing, intended for the eye to understand, begins with pictures of things that strike the eye, and proceeds from them, in various ways, to indicate matters of more varied and even of subjective knowledge. A system of audible signs begins in like manner with a rude, sketchy depiction, as it may be called, of audible sounds, and arrives, by figurative transfer and by various ties of association, at the intimation of other classes of acts and qualities. The sphere of imitation is by no means restricted to the actual sounds occurring in nature, though these may well enough have been the first subjects of reproduction. What its limits are may be best seen from the range of onomatopoetic expression in existing languages. There is a figurative imitation, whereby rapid, slow, abrupt, repeated movements are capable of being signified by combinations of sounds which make through the ear upon the mind somewhat the same impressions as the movements themselves through the eye. While this was a principal suggester of the means of mutual intelligence, it may well enough have been found even more fertile than we now regard it as being. Our recognition of the value of the imitative principle is thus founded upon our general theory of language, in combination with the fact that the same principle continues efficient, in greater or less degree, through the whole history of language; it does not depend upon our ability to trace the main mass of material in any existing language to an onomatopoetic origin; for, the intent being simply to provide by the most available means for communication between man and man, onomatopœia would be gradually crowded out, after the provision of a certain quantity of intelligible signs, by the later and now almost exclusive method of the combination and variation of those signs; and, with that readiness to forget derivations

and disguise etymologies which is a leading and most valuable feature in universal language-history, the signs of imitative origin would be hidden and disappear.

If by such methods as those here described there could be made a sufficient working provision of signs, to be developed by degrees into such languages as we now find in the world; if these methods are in harmony with the known history of language, the one stage passing into the other without a break or a change of governing principle; if, from what we know of man and of his linguistic capacities and activities, these are the methods by which a new language would be created if it were possible that a community of human beings should begin life again without any—then this is such a solution of the problem of the origin of language as science demands.

It may be briefly pointed out, in conclusion, that there is no relation whatever between the development of language and any development of man himself out of a lower type of animal. Man was man in endowment when the production of his present speech began; its acquisition, like that of the other parts of his civilization, has only helped in the development of his powers, raising him higher and higher in the scale of manhood, and being, of all his acquisitions, the one most fundamentally important, most needful and helpful to everything else that he possesses.

The view of the history, nature, and origin of language here compendiously presented will be found worked out in much greater fullness in the writer's works, *Language and the Study of Language* (New York, 1867); *Oriental and Linguistic Studies, I.* (1872); and *The Life and Growth of Language* (1875). Other general works on the subject in English are Max Müller's *Lectures on the Science of Language*; H. Wedgwood's *Origin of Language* (London, 1866); F. W. Farrar's *Chapters on Language, Families of Language*, etc.; A. H. Sayce's *Principles of Comparative Philology* (London, 1874); an *Introduction to the Study of the History of Language*, by Messrs. Strong, Logeman, and Wheeler (London, 1891), founded on Paul's *Principien der Sprachgeschichte*, of which there is also an English translation; J. Clark's *Manual of Linguistics* (Edinburgh, 1893).

To trace the history of the study of language, from the often surprisingly acute but crude and narrow speculations of the ancients down to and through the remarkable collections, comparisons, analyses, deductions, of the great linguistic scholars (especially in Germany) of the nineteenth century, constituting the vast and rich department of "comparative philology," is a task by itself, and will not here be attempted. The best authorities for it are L. Lersch, *Sprachphilosophie der Alten* (1840); H. Steinthal, *Geschichte der Sprachwissenschaft bei den Griechen und Römern* (1863); T. Benfey, *Geschichte der Sprachwissenschaft und der Orientalischen Philologie in Deutschland* (1869). J. Jolly has added a general sketch of the history to his German translation of the writer's *Language and the Study of Language* (Munich, 1874), and some interesting details are given in the first series of Müller's *Lectures*. W. D. Whitney.

Languedoc, läⁿg'dok' [Fr., orig. the name of the dialect of French spoken there; *langue*, language + *de*, of + *oc*, Prov. for *yes*, which being distinct from the northern *oïl* (> Mod. Fr. *oui*) gave this distinctive name to the language]: one of the old provinces of France; bounded S. by the Mediterranean and E. by the Rhône; it bore while a Roman province the name of *Gallia Narbonensis*; passed from the Romans to the Goths, from the Goths to the Saracens, and from the Saracens to the Counts of Toulouse; in 1271 it was finally annexed to the French crown. Christianity was introduced from Greece through Marseilles and Lyons, but from the very beginning the clergy complained of the peculiar predisposition the people showed for heresy. Languedoc was the chief seat of the Cathari, and afterward of the Camisards. It is now divided into the departments of Ardèche, Aude, East Pyrenees, Upper Garonne, Gers, Hérault, Lozère, Tarn, and Tarn-et-Garonne. The chief city of Languedoc was Toulouse.

Lan'ier, Sidney: poet; b. at Macon, Ga., Feb. 3, 1842. He served in the Confederate army during the civil war, and was taken prisoner. After the war he taught school and practiced law in Alabama and Georgia, removing to Baltimore, Md., in 1873. From 1879 to 1881 he was lecturer on English Literature at Johns Hopkins University. He was a practical musician, and applied musical principles to poetry in his *Science of English Verse* (1880). He wrote the cantata sung at the Centennial Exposition of 1876. A complete edition of his poems, with a memoir, was published in 1884. He also wrote *The English Novel* (1883), and edited for boys Froissart's *Chronicle*, the *King Arthur*, the *Mabinogion*, and Percy's *Reliques*. D. at Lynn, N. C., Sept. 7, 1881. H. A. Beers.

Lanjuinais, läⁿ'zhü'i-nā', Jean Denis: jurist and statesman; b. at Rennes, France, Mar. 12, 1753; studied law; practiced law, and was appointed Professor of Ecclesiastical Law in his native city in 1775, and became conspicuous as a man of superior talent, when in 1789 he was elected a deputy to the States General. As a member of the Convention he sided with the Girondists, and while he wished to destroy the special privileges of classes and to improve the condition of the common people he opposed the more radical measures of the Jacobins. Though denying the right of the Convention to try the king, he voted him guilty of the offenses charged, but advocated banishment instead of the death penalty. On June 2, 1793, he was arrested, but escaped to Rennes, and resumed his seat in the Convention in 1795, after the fall of the Terrorists. During the Directory he was a member of the Council of Ancients, and of the senate during the consular rule, in which latter position he led the opposition against the monarchical tendencies of the government of Napoleon, who nevertheless made him a count on the establishment of the empire. In 1808 he was made a member of the Institute. He voted for the deposition of the emperor in 1814, was made a peer of France by Louis XVIII., and advocated liberal principles during the Restoration, in opposition to the reigning political and ecclesiastical reaction. D. Jan. 13, 1827. Among his more important legal writings are *Appréciation du projet relatif aux trois concordats* (1817); *Constitution de la nation française* (Paris, 1819); *De l'organisation municipale en France* (1821). He was a man of great literary attainments, and after his death his son, Victor Ambroise de Lanjuinais, published a collected edition of his writings (4 vols., Paris, 1832), also a *Life*.

Revised by F. Sturges Allen.

Lankester, lang'kes-ter, Edwin, M. D., LL. D., F. R. S.: writer on scientific subjects; b. at Melton, Suffolk, England, Apr. 23, 1814; studied medicine at University College, London, 1834–37; graduated at Heidelberg 1839; became a lecturer at St. George's school of medicine 1843; secretary of the Ray Society 1844; Professor of Natural History at New College, London, 1850; president of the Microscopical Society 1859; was elected coroner for Central Middlesex (city of London) 1862. He acquired wide fame as a lecturer and writer upon sanitary and social science, physiology, botany, zoölogy, foods, microscopy, etc.; was author of many valuable reports and scientific papers, and of various books upon the above subjects, mostly designed for popular use, and since 1866 edited *The Journal of Social Science*. D. Oct. 30, 1874.

Lankester, Edwin Ray, LL. D., F. R. S.: zoölogist; son of Edwin Lankester, M. D.; b. in London, May 15, 1847; was educated at St. Paul's School, London, and at Oxford, where he became a fellow of Exeter College in 1872. He was appointed Professor of Zoölogy and Comparative Anatomy in University College, London, in 1875, and Linacre Professor of Comparative Anatomy and fellow of Merton College, Oxford, in 1890. He was elected president of the Marine Biological Association of the United Kingdom in 1891. He has devoted particular attention to the structure, development, and classification of invertebrates, and was the author of the articles *Mollusca* and *Protozoa* in the last edition of the *Encyclopædia Britannica*. Among his earlier works are *Fishes of the Old Red Sandstone* (1870) and *Comparative Longevity* (1871). Since 1869 Prof. Lankester has been editor of *The Quarterly Journal of Microscopical Science*, besides contributing numerous articles. F. A. Lucas.

Lanman, Charles: author; b. in Monroe, Mich., June 14, 1819; was a clerk in New York from 1835 to 1845, when for a few months he edited the Monroe *Gazette*; was associate editor in 1846 of the Cincinnati *Chronicle*, and was associated with *The Daily Express*. In 1848 he became a correspondent of *The National Intelligencer*; held at Washington the positions of librarian of the War Department, and as such organized the library in the executive mansion; librarian of copyrights in the State Department, and private secretary of Daniel Webster; librarian of the Interior Department, and librarian of the House of Representatives. He published a number of volumes of travel; *Private Life of Daniel Webster* (New York and London, 1852); *Dictionary of Congress*, 6 eds., three of them published by the

general Government; *The Red Book of Michigan* (Detroit, 1871); *The Japanese in America* (New York and London, 1872); *Annals of the Civil Government of the United States* (Washington, 1876; 2d ed. New York, 1887); *Leading Men of Japan* (Boston, 1883); *Haphazard Personalities* (Boston, 1886); and other works. From 1871 to 1883 he was secretary to the Japanese legation. D. Mar. 4, 1895.

Lanman, Charles Rockwell, A. B., Ph. D.: Sanskrit scholar; b. at Norwich Town, Conn., July 8, 1850; graduated at Yale College in 1871, then took a two years' course of instruction in Sanskrit and comparative philology under Prof. Whitney; continued his studies at the Universities of Berlin, Tübingen, and Leipzig; on his return to the U. S. was appointed associate instructor at Johns Hopkins University, Baltimore; in 1880 was appointed Professor of Sanskrit at Harvard University. During a visit to India in 1889 he acquired a valuable collection of Sanskrit books and MSS. for the university library. He was secretary of the American Philological Association from 1879 to 1884, edited five volumes of its *Proceedings* and *Transactions* (1879 to 1883), and during 1890 was president of that society. He was corresponding secretary of the American Oriental Society from 1884 to 1894, and projected the Harvard Oriental Series, the first volume of which, edited by Prof. H. Kern, of Leyden, appeared in 1891. Prof. Lanman has published *On Noun Inflection in the Vedas* (1880); a *Sanskrit Reader* with dictionary and notes (Leipzig, London, and Boston, 1881; new ed. 1888).

Lannes, laan, Jean: one of Napoleon's marshals; b. at Lectoure, in Guienne, Apr. 11, 1769, of poor parents; was apprenticed in his fifteenth year to a dyer; in 1792 left this occupation and enlisted in the army, where he soon rose to the rank of a colonel; was nevertheless discharged in 1795, at the reorganization of the army, but in 1796 followed Napoleon to Italy as a volunteer, and very soon attracted his attention by his boundless audacity; distinguished himself in every battle by some daring feat, and was made a brigadier-general in 1797; in 1798 accompanied Napoleon to Egypt, returned with him in 1799, and rendered him great services by his faithful adherence on Nov. 9, 1799, in reward for which he was made a general of division in 1800, and commander of the consular guard; led the vanguard when in the same year the army crossed the Alps at St. Bernard, and gained a brilliant victory over the Austrians at Montebello. On the establishment of the empire he was made a marshal. He led the memorable siege of Saragossa, and compelled the city to surrender Feb. 21, 1809, after which Napoleon created him Duc de Montebello. At the battle of Aspern, May 22, 1809, a cannon-ball cut off both his legs, and on May 31 he died. Napoleon said of him that he had found him a pygmy and made him a giant. See René Perin, *Vie militaire de J. Lannes* (Paris, 1809), and the *Life* by Thoumas (1891).

Lan'oline: the purified hydrous fat of sheep's wool, with not more than 30 per cent. of water; introduced into medicine with the idea that, as it was derived from the secretions of the skin, it would be a useful basis for medicinal ointments. This it has proved to be, and is frequently used in place of lard and other fatty substances where it is desirable to apply medicaments to the skin or mucous membranes in the form of an ointment. H. A. Hare.

La Noue, François, de: soldier; b. in 1531, in the vicinity of Nantes, of an old noble family of Brittany; embraced the Reformed creed, and distinguished himself in the army of the Prince of Condé as one of the most valiant Huguenot soldiers. At the siege of Fontenay-le-Comte, in 1570, he lost his left arm, and had it replaced by one of iron, whence he received his surname, *Bras de Fer*. He was taken prisoner by Alva at Mons and sent to Charles IX., who treated him with unexpected kindness, and induced him to act as mediator between the city of La Rochelle and the court. La Noue thus filled the two incompatible positions of king's agent and commander of Huguenot troops in the rebellious city, and, strangely enough, was trusted by both parties; but when the war was renewed he fought as before on the Huguenot side, and defended the city for four years with great success. After the conclusion of peace of Bergerac in 1577 he went to Flanders, entering the service of the Low Countries; was taken prisoner by the Spaniards, and retained at Madrid for five years, but at last exchanged in 1585 for Count Egmont. Under Henry IV. he again fought for the cause of his religion, and died at Moncontour, Aug. 4, 1591, from a wound he received at the siege of Lamballe. His *Discours politiques et militaires* (Basel, 1587) have been often republished. His correspondence was published in 1854. See C. Vincen's *Les Héros de la Réforme: Fr. de La Noue* (1875). Revised by F. M. Colby.

Lansdell, Henry: See the Appendix.

Lansdowne, Henry Charles Keith Petty-Fitzmaurice, Marquis of: b. in England, Jan. 14, 1845; was educated at Eton and at Oxford University, and succeeded his father as marquis in 1866. He was Lord of the Treasury 1868–72, Under Secretary for War 1872–74, and was Under Secretary for India for two months in 1880, when he resigned owing to a disagreement with the Government. He was appointed Governor-General of Canada in 1883, and for five years administered the duties of that office with such tact and skill as rendered him very popular among all races and classes in the Dominion. As the functions of the representative of royalty in Canada are largely social, the marchioness contributed in no slight degree to the success of his *régime* in that country. In 1888 he became Viceroy of India, and in the administration of the affairs of that dependency was not less successful than he had been in the performance of the less important duties devolving upon him in Canada. He retired from the viceroyship in Sept., 1893, and was succeeded by the Earl of Elgin. The marquis was married in 1869 to Lady Maud Evelyn Hamilton, youngest daughter of the Duke of Abercorn. Neil Macdonald.

Lansdowne, Henry Petty-Fitzmaurice, Third Marquis of: b. in London, England, July 2, 1780; second son of William Petty, first Earl of Shelburne (*q. v.*), who in 1784 was created Marquis of Lansdowne; educated at Westminster School and at Edinburgh under the tutorship of Dugald Stewart; graduated at Trinity College, Cambridge, in 1801, and under the name of Lord Henry Petty was chosen as a Whig in 1802 to a seat in Parliament for the borough of Calne. He distinguished himself in debate, giving his chief attention to finance; was elected member for the University of Cambridge in 1806 on the death of Pitt, and in the same year became Chancellor of the Exchequer in the ministry of Grenville and Fox, retiring from office in 1807. On the death of his elder brother in 1809, he succeeded to the title, and became one of the heads of the Liberal party in the House of Lords. He was an early advocate of Catholic emancipation, the abolition of slavery, parliamentary reform, and free trade. On the return of the Whigs to power in 1827, he became Secretary of the Home Department under Canning, Secretary of Foreign Affairs under Lord Goderich (1828), Lord President of the Council under Earl Grey from Nov., 1830, to Nov., 1834, under Lord Melbourne from Apr., 1835, to Sept., 1841, and under Lord John Russell from July, 1846, to Feb., 1852. For many years he had been the Liberal leader in the upper house, when he resigned that position in 1852, not intending to return to office, but in December of the same year, on the formation of the Aberdeen ministry, he consented to take a seat in the cabinet without a portfolio, and again in the first Palmerston ministry, Feb., 1855, to Feb., 1858. He twice declined the premiership and once refused a dukedom. He was a man of cultivated taste, formed a splendid library and collection of art-treasures, was a generous patron of literature, and made Lansdowne House the center of polite society in England. After the death of the Duke of Wellington he was the patriarch of the House of Lords, and for some years was the most honored statesman of the realm. D. at Bowood House, Calne, Jan. 31, 1863. Revised by C. K. Adams.

Lansing: city (incorporated in 1859); capital of Michigan; Ingham County (for location of county, see map of Michigan, ref. 7–I); on both sides of the Grand river, at the mouth of Cedar river, and on the Chi. and Gr. Tk., the Pere Marquette, the Lake S. and Mich. S., and the Mich. Cent. railways; 88 miles N. W. of Detroit, 65 miles S. E. of Grand Rapids. It has an elevated location; derives good water-power from the rivers, which are here crossed by 10 bridges; has important manufactures; and is the center of an excellent farming region. In and near the city are the State Industrial School for boys, with property valued at $310,000; the State School for the Blind, with property valued at $148,747; and the State Agricultural College, with 57 buildings and a farm of 676 acres, valued at $612,000. The State Capitol, built in 1871–78, covers four city blocks, and cost $1,500,000. The City Hall and P. O. building, each cost $150,000. The city owns the water-works and electric light plant, and contains 24 churches, public school property valued at $200,000, 2 parks, electric street-railway, 14 hotels, a national

bank with capital of $100,000, 1 State bank with capital of $150,000, and 2 dailies, 5 weeklies, and 1 semi-monthly. The manufactures include gas and gasoline engines, cream separators, agricultural implements, sleds, stoves, carriages,

State Capitol, Lansing, Mich.

road-carts, wheelbarrows, pressed stone, condensed milk, beet sugar, cut glass, beer, flour, knit goods, and machinery. Pop. (1890) 13,102; (1900) 16,485. ALVA M. CUMMINS.

Lansing, JOHN GULIAN, D. D.: an exegetical scholar of the Reformed Church in America; b. in Damascus, Syria, Nov. 27, 1851; a graduate of Union College and New Brunswick Theological Seminary. He became minister at Mohawk, N. Y., 1877, at West Troy 1880; Professor of Old Testament Languages and Exegesis in the New Brunswick Seminary in 1884. He is the author of the *American Revised Version of the Book of Psalms* (New York, 1885); *An Arabic Manual* (1886; 2d ed. 1891). W. J. B.

Lansingburgh: village (named from Abraham J. Lansing, who settled here in 1771); Rensselaer co., N. Y. (for location of county, see map of New York, ref. 5–K); on the Hudson river, and the Fitchburg Railroad; 3 miles N. of Troy. It is connected with Troy by electric railway and with Waterford and Cohoes by bridges across the Hudson. There are 11 churches, 5 public schools, parochial school, public-school library, academy, and 2 weekly newspapers. The industries include the manufacture of brushes, crackers, oilcloth, and collars, cuffs, and shirts, and the village has considerable river trade. Pop. (1890) 10,550; (1900) 12,595; township, including village, 12,939. EDITOR OF "TIMES."

Lanta'na [Mod. Lat.]: a genus of mostly tropical shrubs of the family *Verbenaceæ*. Many have stimulant and aromatic qualities. *L. pseudothea* is highly esteemed in Brazil as a substitute for tea. A number of the species are beautiful greenhouse shrubs, notably *L. camara* and *mixta* of tropical America. The U. S. have at least two species native to the Gulf States, *L. camara* and *involucrata*. Some have square stems. The flowers are mostly showy and of changing colors.

Lantern [M. Eng. *lanterne*, from O. Fr. < Lat. *lanter'na* (also *later'na*), from Gr. λαμπτήρ, light-stand, torch, liter., lighter, deriv. of λάμπειν, shine, give light. Cf. LAMP]: in architecture, a small structure of somewhat light and open design and decorative aspect, surmounting or crowning a dome or other more massive and important architectural feature. A conspicuous example in mediæval architecture is the lantern of the Church of St. Ouen at Rouen, France, a polygonal turret of rich open-work tracery over the intersection of the nave and transept of that church. The lantern, surmounting a dome, is an invention of the Renaissance, intended to give lightness and movement to the converging lines of the exterior dome, to which it serves as finial. The lantern of the Duomo at Florence, finished 1461 from the designs of Brunelleschi, is the earliest example of these. Even more celebrated is the great lantern of St. Peter's at Rome, designed by Michaelangelo and finished after his death in 1564. A. D. F. HAMLIN.

Lantern-fly: a name given to several insects of the family *Fulgoridæ*. Of these, *Fulgora candelaria* of China and *F. lanternaria* of Guiana are the best-known species, and the name may have been bestowed upon these insects on account of a fancied resemblance to a lantern shown by the large projecting head. None of them emit light. They are nearly 3 inches long, and are the largest of the Homoptera. Some of the genera produce a fine white wax, utilized in the southeast of Asia. Revised by F. A. LUCAS.

Lan'thanum [Mod. Lat., from Gr. λανθάνειν, to escape notice]: one of the chemical elements of rare occurrence, to which Mosander, its discoverer, in 1839, gave this name, because it had escaped notice for a long time after the mineral which contains it was discovered. It occurs in several rare minerals in Norway, as cerite, gadolinite, and allanite. Lanthanum forms an oxide of the formula La_2O_3, analogous to that of aluminium. Its atomic weight is 138. I. R.

Lanza, laan'zăă, GIOVANNI: statesman; b. at Vignala, Piedmont, Italy, in 1815; studied medicine at Turin, and practiced in his native city; in 1848 was elected a member of Parliament, and espoused the policy of Cavour; in 1855 entered the cabinet of Cavour as Minister of Public Education, and in 1858 exchanged this office with the Ministry of Finance; in 1859, after the Peace of Villafranca, resigned, together with the whole cabinet of Cavour, and then worked simply as a member of Parliament, of which he was elected president several times; in 1864 took charge of the Ministry of the Interior under La Marmora, but retired in 1865. Once more entering Parliament, and having been elected president in Sept., 1867, he opposed the financial policy of the ministry of Menabrea, and resigned his presidency when the ministry triumphed. His re-election in 1869 caused the dissolution of the ministry, and he now undertook to form a new cabinet himself. He occupied the Ministry of the Interior, and the other members belonged mostly to that section of the Right which had supported Menabrea's internal policy, but opposed his financial measures. Lanza endeavored to introduce the greatest possible parsimony to bring order into the internal affairs of the kingdom. Nevertheless, as the annexation of the papal states in 1870 took place while he held office, large expenses for the army and navy were necessary. The peculiar tendency of the Italian Parliament to grant the expenses, but to reject the taxes, overthrew the cabinet of Lanza in 1873. On June 23 he resigned, as the Parliament would not allow Sella's tax bill to be discussed. D. in Rome, Mar. 9, 1882.

Lanzarote, laăn-thaă-ro'tā: the most N. E. of the Canary islands; area, 325 sq. miles. It rises to the height of 2,000 feet, and contains several active volcanoes. It is very fertile, and produces the finest grapes and wines on the Canaries, but it is much exposed to drought. Pop. (1887) 16,409. Teguise is the capital; Arrecife the principal port.

Lanzi, laan'tsĕe, LUIGI: antiquary; b. at Monte dell' Almo, Italy, June 14, 1732; entered the order of the Jesuits in 1749, and became, after its dissolution in 1773, assistant director of the gallery of Florence. He devoted himself much to the study of art and archæology, especially Etruscan language and antiquities, and his two works on these subjects, *Saggio di lingua etrusca* (3 vols., 1789) and *Storia pittorica dell' Italia* (6 vols., 1792), attracted great attention; the latter was translated into English by Thomas Roscoe. D. in Florence, Mar. 30, 1810.

Laoc'oön (in Gr. Λαοκόων): a Trojan patriot and priest who opposed the introduction of Sinon's wooden horse into the city of Troy. He almost defeated the plans of the Greeks, and thereby aroused the anger of Athene, who loved the Grecks because she hated Paris. When Laocoön was sacrificing, Athene sent from Tenedos two huge serpents, which killed Laocoön and his two sons. His myth is variously given, but the account in Vergil's *Æneid* is the best known. The death of Laocoön and his sons is the subject of a noble group now existing in the Vatican. It is described by Pliny, and was rediscovered on the Esquiline Hill in 1506. It was executed by Agesander, Athenodorus, and Polydorus, Rhodian artists who probably lived in the time of Titus. The Laocoön has been an object of Lessing's masterly criticism. See his *Laocoon*, translated by Ellen Frothingham (1875); see also his *Laocoön, herausgegeben mit kritischen und archäologischen Erläuterungen von H. Blümner* (2d ed. Berlin, 1880); Robert, *Bild und Lied* (p. 192 ff., Berlin, 1881). Revised by J. R. S. STERRETT.

Laodice'a (in Gr. Λαοδίκεια): the name of six Greek cities built by the Seleucidæ, monarchs of the Syrian empire, who, after the death of Alexander the Great, were the chief representatives and inheritors of his Eastern conquests, five of them having been named in honor of Laodice, wife of

Seleucus Nicator, and one in honor of the wife of Antiochus Theos. Of these, one in Media, one in Mesopotamia, and another on the Orontes in Phœnicia (called *Cabiosa* by Ptolemy and *ad Libanum* by Pliny), have not been identified in modern times. I. Laodicea Combusta [Gr. Κατακεκαυμένη, the burned], now *Ladik*, situated to the N. W. of Iconium on the highroad from Greece to the Euphrates, and variously assigned to Lycaonia, Pisidia, and Galatia, as the boundaries of these provinces were changed. Strabo derived the name from the volcanic nature of the surrounding country, but Hamilton (*Researches*, vol. ii.) asserts that there is not a particle of volcanic or igneous rock in the neighborhood, and proposes to derive the name from some conflagration. Leake (*Asia Minor*, p. 44) found at Ladik more numerous fragments of ancient architecture and sculpture than at any other place visited by him in that country. Imperial coins of the reigns of Titus and Domitian show that it must have been a large city.—II. Laodicea ad Lycum, now *Eski-Hissar*, a city in the S. W. of Phrygia, sometimes reckoned to Caria and to Lydia, near Colossæ, 40 miles E. of Ephesus and 6 miles W. of Hierapolis, situated on the spur of a hill between the valleys of the Asopus and Caprus brooks, which here fall into the Lycus, was originally called *Diospolis* and afterward *Thoas*, and having been rebuilt by Antiochus II. (Theos), 260 B. C., was named from his wife Laodice, by whom he was poisoned B. C. 246. From the Syrian monarchs it passed to the Kings of Pergamus, and was annexed to the Roman empire on the death of Attalus III., 133 B. C., when it became the capital of the vast province of Greater Phrygia, and rapidly took position as one of the most populous, splendid, and wealthy cities of Asia Minor, distinguished also in literature, noted as the seat of a great medical school, and was the official residence of Cicero during his proconsulate in Asia (49–50); and very interesting accounts are to be found in the great orator's correspondence. It became the residence of great numbers of Jews; was one of the earliest seats of Christianity in Asia Minor, the Church having been founded by Paul, who wrote an epistle to the Laodiceans (now lost), mentioned in the Epistle to the Ephesians. According to the superscription to 1 Timothy, Paul wrote that epistle from Laodicea, called "the chiefest city of Phrygia Pacatiana," but there is no further notice of his visit. The terrible threat conveyed by the author of Revelation to the "angel of the Church of the Laodiceans," one of the seven churches of Asia (iii. 14–22), will readily occur to mind, and has rendered the term *Laodicean* a synonym for *lukewarm*, "neither cold nor hot." During the reign of Tiberius the city was nearly destroyed by earthquakes, but was quickly restored, and was the seat of two important general councils of the Christian Church; the first, whose date is variously placed from 363 to 372, enacted sixty canons, one of which defined the books (thence called *canonical*) of Scripture; the second in 476 condemned the Eutychians. It was again overthrown by an earthquake in 494, was captured by the crusaders in 1199, by the Turks in 1255, and finally destroyed by Tamerlane in 1402. Its splendid and widely scattered ruins, including a stadium, gymnasium, aqueduct, and three theaters, have been frequently described by modern travelers. (See good account in Smith's *Dict. Geog.*, ii., 122.)—III. Laodicea ad Mare, a city of Syria, founded by Seleucus Nicator, now Latakiah (*q. v.*).

Revised by J. R. S. Sterrett.

Laom'edon (in Gr. Λαομέδων): in Greek mythology, the father of Priam and Hesione, and King of Troy. Apollo and Poseidon built the walls of Troy for a specified reward, which Laomedon refused them after the completion of the work. Thereupon Apollo sent a plague and Poseidon a sea-monster to distress the land, which, according to an oracle, might only then gain rest when Hesione had been offered up to the sea-monster. Heracles went to Troy on his return from the land of the Amazons just at the time when Hesione had been chained to a rock to await the coming of the monster, and offered to rescue her in return for the horses given by Zeus to Tros after the rape of Ganymede. Once again Laomedon declined to keep his word. Heracles made war upon him, captured Troy, and killed Laomedon along with all his sons except Priam.

J. R. S. Sterrett.

Laon, lăă'ōñ' (Lat. *Lugdu'num*, later *Laudu'num*): town of France; the ancient *Lugdunum Clavatum*, the *Bibrax* of Cæsar; capital of the department of Aisne; 87 miles N. E. of Paris (see map of France, ref. 2–G). It is situated on the top of an isolated hill with steep declivities, and surrounded by a wall flanked with towers. Its Gothic cathedral, crowning the top of the hill, adds much to the picturesqueness of its appearance, and is of itself one of the most beautiful creations of the art of the twelfth century. Each of its three façades had formerly two towers with spires, and there was also a central tower; but the spires have fallen, and of the towers only four remain. This ancient city was the scene of an ecclesiastical council in 948, was memorable in the Hundred Years' war, the wars of Napoleon I., and in the Franco-German war of 1870, having capitulated to the Germans Sept. 9. Pop. (1896) 14,625.

Laos, laa'ōz: a people of Central Indo-China, more especially of the middle valley of the Cambodia or Mekong river. They are nearly related to the Siamese, and call themselves Thaï or Thaïyai (ancient Thaï), while the Burmans call them Shans. They are somewhat civilized, though still often in tribal relations, while there are certain uncivilized tribes of them called Lava. The Laos are small, strong, slender, and rather graceful. Their skin is yellowish white, becoming brown on exposed parts of the body; the eyes are oblique, the hair straight and black, and is usually shaved off, except a tuft on the top of the head. They are garrulous, vain, cunning, gentle, peaceable, lazy, and not exclusive. In religion they are Buddhists. Their language resembles that of the Siamese. They belong in part to Siam (the Siamese Laos), in part to Northeastern Burma (the Shan states), and are found in large numbers in Tonquin and Annam.

Mark W. Harrington.

Lao-tse, or **Lao-tsŭ** (literally, old boy or venerable philosopher), sometimes also **Lao-kiun** (literally, venerable prince): a Chinese philosopher, the reputed founder of Taoism (*q. v.*). According to the Chinese historian Sze-matsien (B. C. 100), his surname was *Li* (pronounced lęe), his name *urh*, and his style *peh-yang*. He was born in the year 604 B. C., in the village of Kiuh-jin (oppressed benevolence), in the parish of *Li* (cruelty), in the district of K'û (bitterness), in the principality of Ts'û (distress), in the present province of Honan, or perhaps in Ngan-hwuy. His father is said to have been a peasant, who at seventy married a woman only half his age. Little is known of Lao-tse except that he was state librarian and keeper of the imperial archives at Loyang, the capital of Chow. In the year 517 he was visited by Confucius (then a man of fifty, while Lao-tse was eighty-five), who wished to consult him in regard to ceremonies, and to hand in a book to be preserved in the archives. The account of the interview was not flattering to Confucius, whose attachment to the ancients, and whose conventional methods of establishing society ill comported with the deeper system of Lao-tse, who sharply exclaimed: "Why talk on forever of men who are long dead, and whose very bones are dust? Only their words remain and are heard. When the wise man meets with opportunity, he rises with it; if he does not, he lets the weeds grow, goes his way, and follows his destiny. I have heard that a shrewd merchant conceals his opulence, and the sage of perfect virtue loves to seem simple. Put away your pride and your many desires, with the endless ambition which is manifest in your manner. It is all folly; and that is all I have to say." On returning to his disciples, Confucius remarked: "I know how birds can fly, how fishes swim, and animals run; the runner may be snared, the swimmer hooked, and the flier shot; but there is the dragon—I can not tell how he mounts on the wind through the clouds and rises to heaven. To-day I have seen Lao-tse, and can only compare him to the dragon."

Some years after this Lao-tse resolved to retire, and withdrew to the west, lingering for a time, however, at the Han-k'ow pass or barrier in the N. W. of the state, instructing Yin-hi, the warden, at whose request he wrote a book of about 5,000 words, entitled *Tao-teh-king* (literally, the Classic of the Way and of Virtue). The date and place of his death are unknown. Tradition states that when last seen he was riding away into the wilderness of Tibet mounted on a black ox. For his teaching, see Taoism. See also *Lao-tzu, a Study in Chinese Philosophy*, by T. Watters (London, 1870), and the works mentioned under Taoism.

R. Lilley.

Laparotomy: the operation in which the abdominal cavity is opened, is a surgical procedure of recent years, at least in its general performance. Lately the name *cœliotomy* has been proposed as a more accurate term, etymologically. This operation was proposed and even performed by some of the older surgical masters, but the danger of peritonitis

was so great that it remained for the period of antiseptic surgery to render this a comparatively simple and safe operation. It has been of especial service in the surgical treatment of diseases of the ovaries and uterus. In the former the operation of ovariotomy is now one of the commonest surgical operations. It was first performed by an American physician, Dr. Ephraim McDowell, in 1809, and subsequently by the same surgeon in many cases, but did not gain general popularity with physicians until very recent years.

Laparotomy is applied in all cases where surgical diseases of the organs of the pelvis or abdomen require direct treatment or removal. It consists in the careful opening of the abdomen, generally through the middle line of the body. Careful cleanliness or *asepsis* is necessary to avoid the greatest danger, peritonitis; and in the subsequent closure of the incision accurate adjustment must be obtained to obviate the danger of weakness of the walls and hernia. With the modern improvements in surgery both of these dangers are extremely slight, and in uncomplicated cases the mortality of the operation in itself is almost *nil*. WILLIAM PEPPER.

La Paz, laa'-paaz': a town in the northwestern part of the province of Entre Rios, Argentina; on a bluff about 100 feet high, a little back from the left bank of the Paraná; lat. 30° 44′ 27″ S. and lon. 59° 37′ 28″ W. (Gould); pop. about 9,000, and rapidly increasing. It is one of the most important ports of call of the upper Paraná, exporting large quantities of hides and beef-products, and timber from the Montiel forest. The town is built on the site of the old Guarany village of Cavallú-Cuatiá. H. H. S.

La Paz: a northwestern department of Bolivia; the most important and populous of the republic, and, according to official figures, the largest; bounded N. by Brazil, E. by Beni and Cochabamba, S. by Oruro, and W. by Peru. The official but very vague calculations give an area of 275,413 sq. miles. It may be broadly divided into two parts. The northern portion, until lately included in Beni, is a vast tract, almost entirely unexplored, between the river Beni on the E. and Peru on the W.; its area depends on the unsettled boundaries with Brazil and Peru; but if the abovementioned official statement is taken, it has over 200,000 sq. miles. So far as known it is a plain, mostly covered with forest, drained by the Beni, Madre de Dios, and Purús, and inhabited only by savage Indians. The remainder, and at present by far the most important portion of the department and of Bolivia, is in the Andean region, and, as a whole, is the highest part of the republic; the area is estimated at 69,000 sq. miles. It includes most of the Bolivian portion of the great Titicaca basin, 13,000 feet high, with about half of Lake Titicaca and the upper portion of the Desaguadero river. E. of this basin, and limiting it, the Eastern Cordillera, here known as the Cordillera Real, extends from N. W. to S. E., including Sorata, Illimani, and other snowy peaks, the highest in Bolivia. Sub-ranges and spurs of the Cordillera cover all this portion of the department, subsiding eastward to the Beni valley; the Beni itself rises high among the mountains, and receives numerous tributaries. La Paz includes nearly every variety of climate, soil, and productions. The finest portions are the cool, elevated valleys on the eastern slopes of the Cordillera, where most of the population is gathered. The wet season lasts from October or November to March, rains being more abundant E. of the mountains. The principal agricultural products are potatoes, quinoa, and barley in the Titicaca basin; maize, wheat, beans, cocoa, etc., in the high valleys; and coffee, cacao, rice, sugar-cane, and tobacco toward the Beni valley. The forests of the lower mountain slopes and plains are rich in cinchona, rubber, cabinet woods, etc., as yet but little utilized. There are large areas of excellent pasturage, and cattle and sheep breeding are important industries. The rich gold regions of Bolivia are partly included in this department; the Corocoro copper mines, near the Desaguadero, produce most of the Bolivian supply of this metal; and silver, tin, and other minerals are obtained. The few manufactures of Bolivia, and nearly all its projected railways, are in this department, which is the commercial center of the country. Pop. (estimated for 1888, and excluding the wild Indians of the northern plains) 346,139.
HERBERT H. SMITH.

La Paz: a southern department of Honduras; bounded N. by Comayagua, E. by Tegucigalpa and Paraizo, S. by Salvador, and W. by Gracias; area, 1,250 sq. miles. Pop. (1889) 18,800. It was separated from Comayagua about 1880, is hilly or mountainous throughout, and agriculture and grazing are the only industries. La Paz, or Las Piedras, the capital, is a small village. HERBERT H. SMITH.

La Paz: capital and principal town and port of the territory of Lower California (Baja California), Mexico; on La Paz Bay, west coast of the Gulf of California (see map of Mexico, ref. 5–C). It is on a small but very beautiful and verdant plain between the bay and the coast mountains; built in the typical Mexican fashion, and offers little of interest. The inhabitants are mainly engaged in gold and silver mining in the surrounding region. The pearl-fisheries of the bay, once famous, have greatly declined; the divers employed in the work are Yaquis Indians. The exports of La Paz in the year 1890–91 amounted to $808,000, the greater part being precious metals. Pop. (1892) about 6,000. HERBERT H. SMITH.

La Paz, or **La Paz de Ayacucho**: a city of Bolivia; capital of the department, and at present the seat of the Bolivian Government; in a high valley on the eastern slope of the Cordillera; separated from the Titicaca basin by a low pass, and communicating with the lake by a road 45 miles long; elevation, 12,226 feet (see map of South America, ref. 15–C). The city occupies a space 3 miles long by a mile wide, on both sides of the little river Chuquecapo; the ground is very irregular, so that few of the streets are level, and some are steep. The paving is poor, and the sidewalks are narrow. The river and several streams which flow into it are crossed by stone bridges. Most of the private and public buildings are unpretentious, built of concrete or brick, with tile roofs; there is a fine but unfinished cathedral, and many churches. The city has a university, schools of law, medicine, etc., and a public library. At the southeast end is the Alameda, a beautiful promenade planted with four rows of trees; from it there is a superb view of the mountains, including Illimani. La Paz is the commercial metropolis of Bolivia, and is the center of a proposed network of railways, some of which are in course of construction; at present it is generally reached by diligence from Lake Titicaca, or from the Oruro Railroad. The mean annual temperature is about 50° F., the extremes observed during several years being 19·4° and 73·4°; the nights are nearly always cold. Pneumonia and kindred diseases are somewhat prevalent, but consumption is rare. La Paz was founded in 1548 on the site of the Inca village of Chuquiapu. It was made a bishop's see in 1605. Pop. (1893) about 65,000 (75,000 according to some estimates). HERBERT H. SMITH.

Lapeer: city; capital of Lapeer co., Mich. (for location of county, see map of Michigan, ref. 7–K); on the Chi. and Gr. Trunk and the Mich. Cent. railways; 46 miles W. of Port Huron, 60 miles N. by W. of Detroit. It is in an agricultural region, with a large trade. Pop. (1900) 3,297.

La Pérouse, JEAN-FRANÇOIS GALAUP, de: See Appendix.

La Péruse, laa-pā'rüz', JEAN, de: poet; b. at Angoulême, France, about 1530. He was an eager follower of the revival of classical letters in France. He wrote a mediocre tragedy, *Médée* (1553), after Seneca, by which he sought to support Jodelle's attempt to reform French tragedy according to classical models, and *Poésies diverses*, consisting of sonnets, elegies, odes, and love poems, of considerable originality and pure and good style. He died in 1555, leaving his works in manuscript; they were published in 1556. A. G. C.

Lapham, INCREASE ALLEN, LL. D.: naturalist; b. at Palmyra, N. Y., Mar. 7, 1811. He was a civil engineer by profession, and was secretary of the Ohio Canal commission (1833–35). He early won fame as a botanist and geologist. In 1836 he removed to Milwaukee, Wis. He published valuable papers and works on the geography, geology, mineralogy, and history of Wisconsin, was a careful observer of the meteorology of the region, and prepared a memorial to Congress showing the necessity of storm-predictions for the benefit of commerce, and how they could be secured, the suggestions of which were subsequently carried out. He became an authority on the antiquities of Wisconsin, especially the aboriginal earthworks which abound in that State. The Smithsonian Institution published his report on this subject in 1855. In 1873 he was appointed to take charge of a geological survey of the State. He organized the survey and conducted it with great efficiency for two years, until, in consequence of political changes, he was superseded. D. at Oconomowoc, Sept. 14, 1875.

Lapidary Work [*lapidary* is from Lat. *lapida'rius*, stone-cutter, substantive use of adjec. *lapida'rius*, belonging to or having to do with stones, deriv. of *la'pis*, *la'pidis*,

stone]: the preparation of precious stones for jewelry by cutting and polishing them. The term excludes the engraving of intaglios, cameos, and the like, which is called gem-engraving; not diamond-cutting. The first step in polishing a stone is to chip it with a large, square-edged hammer on an iron plate; or to slit it by means of a circular disk of thin sheet iron placed horizontally, and made to revolve by very simple machinery. Diamond-dust, mixed with sperm or other oil, is applied to the edge of the iron plate. A raised edge around the table is provided, to prevent the loss of the dust. A small quantity is put on the disk and it is charged from time to time. When cut, the stone is ground on horizontal wheels made of lead, iron, copper, tin, or alloys, and sometimes of wood of different degrees of hardness and called laps. On these is spread emery, diamond, or corundum powder. For the last polish, for some gems, wheels are used covered with cloth, leather, or hard brushes. The emery, finely ground, gradually imbeds itself firmly in the lead or other soft metal of which the wheels are made. The stone is held cemented to a gem-stick with shell-lac and brick-dust, and pressed against the wheel. The facets, or flat surfaces which give brilliancy to transparent stones, are cut by a simple contrivance. By the side of the horizontal grinding-wheel is placed an upright heavy, club-like piece of wood, resembling a long-necked, very narrow bottle reversed. In this, in different places, notches are cut. The gem presses on the wheel as it revolves, and the surface is cut away. To make a new facet, the rod holding the gem is held against a notch, which gives a new inclination or a new angle. A wooden instrument is used by some lapidaries to hold the gem-stick, and by a mechanical contrivance the facets are adjusted. Only in the very commonest imitation work is the stone held in the hand. The diamond-powder used is made from *bort* or imperfect coarse diamonds, and sells at from 75 cents to $3 per carat. The workmen acquire wonderful facility in shaping and polishing stones, and from a given pattern will produce any object required with great rapidity. Most of the beads, bracelets, and inferior "precious stones" made or prepared by lapidaries come from Oberstein and Waldkirch im Breisgau in Germany. The finest cutting of precious stones is done in New York, London, and Paris, and in the Jura; of semi-precious stones, in Paris and the Jura; of garnets, in Bohemia; of amethysts, citrine, Spanish topaz (brown quartz), in Paris, Oberstein, etc.; of blue, white, and green topaz, amethysts, green garnets, jaspers, agate, rock-crystal, etc., in wonderful perfection, in the Ural Mountains; of imitation stones, in Paris, the Jura, and Turnau and Gablonz in Bohemia, and in Providence, R. I. For further information, consult the works of Dr. A. Billing, Dr. Feuchtwanger, King, and Holtzapfel, and Streeter's *Dieulafait*. See also AGATE, JEWELRY, and PRECIOUS STONES. G. F. KUNZ.

La Piedad, laa-pĕĕ-*ā*-dăăd′, or **La Piedad de Rivas**: a town in the northern part of the state of Michoacan, Mexico; 78 miles N. W. of Morelia; on the little river Lerma, which flows into the Lake of Chapala (see map of Mexico, ref. 7–G). Pop. (1889) 10,000, and rapidly growing. It is the center of an important agricultural district. H. H. S.

Lapis Lazuli [liter., stone of heaven, azure stone; Lat. *lapis*, stone + Arab. *azul*, heaven, *l* representing Arab. or Romance article and Lat. genitive ending *-i*]: a natural silicate of alumina with lime and soda; usually massive, but at times crystallizing in the monometric system; of a beautiful Berlin-blue color, opaque, and often speeked with yellow iron pyrites (the so-called gold). It is really a mixture of two minerals, hauynite and another, lately named lazurite, which has nearly the composition of artificial ultramarine. It is highly valued for the manufacture of ornamental articles, and was long the sole source of the rich paint ultramarine, which is now prepared artificially. The finest lapis lazuli, or azure stone as it is often called, is found in Persia, also near Lake Baikal in Siberia, and an inferior variety in the Andes of Chili. Probably this stone is the sapphire of the ancients, which was traded by the Persians with the Egyptians for their emeralds. See CORUNDUM.

GEORGE F. KUNZ.

Lap'ithæ (in Gr. Λαπίθαι): in Greek mythology, a race of Thessalians, the descendants of Lapithes, a son of Apollo. Their king was Pirithous, son of Ixion; they were therefore half-brothers of the Centaurs, with whom, for varying reasons, they were continually at war. The chief war between them arose from the fact that at the marriage of Pirithous to Hippodamia the Centaurs carried off the women of the Lapithæ. In this war Theseus assisted his friend Pirithous, and so the myth came to be considered by the Athenians as a national one. It was used on the pediment, friezes, and metopes of temples built by Athenian artists to typify the superiority and final victory of intelligence (Lapithæ) over the wild forces and manners of untamed nature (Centaurs). So we find the wars between the Lapithæ and the Centaurs on the metopes of the Parthenon, on the friezes of the so-called temple of Theseus at Athens and of Apollo at Bassæ, and in the western pediment of the temple of Zeus in Olympia. In all of these temples the Lapithæ stand for the Greeks (especially of Athens) resisting and overcoming the rude force of the Persians, who are represented by the Centaurs. J. R. S. STERRETT.

Laplace, laa′plaas′, PIERRE SIMON, Marquis de: mathematician and astronomer; b. at Beaumont-en-Auge, Normandy, France, Mar. 23, 1749. His parents were poor, and he was indebted to the interest of wealthy friends for admission to the College of Caen and the military school of Beaumont. Brought to the notice of d'Alembert, who procured him the mathematical mastership of the military school at Paris, that city became his residence at the age of eighteen. Two papers on the *Theory of Probabilities*, printed at the Academy during the ensuing five or six years, are mentioned by the Academy as chosen for publication among many, with the eulogy, "This society has never known so young a person to furnish in so short a time so many important memoirs on subjects so diverse and so difficult." He was elected an associate, and in 1785 a member. His political career during the Revolution and under Napoleon has been much commented upon, but neither space nor adequate data allow its discussion here. Laplace is styled by Prof. Forbes "a sort of exemplar or type of the highest class of mathematical natural philosophers of this, or rather the immediately preceding, age"; by Airy, "the greatest mathematician of the past age"; and by Prof. Nichol, "the titanic geometer." It may be added that the present age has produced no recognized rival; that to Newton alone, as a "mathematical philosopher," is, in any age, superiority conceded. His more important investigations are his improvements of the lunar theory; his discovery of the cause of the great inequality of Jupiter and Saturn's motions; his theory of the tides; his work on probabilities. Newton's newly discovered law of gravitation had been so successfully applied to the lunar motions as with one important exception to reconcile them to the requirements of the theory; the unexplained exception was "that the mean motion of the moon has been accelerated from century to century by a minute quantity, which, in the lapse of thousands of years, has become recognizable." The earliest authentic observations of eclipse, made at Babylon in the years 719, 720, 721, show that they occurred $1\frac{3}{4}$ hours sooner than if the present mean motion of the moon then obtained. The interval has been longer than it should have been found to be, and hence the motion less rapid in former centuries. As regards the moon's orbit, "the effect has been that at each lunation she approaches nearer to the earth than during the last by one-fourteenth of an inch!—thus describing a spiral of almost infinitely slow convergence."

A comparison of ancient observations with modern revealed an acceleration of the mean motion of Jupiter and a retardation of that of Saturn, whereas modern observations alone show a contrary effect to be in progress. The revealing after many years of study of the source of the resulting discrepancy between astronomical tables and observation is regarded as one of the proudest achievements of its author, though Airy regards his theory of the tides as furnishing a "greater claim for reputation."

Analytical expressions for celestial phenomena can, in general, be but approximations, in which terms considered insignificant, as involving the square, cube, or higher powers of minute quantities, are discarded. Laplace demonstrated that among those which had been thus neglected in the expansions of the mutual perturbations of Jupiter and Saturn were some multiplied by sines or cosines of angles rendered small by small multipliers. Mathematicians are familiar with the fact that, subjected to integration, such terms, by making the small multiplier a divisor, produce quantities of appreciable magnitude. The effect of this discovery and the restoration of such terms was a complete reconciling of ancient and modern observations. Thus were removed from the theory of gravity the two most formidable obstacles to its acknowledged adequacy to ex-

plain celestial phenomena—the anomaly of the lunar acceleration and the great inequalities of Jupiter and Saturn.

The doctrine of Probabilities—the subjecting to the rigor of mathematical methods subjects which know no law (i. e. of chance)—furnishes the most subtle and at the same time the most fascinating of problems, occupying as it were a borderland to Metaphysics, Logic, and Mathematics. The *Théorie analytique des Probabilités* of Laplace is regarded as one of the ablest specimens of mathematical writing of his age; but one which can not here be discussed. See PROBABILITY, THEORY OF.

In this brief notice it would be in vain to discuss Laplace's distinctive claims to greatness as a mathematician and a philosopher. His mastery of mathematical analysis was perhaps unsurpassed, and he has contributed greatly to the development of this powerful agent of human reason, especially in its application to physical problems. He is the inventor of the most powerful calculus (since generalized and enlarged as the Spherical Harmonic Analysis) known generally as that of Laplace's coefficients. (See COEFFICIENT.) It is due, however, to Legendre to say that he (according to Dr. Forbes) "was the first to imagine and employ those artifices of calculation known as 'Laplace Functions.'" His longest and most systematic work, the *Mécanique Céleste*, is a compendium of the problems of physical astronomy which had been accumulating for a century, but which are treated by methods mainly original with himself. This work, though written with entire disregard to preserving the order and connection which would enable the reader to follow him, is justly considered his most imperishable monument. Dr. Bowditch, who has appended voluminous explanatory notes to his translation, was accustomed to remark, "Whenever I meet the words of *il est aise à voir* (i. e. it is easy to see), I am sure that hours and perhaps days of hard study will be necessary for me to discover how it plainly appears." It is certainly a disparagement to the work that it should be so, for most mathematicians will admit that a little more regard to order and connection, and a slight condescension to furnish explanation or clew, would make the work more useful, certainly more easily read.

For a short time Laplace was one of Napoleon's ministers. The cause of disagreement is unknown, but his was not the character of mind best fitted for politics or diplomacy, and he was evidently out of his element. No more infelicitous or unjust characterization than that applied by Napoleon, "the infinitesimal philosopher," could have been made. No modern mathematician has exhibited greater powers of generalization; and in his *Nebular Hypothesis* we have one of the grandest conceptions of the origin of the actual cosmos, as the result of continuous action of physical "laws," and one which has anticipated modern thought in relation to development. Laplace has been censured for "meanly" suppressing in the second edition, published after the emperor's fall, the dedication, "À Napoléon le Grand," which had been given to the first edition. Mr. Todhunter (*History of the Theory of Probability*) thinks that "the fault was in the original publication, and not in the final suppression"; and that it would have been "almost a satire to have repeated it when the tyrant of Europe had become the mock sovereign of Elba or the exile of St. Helena." He has, too, on very inadequate grounds been charged with atheism. His last words (he died in Paris, Mar. 5, 1827), so similar in sentiment to language attributed to Newton, his great predecessor, prove that, like that great philosopher, insight into the mysteries of nature deeper than other men's nourished in him not arrogance, but humility: "Ce que nous connaissons est peu de chose: ce que nous ignorons est immense." Revised by S. NEWCOMB.

Lapland, or **Lappland** [lit., the land of the Lapps; in Lappish, *Same ädnam*]: an extensive territory in Northern Europe, stretching along the Arctic Ocean from the Atlantic to the White Sea. It is not an independent political unit, but includes the northern parts of Norway, Sweden, and Finland, and the northwestern part of Russia, and contains, in addition to the original Lapps, a considerable number of Norwegians, Swedes, Finns, and Russians in its population. Down to the fourteenth century all Lapland, including the Kola Peninsula, was supposed to belong to Norway, and Norway collected her so-called fin-tax. Gradually Russia secured control of the Kola Peninsula, and in 1752, after much dispute, the present boundaries of Norwegian Lapland were established by a treaty, according to which Enare and Utsjoki (both now Finnish) became Swedish, and Kautokeino and Avjovarre Norwegian possessions. Lapland is bounded on the N. by the Arctic Ocean and on the E. by the White Sea, but its southern and southwestern boundaries are irregular and indefinite. Its total area is estimated at 153,000 sq. miles, of which about 16,000 belong to Norway, 49,000 to Sweden, 26,000 to Finland, and 62,000 to Russia proper. That part of Lapland which belongs to Norway and Sweden consists of mountain plateaus and deep-grooved valleys. The general aspect of the country is barren and somber, but there are spots where the soil is fertile, and the monotony is occasionally relieved by luxuriant forests, large lakes and rivers, and snow-capped mountain-peaks. More than half of Finnish and Russian Lapland is a low, flat country, containing vast stretches of desolate tundra—woodless plains covered with mosses and lichens.

Industries.—Agriculture is pursued only in some of the valleys in Norway and Sweden, but the summer, with its midnight sun, is too short to permit grain to ripen. There are many excellent iron and copper mines, and the extensive forests of pine, spruce, and birch give employment to thousands of people, and yield handsome revenues. Along the coast fishing is an important industry and the principal one, while in the interior, on the mountain plateaus, the nomadic Lapps, the only inhabitants, get their subsistence exclusively from the reindeer. The number of nomads is decreasing, partly because many sell their herds and take to fishing and stock-raising, and partly because the Russian laws of 1852 prohibit the Norwegian and Swedish Lapps from pasturing their reindeer on Russian territory.

The People and their Habits.—The *Lapps*, whom the Norwegians and Danes usually call Finns (*Finner*), are in their own tongue called *Same* (pl. *sameh*), or *same-lats*, in which we find the same root as in the Finnish *suoma-laisset* and in the Esthonian *soom-lasse*. The word Lapp is doubtless of Finnish origin, the Finnish word *lappaan* meaning to flit, to move from place to place, and from time immemorial the Lapps have lived a nomadic life. They belong to the Lapponian subdivision of the Ugro-Finnic group of the great Turanian family. Many Lapps having abandoned their nomadic life and taken to fishing and stock-raising, thus adopting more or less civilized habits of life, scholars are in the habit of dividing them into various separate groups. Thus we have mountain Lapps, forest Lapps, sea Lapps, and river Lapps, but this classification is wholly artificial, based simply on accidental circumstances, there being no fundamental differences between them. To quote E. Torrey, the Lapps "are small of stature, with large head, short neck, small, gray reddish eyes, hair dark brown, beard short, hands long, legs thin, abdomen projecting, the result of improper or insufficient food, complexion light, chin protruding, cheek-bones prominent." According to Retzius, the Lapp is the most brachycephalous type of man in Europe, perhaps in the world. The Lapp is hospitable, cheerful, and talkative, and given to asking countless questions. In his conversation he is bright and sometimes very sarcastic. His moral character, considering his limited knowledge, is of a high standard. He is thrifty even to avarice, but not dishonest. He seldom steals, and adultery is rare. Formerly the Lapp buried his money, in the form of silver, in the ground, but now he either puts his savings in a bank or loans it on interest. About 20,000 Lapps are found in Norway, 7,000 in Sweden, and 3,000 in Finland and Russia. The true representatives of the race are the mountain and forest Lapps, who subsist on the reindeer, and follow them to the coast or to the interior, according to the season, in search of reindeer-moss. Of the 20,000 Lapps in Norway, not more than 1,200 are nomadic. These nomads suffer hardships which it would be impossible for civilized man to endure. They live with their reindeer day and night, and utilize every part of that animal. The blood, meat, marrow, and entrails are all eaten. The skin is used for shoes and clothing, and the sinews are torn into threads for sewing. The antlers and bones are made into all kinds of household utensils and into ornaments. What can not be converted into food or clothing for themselves is either cooked into soup for their dogs, their only servants in herding the reindeer, or manufactured into glue. By the sale of meat, skins, and glue, they are able to buy cloth, salt, coffee, and tobacco. The women do their full share of work in herding. They do all the sewing, but the men do the cooking, a remarkable fact doubtless based on some old superstition. While caring for his reindeer herd the Lapp frequently sleeps with no other covering than the snow, into

which he digs a hole. His reindeer clothing keeps him warm, and makes such hardships possible. The size of the herd determines the wealth of the Lapp. A family can live on 300 reindeer, and if they own 1,000 they are in easy circumstances. In Norway the nomadic Lapps spend the winters on the mountain plateaus near Kautokeino and Karasjokk, where the snow is less deep than along the coast, and this makes it easier for the reindeer to get at the moss and lichens, their principal food. In the summer they flit from place to place, the reindeer themselves seeking out the best pastures. The summer tent of the Lapp is made of canvas, while his winter tent is made of matting and woven grass, and is lined with reindeer skin. The fireplace consists of three or four stones laid in the center of the tent, and a hole in the top serves as chimney.

In the summer the reindeer steers are made to carry the tents, household utensils, the food, and the little children on their backs, while in the winter they draw the pulks, and in these boat-formed sledges sit the Lapps with their baggage. The post is carried by Lapps and reindeer overland from Alten to Vadsö, Kautokeino, Karasjokk, and other points in Lapland, and it rarely fails to arrive on schedule time, the reindeer making easily 100 miles in a day. Were it not for the reindeer the dreary and extensive tundra of Lapland could not be inhabited by man; but this "camel of the north" serves the Lapp as a substitute for the horse, the cow, the sheep, and the goat, none of which can exist in these Arctic regions.

Religion and Education.—The Lapps are Christians, and those in Norway, Sweden, and Finland belong to the Lutheran Church, the state religion of those countries, while those in the Kola Peninsula are Greek Catholics. While their knowledge of the principles of Christianity is superficial, they cling with tenacity to the outward forms, and are very particular to have their children properly baptized and confirmed, the marriage ceremony performed by a regularly ordained priest, and to have their dead buried in consecrated ground. The Lapps of Norway, Sweden, and Finland are all able to read, and the children attend school during the winter months, while the Lapps are gathered at their winter quarters. Prominent winter stations in Norwegian Lapland are Kautokeino and Karasjokk, where there are churches and schools.

Population.—The population of Lapland is only about 102,000. It is most dense in the Norwegian and most sparse in the Russian part. Thus the Norwegian part of Lapland has about 50,000 inhabitants, the Swedish about 37,000, the Finnish about 6,000, the Russian about 9,000. The national groups are represented by 30,000 Lapps, 28,000 Swedes, 20,000 Norwegians, 15,000 Finns, 7,000 Russians, and 2,000 Karelians. These figures are mere approximations, as there are many mixed marriages. The chief cities are Vardö, Vadsö, and Hammerfest, with about 2,000 inhabitants each. Hammerfest is the most northern city in the world.

History.—The oldest known reference to the Lapps is found in the *Germania* of Tacitus. He calls them Fenni, but there is no doubt that he refers to the ancestors of the Lapps. Between the years 500–850 they are occasionally mentioned for their skill on skees (snow-shoes) by the Goths and Longobardians, as *skrito-fini*, *skrito-vini*, *crefennæ*, etc. Ottar speaks of his visit to the "Skridfinns" in his report to King Alfred of England (about 893). The reindeer had been domesticated long before Ottar's time. From the ninth century on the Lapps are never lost sight of in Scandinavian literature. In the old Norse sagas we read that Erik Blood-axe, on a visit to Bjarmaland in 922, met with Gunhild, a daughter of Asur Tote, who had been sent thither to live among the Lapps in order to get a thorough knowledge of witchcraft, and the Russian chronicles tell us that Ivan the Terrible sent for sorcerers from Lapland in order to have the cause of the appearance of a comet explained to him. Whence the Lapps originally came is still an unsettled question, but all investigators accept the Lappish answer, "From the east we have come." It is certain that no traces of them can be found S. of 60° N. lat. in Scandinavia. The first Christian missionaries went to them from the Swedes in the beginning of the seventeenth century. The chief apostles of the Lapps were the Norwegians Thomas von Westen and N. V. Stockfleth, and the two Swedish brothers Lars Levi and Petrus Læstadius. Thomas von Westen practically converted the Lapps to Christianity in the first quarter of the eighteenth century, while Stockfleth and the brothers Læstadius did their work in the first half of the nineteenth century. Stockfleth particularly did the Lapps a great service by creating an alphabet for them, and translating the most important religious and devotional books into their own language.

Language.—The Lappish language is a branch of the Ugro-Finnic group spoken throughout Western Siberia and Northeastern Europe. It is agglutinate, the inflectional endings being loosely added to the principal word, all modifications being post-positive, like the definite article in the Scandinavian languages. There are no prepositions. Relations expressed in English by prepositions are in Lappish represented by case-endings, which, accordingly, are much greater in number than in any Aryan tongue. Post-positive syllables or words also take the place of our possessive pronouns. The verb is but little inflected, and has no future tense. Lappish has neither article nor gender, but, on the other hand, it has the dual number, like the Greek and Icelandic. As the Lapps are spread over an extensive territory, their language has been broken into a number of dialects, the most important of which are the so-called Norwegian, Swedish, Finnish, and Russian, all with subdivisions. The dialect found in Norway has been adopted by Stockfleth, Friis, and others as the book-speech. The best grammar is by J. A. Friis, published in 1856. A Norwegian-Lappish dictionary by Stockfleth appeared in Christiania in 1852, and J. A. Friis is (1894) publishing an exhaustive Lappish-Latin-Norwegian lexicon.

Literature.—Lappish literature is of course limited in extent, and consists mainly of school-books and religious and devotional works translated from other languages. In 1856 J. A. Friis published a book called *Lappiske Sprogpröver*, which contains a collection of stories and riddles in Lappish. From E. W. Borg we also have a small collection of stories gathered from the lips of the Finnish Lapps. Lönnrot and Andelin have also collected some specimens of Lappish in Finland, and Genetz has published a few stories from the Russian Lapps in an Hungarian periodical. Besides this we have some lyric poems, and two epics of considerable length and of rare beauty. One of these epics is called *Päiven Parne*, and in it we are told how the son of the sun learned of a golden land in farthest north, and goes in search of it. He sails on until sun and moon are left behind, and replaced by the north star. He reaches the golden land, which is inhabited by giants. The king's daughter falls in love with the stranger. She helps him with her powers of sorcery, and he carries her off together with a cargo of golden stones. After the son of the sun has departed with his treasures, the brothers of the princess return home, and at once begin pursuit of the fugitives. By witchcraft again the princess produces a violent storm for the ships of her brothers. Thus she and her lover escape, and when the sun rises the giant brothers are turned into stone. This poem has many features in common with Sampo's journey in *Kalevala*. The other epic is called *Pischas, son of Paschas*, and in its main outlines reminds us of the stories of Lemminkäinen and Kullervo in *Kalevala*. Both these epics and many lyric poems were known by heart by the aged priest A. Fjellner of Sorsele, himself a Lapp by birth. He had committed parts of them to writing, and shortly before his death he dictated them to the celebrated Lappish scholar Prof. O. Donner, of Helsingfors, who afterward published them in the Finnish periodical *Suomi*. They also appeared in a German translation, *Lieder der Lappen* (1876). A Swedish translation of *Päiven Parne* is given in Gustaf v. Düben's work, *Om Lappland och Lapparne* (1873).

Mythology.—The Swedes began to gather materials for a Lappish mythology about the year 1670; Danes and Norwegians a century later. As the Lapps have taken no care of their traditions themselves, our information on this subject is rather fragmentary, but we have sufficient data to show that the Lappish religion consisted of a personification of the visible forces and phenomena of nature. The son (*Päive*), the moon (*Manno*), and the stars (*Nastek*) were honored as masculine deities, who had wives and children, and were conceived to live a patriarchal life. Chief among the gods was Päive, the author and father of all things. The sun's daughter (*Päiven neita*) represented goodness, and was probably identical with *Ruona neita*, the goddess of spring, who clothed the fields with a carpet of green. *Tiermes*, or *Diermes*, was like the Norse god Thor, worshiped not only as the god of thunder, but also as the divinity who sent the beneficent rains and blessed the pastures for the reindeer. The god of thunder was also called *Jubmel*, *Jibmel*, and *Ibmel*, all of which are variations of the Finnish *Jumala*, originally the god of thunder, or the home

of thunder, but now meaning simply god. In Southern Lapland Tiermes was called *Hora*, a corruption of *Thor*, and as such he was not only the god of thunder and lightning, the latter being a fiery arrow which he shot from the rainbow, but he also presided over the weather and the seasons, and over the woes and weals of the Lapps generally. Hora has neither chariot nor goats like Thor, but has been entirely naturalized and adapted to his Lappish home. There were also a large number of lesser divinities corresponding to the nymphs of the Greeks and to the elves and nisses of the Norsemen, and supposed to have their abodes within various objects, whose guardian spirits they were. Such a guardian spirit was called a *haldde*. Thus the alder (*läipe*) was a sacred tree, doubtless on account of the blood-like color obtained from its bark, and in this tree dwelt a spirit called *Leip olmai* (the alder-man), plural *Leip olmak*, for there were many of them. There were wind and water spirits (*Biegga-gales* and *tjatje olmak*) who inhabited and protected the seas, rivers, and particularly the waterfalls. On the origin and generation of life they had a curious and very complicated myth. *Mader-atje* (earth or progenitor) dwelt in the uppermost air. His wife was *Mader-akka*, whose abode was in the middle air. When this pair created a soul, *Mader-atje* took it into his belly, which was always open for this purpose, and circled through the sunbeams around the sun until he came to *Mader-akka*. If the soul was to be a son, she introduced it into one of her earthly daughters called *Juks-akka* (the mother of the bow and arrow), who was the guardian spirit of the hunters. If the soul was to be a daughter. *Mader-akka* put it within her other terrestrial daughter *Sar-akka* (the mother of creation), the guardian spirit of women. *Juks-akka* and *Sar-akka* gave the souls the first marks of gender, and then transmitted them to the women, who were to give them physical birth. This process of generation applies to both men and animals. There was a third daughter, *Uks-akka* (the door-mother), who resided near the door of the *njalla*, or tent, and who protected the child after it was born, and made it strong and healthy. These *akkas* were zealously worshiped with prayers and sacrifices. Thus a little milk was always thrown out of the door at meal-time in order to win the favor of the *Uks-akka*. This strange myth of generation is found only among the Lapps.

Lappish mythology teaches a life hereafter, but in all respects like that before death. Hence the dead were buried with their pulks, implements, and ornaments, and the graves were carefully protected with heaps of stones. The dead had their tents and reindeer and pastures in subterranean regions. The heathen Lapps immersed their children in water when they named them. The mothers sometimes dreamed before their confinement, which ghost from the realm of the dead (*saivo*) was to rise again in the child, but usually this had to be learned by means of sorcery. Sometimes a child was immersed several times, and the name changed as many times, as the child's illness or misfortune would lead to the conclusion that the wrong *saivo* or *jabmek* had been chosen. Lappish mythology has no place for evil gods. There is no dualism. The divinities are all beneficent, while they have human attributes and frailties, make mistakes, get angry and quarrel. The gods also practice witchcraft, by which they produce sickness and mishaps among men. To appease the gods the Lapps offered sacrifices consisting chiefly of a piece of meat or cheese, a little milk, a piece of reindeer antler, etc. On important occasions they might sacrifice a whole reindeer. A reliable work on Lappish mythology is *Lappisk Mythologi Eventyr og Folkesagn*, by J. A. Friis, published in Christiania in 1871.

Bibliography.—The most thorough and comprehensive works on Lapland are *Lappland och Lapparne* (1873), by Gustaf von Düben, and *Dagbog over mine Missions reiser i Finmarken* (1860), by N. V. Stockfleth. Von Düben's work, which has mainly been consulted in the above article, gives a list of more than 200 writers on Lapland and Lappish subjects. From this extensive literature the following may be selected as the most important: P. Högström, *Beskrifning öfver de till Sveriges Krona lydende Lappmarker* (1746); K. Leem, *Beskrivelse over Finmarkens Lapper* (1767); C. von Linné, *Lachesis lapponica, or a Tour in Lapland*, published by J. E. Smith (London, 1811); P. Læstadius, *Journal för Tjenstgöring såsom Missionaire i Lappmarken* (2 vols., 1831–33); Bayard Taylor, *Northern Travel* (1858); J. A. Friis, *Ethnografisk Kart ver Finmarken i 10 Blad* (1862); J. A. Friis, *Russisch Lapland* (in Petermann's *Mittheilungen*, 1870); J. A. Friis, *En Sommer i Finmarken* (1871); Aubel, *Reise nach Lappland* (1874); P. B. Du Chaillu, *The Land of the Midnight Sun* (1881); Edward Rue, *The White Sea Peninsula* (1882).

Rasmus B. Anderson.

La Plata, Bolivia: See Sucre.

La Plata: capital of the province of Buenos Ayres, Argentina; on the south shore of the Rio de la Plata, 24 miles below Buenos Ayres, with which it is connected by railway (see map of South America, ref. 8–E). The Plata is here deeper than before Buenos Ayres, and forms a bay, somewhat sheltered on the side of the sea. The village of Ensenada existed previous to 1882, Tolosa being a little inland. By law of Apr. 22, 1882, 63½ sq. miles of land, including these two places, was set apart for a provincial capital with the name of La Plata. The first stone of the new city was laid Nov. 19, 1882, and since then its growth has been phenomenal; in 1889 it had (including Ensenada and the suburb of Tolosa) 65,000 inhabitants. A fine dock has been constructed at great expense, communicating with the deep channel of the Plata by a canal nearly 5 miles long, admitting vessels of 21 feet draught, and with ample wharves and landing facilities. These advantages have transformed La Plata into the commercial port of Buenos Ayres. The city has numerous public buildings, a museum, library, observatory, cathedral, provincial college, etc., fine parks and many handsome residences. As yet it covers only a small portion of the allotted space. There is a large floating population. See Coni, *Reseña estadística y descriptiva de La Plata* (1885).

Herbert H. Smith.

La Plata River: See Plata, Rio de la.

La Plata, United Provinces of: the official name until 1830 of the Argentine Republic. During a portion of this time it included Uruguay; later the strife of the federalists and centralists brought about the separation of Buenos Ayres and the confederation's dissolution.

H. H. S.

La Porte: city; capital of La Porte co., Ind. (for location of county, see map of Indiana, ref. 1–D); on the Chi. and W. Mich., the Ind., Ill. and Ia., the Lake Erie and W., and the Lake Sh. and Mich. S. railways; 12 miles S. of Lake Michigan, 59 miles E. of Chicago. It is built on a high plateau on the edge of a rich prairie, and near it is a chain of seven beautiful lakes, on which are four popular summer resorts, including the State Baptist Chautauqua. Large quantities of ice are cut on the lakes and shipped to Chicago and the South. The city has the Holly system of waterworks, electric lights, electric fire-alarm, public library, Odd Fellows' library, high-school library, horological institute, orphans' home, old ladies' home, a national bank with capital of $100,000, 2 private banks, and a daily and 4 weekly newspapers. Pop. (1880) 6,195; (1890) 7,126; (1900) 7,113.

Editor of "Herald."

La Porte: town (laid out 1855); Black Hawk co., Ia. (for location of county, see map of Iowa, ref. 4–I); on Wolf creek, and the Burl., Cedar Rap. and N. Railway; 15 miles S. of Waterloo, the county-seat, 40 miles N. W. of Cedar Rapids. It is in an agricultural region, and has manufactures of flour, carriages, and wagons, and a weekly newspaper. Pop. (1880) 1,006; (1890) 1,052; (1900) 1,419.

La Porte du Theil, laa-pōrt′dü-tāl′, François Jean Gabriel: scholar; b. in Paris, July 16, 1742; received a military education, and served in the later campaigns of the Seven Years' war, but devoted all his leisure hours to the study of the Greek language and literature, and published in 1774 a translation of Æschylus's *Orestes*, and in 1775 of the *Hymns* of Callimachus. From 1776 to 1786 he resided in Rome, and having received admittance to the Vatican Library, which at that time was generally closed to foreigners, he brought back to Paris nearly 18,000 documents illustrative of European history of the thirteenth and fourteenth centuries. Three volumes of these documents, containing among other things the letters of Pope Innocent III., were published in 1791; but the further publication was interrupted by the Revolution, and the materials were placed in the National Library. Among other works may be mentioned a new edition of Brumoy, *Le théâtre des Grecs*, a translation of *Hero and Leander*. A commentary to *Athenæus* was left incomplete. His translation of *Petronius*, with a learned commentary, was ready for publication, when, on the advice of Sainte-Croix that such a work would still further demoralize an age already corrupt, he burned all the copies already printed (1800); two, however, escaped destruction. He then returned to the study of the ancients,

and wrote *Théâtre Eschyle, traduit du grec en français* (1794). In the latter part of his life he was occupied with a translation of the *Geography* of Strabo, of which only seven books were finished, when he died May 28, 1815.

Revised by A. GUDEMAN.

Lappenberg, laa′pen-bărch, JOHANN MARTIN: historian; b. at Hamburg, Germany, July 30, 1794; studied medicine at Edinburgh and law at London, Berlin, and Göttingen, receiving the doctorate in 1816; was for a time minister resident for Hamburg at Berlin; became in 1823 keeper of the archives at Hamburg, and was in 1850 plenipotentiary in the Frankfort conference. His best work is *Geschichte von England* (2 vols., Hamburg, 1834–37); he also wrote valuable histories of the German Hanse Towns, of Heligoland, etc. His *History of England* relates to the Anglo-Saxon period, and is still a leading authority for early English history. It has been translated into English, with notes and additions, by Benjamin Thorpe. The *History of England under the Normans*, begun by Lappenberg and finished by Pauli, was also translated by Thorpe. Of great value also are his *Quellen zur Geschichte der Erzbisthums und der Stadt Bremen*, and his editions of Thietmar of Merseburg, Adam of Bremen, Helmold, and Arnold of Lübeck in Pertz, *Monumenta Hist. Germ.* D. Nov. 28, 1865.

Laprade, laă′praăd′, PIERRE MARIE VICTOR RICHARD, de: poet; b. at Montbrison, France, Jan. 13, 1812. He studied law, but soon abandoned its practice for literature. He first gained notice by *Psyché* (1841); then followed *Odes et poèmes* (1844); *Poèmes évangéliques* (1852); *Symphonies* (1855); *Idylles héroiques* (1858); *Pernette* (1868); *Poèmes civiques* (1873); *Le Livre d'un père* (1876); *Œuvres poétiques* (2 vols., 1878). In 1847 he was made Professor of French Literature at Lyons, but was removed in 1861 for a political satire. He entered the Academy in 1858, and was a member of the Chamber of Deputies from Lyons in 1872–73. D. at Lyons, Dec. 13, 1883. His poetry suggests Lamartine; it celebrates nature, and is pervaded by a religious and philosophical tone.

A. G. CANFIELD.

Lapse [from Lat. *lapsus*, a falling, slipping; deriv. of *labi*, *lapsus(est)*, slip, glide, slip down, fall]: a term used in law in several cases to denote the failure or loss of an estate or right owing to the occurrence or non-occurrence of some condition precedent.

In England the term is used in criminal proceedings in the same sense as abate to denote the determination or ending of proceedings in an action owing to the death of one of the parties or to some other occurrence. It is also used to denote the loss or failure of the right of presentation to a benefice when the right of presentation is not exercised by the patron within six calendar months after the avoidance of the benefice, exclusive of the day of avoidance. In such a case the right devolves (1) to the bishop as ordinary, (2) to the metropolitan as superior, and (3) to the sovereign as patron paramount.

The most important use of the term, however, is that in connection with wills where it denotes a failure of a devise or bequest, originally valid, to vest at the death of the testator owing to there then being no person who can accept the devise according to the terms of the will, or because of such person's unwillingness to accept it. The lack of a person capable of accepting may result either from the death of the legatee before he is to take under the will (usually by his death before that of the testator) or by the non-occurrence of some event upon which the legacy to him is conditioned. The reason why a devise or legacy lapses by the death of the beneficiary before that of the testator is that a will takes effect only from the time of the testator's death, and the beneficiary can acquire no rights in the devise or bequest before that time. A lapsed devise or legacy is distinguished from one that is void, the gift being void when the person specified as donee is dead or incompetent to take the property at the time of the making of the will.

The effect at common law of the lapse of a devise is that the property devised passes to the heir at law of the testator, while in the case of a legacy the property bequeathed passes to the residuary legatee if one be named in the will, and if not to the next of kin. (See KIN, NEXT OF.) The effect of a devise or bequest being void is in general the same as that of a lapse, but there are some cases both in England and the U. S. in which it has been held or said *obiter dictum* that in the case of a void devise the property passes to the residuary devisee and not to the heir. (See 1 Jarman *On Wills*, p. 321, Boston, 1893; also 1 Jarman *On Wills*, 4th ed., p. 588, *seq.*; and *Van Kleeck* vs. *Dutch Church*, 20 Wendell 457.) The common-law rules have, however, been to a considerable extent modified by statutes. Thus in England and in some of the U. S. by statute lapsed devises go to the residuary legatee; in others of the U. S. a contrary rule has been established.

A lapse will not be prevented by a declaration in the will of the testator's intention that the legacy or devise shall not lapse, but there must be a designation of some one to whom the legacy is to be paid. In any case the question of lapsing is simply whether the testator has by his will, as interpreted according to the rules of law, designated a person in whom he wishes the property to vest, and the statutes above referred to are statutes of interpretation only, and will not override any expressed intent of the testator.

For a fuller treatment of the technical details of this subject, see Jarman *On Wills* and Redfield *On the Law of Wills*.

F. STURGES ALLEN.

Lapwing [M. Eng. *lapwing*, by analogy of *lap*, to fold, and *wing* < O. Eng. *hlēapewince*; *hlēapan*, leap, run (> Eng. *leap*) + *wincan*, move aside, turn (> Eng. *wink*). The name refers to the irregular flight], or **Pee′wit** [named from its note]: a large species of plover (*Vanellus cristatus*), having a well-developed hind toe and an erect, slightly recurved, pointed crest on the head. The crown, fore throat, upper breast, and half the tail are glossy black; the mantle deep green with a purplish gloss; the sides of the neck, under part of body, and lower half of tail are white; some of the tail coverts are rusty yellow. The lapwing is common in Europe and Northern Asia. It is about as large as a pigeon. The flesh and eggs are excellent, and many of the latter are sent to market, especially in London, under the name of plover's eggs. The nest is a shallow depression, lined with a few grass-stalks; the eggs are four in number, pear-shaped, olive in color, with spots and blotches of dark brown. The nest is carefully concealed, and the parents endeavor to divert attention from it by fluttering about as if injured.

F. A. LUCAS.

Lar: city of the province of Laristan, Persia; 60 miles from the Gulf of Persia; situated on an extensive plain covered with palm-trees and at the foot of a mountain range (see map of Persia and Arabia, ref. 5–H). It was formerly a thriving city, but much of it is now in ruins. It is famous for its tobacco, camels, and for its manufactures of sword-blades, muskets, and silks, and has fine bazaars. The hill in the rear of the city is crowned by the ruins of a castle once considered impregnable. Pop. 12,000.

Lara, laa′răă: one of the northwestern states of Venezuela, formed in 1881 from a portion of Falcon; lying between Falcon, Carabobo, Zamora, Los Andes, and Zulia, with only about 20 miles of coast on the Caribbean Sea, where it possesses the port of Tucacas. Area, 9,296 sq. miles; population (estimated 1890) 260,681. Capital, Barquisimito, united to Tucacas by rail. The surface is mountainous in great part, but interspersed with fertile valleys and plains in which coffee, cacao, sugar-cane, etc., are cultivated; wheat is grown to a small extent at higher points. Lara is noted for its copper mines, the only ones worked in Venezuela.

HERBERT H. SMITH.

Laramie: city (laid out in 1868, incorporated in 1873); capital of Albany co., Wyo. (for location of county, see map of Wyoming, ref. 12–K); on the Big Laramie river, and the Union Pac. Railway; 57 miles N. W. of Cheyenne. It is in the midst of the Laramie plains, 7,122 feet above sea-level, and has mountains rich in ores on the E. and W., and a vast plateau of agricultural and stock-raising land on the N. and S. The first irrigating ditch in Wyoming discharges its surplus water into the river 3 miles from the city, and streams of clear cold water, fed by a spring at the foot of the Black Hills, a few miles E. pass through the city. Laramie is the seat of the State University, the State Agricultural College, the State fish-hatchery, the State penitentiary, and of the Protestant Episcopal bishopric of Wyoming and Idaho. It contains 9 churches, public library, university library, 3 national banks with combined capital of $300,000, and a monthly, 2 daily, and 3 weekly periodicals. Besides extensive railway-machine shops, there are rolling-mills, tie-preserving plant, soda-reduction works, several stone-quarries, glass and soap works, and flour-mills. Pop. (1880) 2,696; (1890) 6,388; (1900) 8,207.

EDITOR OF "BOOMERANG."

Laramie: a river in the State of Wyoming; formed by the union of two branches, the Big and the Little Laramie,

which rise in the Medicine Bow Mountains, and flow N. E., skirting on the E. the plains of the same name. It enters the North Fork of the Platte at Fort Laramie, and is much used for floating lumber from the mountains.

Laramie Group: an American geological formation of transition character passing below into marine Cretaceous and above into fresh-water Tertiary terranes. It occurs along the eastern border of the Rocky Mountains from Central Mexico, northward through the U. S. and far into Canada, a distance of 2,000 miles; this belt was originally 500 miles broad, but has been broken into detached areas by erosion. The rocks are mostly light-yellow sandstones with shaly layers, and had a thickness when deposited of about 4,000 feet. The fossils are brackish and fresh-water mollusks, which indicate many changes in the condition of deposition, together with land plants, the bones of small land mammals and of huge reptiles, but no true marine species have been found. Valuable beds of coal occur in this group, especially in New Mexico, Colorado, and Montana; the coal-fields on Puget Sound have been referred provisionally to the same period. The stratigraphic position of the Laramie has been the subject of long discussion, a summary of which, together with referenees to the literature, is given by C. A. White in Bulletin No. 82, U. S. Geological Survey.

ISRAEL C. RUSSELL.

Laramie Mountains: a range rising at the Red Buttes, near the Sweetwater river, Wyoming, and extending in a curve southward to the Arkansas river, near Long's Peak in Colorado, forming a wall which closes in the Laramie Plains to the N. E. and E. It is composed of a nucleus of red syenite, with margins of fossiliferous formation, Carboniferous, Triassic, Jurassic, Cretaceous, and in some places lignite Tertiary, the beds inclining from a central axis at different angles. This range is connected with the Big Horn Mountains and Black Hills by low anticlinals extending across the prairie, the most complete and beautiful to be found in the Rocky Mountain region. The numerous branches of the Platte rise in this range, of which the principal summit is Laramie Peak. Coal has been found in considerable quantities.

Larash, or **Larache**: See EL ARAISH.

Larceny [by analogy of *burglary*, *felony*, and words in *-y*, from earlier *larson*, from O. Fr. *larrecin* > Fr. *larcin* < Lat. *latroci'nium*, robbery; deriv. of *la'tro*, hired servant, robber. Cf. Gr. λάτρις, hired servant]: the taking and removing by trespass of personal property, knowing that it belongs to another, and for the purpose of depriving him of such property. It was a felony at common law, and, if the value of the property stolen exceeded twelve pence, the punishment was death. This excessive penalty accounts in part for the abundant technicalities and subtle distinctions in the law of larceny, for it induced in the judges a greater anxiety to save human life than to be logical. Only personal goods are subjects of larceny. Injuries to realty, or anything savoring thereof, may constitute a trespass, but not theft. This is mainly attributable to the fact that while the common-law rules on this subject were forming, real property was in small danger from thieves, as it consisted chiefly in lands and castles. The doctrine was made to yield extraordinary results. Deeds of land, and even the chests in which they were kept, were deemed to savor so much of the realty as to have no value apart from it, and therefore not to be subjects of larceny. Even where trees, or growing grass or grain, or precious metals, or FIXTURES (*q. v.*) had been wrongfully severed and feloniously carried away, it was held that the offense was a trespass and not theft, unless the severance and the removal were distinct transactions. At one time it was thought that at least one day must intervene between them, on the theory that the law would not take notice of the fraction of a day; but this view was discarded, and it was settled that no particular space of time need elapse, provided that the severance and the carrying away were not a continuous act. Accordingly, where a person severed an article from the land and concealed it for several hours until it was convenient for him to carry it off, it was held that he had not committed larceny; for he had not abandoned the article, nor had his possession of it passed to any one else, and his removal of the article was but a continuance of the transaction that began with the severance.

A *chose in action* (see CHOSE) could not be stolen. The reasons assigned for this were that it was not a chattel; it had no intrinsic worth; it was mere evidence of value; it derived all its importance from the relation it bore to something else. Hence mortgage securities, bonds, bills of exchange, and even bank-notes were not subjects of larceny at common law. Nor was the paper or parchment on which a valid chose in action was written, because its value was absorbed in the higher character of the writing; but if the chose in action was invalid, or had been extinguished, the paper or parchment, though of an intrinsic value less than the smallest coin, became a proper subject of larceny.

Only those chattels can be stolen in which another than the taker has a property. Hence there can be no larceny of things which are not the subjects of private ownership, or those which have been abandoned. Theft can not be committed of wild animals while living, unless they have been brought within the power and dominion of another than the taker. Even when reduced to private ownership, if they were of a base nature, the common law refused to treat them as subjects of larceny; for the reason assigned by Lord Coke, perhaps, that "no person shall die for them." Theft could be committed of dead wild animals if they were fit for food. In the U. S. some courts have held that any wild animal of pecuniary value to its captors is the subject of larceny. (*State* vs. *House*, 65 N. C. 315.) An example of abandoned property is afforded by the case where the owner of a worn-out horse turned it over to a servant, who was to kill and bury it. The servant sold it to a tanner for 15*s.*, and the court held there was no larceny.

Taking and Removal.—The thief must take the property into his physical possession and control, but the length of time during which he retains it is immaterial. He must remove it, but not to any prescribed distance. It is not a taking and removal to set a bag of grain on end, nor to turn a barrel over, preparatory to carrying it away. In such cases the trespasser's control is not complete. Nor has he a thief's control of a coat which he seizes and carries the length of a chain that fastens it to the owner's premises; but if he lifts a purse from its place in the owner's poeket, although instantly dispossessed of it, the taking and removal are complete. It is not necessary that the thief should grasp the property. Enticement, or trick, or the agency of an innocent third party, may take the place of forcible prehension; but it is not larceny to shoot and kill another's animal, where the wrongdoer leaves it undisturbed after its fall.

In England, by a fiction of law, a thief is guilty of taking the property in every county through which he carries it, and therefore may be indicted for larceny thereof in either county. If the theft was committed on the high seas, or in a foreign country, no such fiction is indulged in; the only felonious taking is the original caption. In some of the U. S. the courts have held, and in others the statutes declare, that a thief who brings into the State property that he has stolen elsewhere is guilty of a new taking and removal in such State, on the ground that every moment's continuance of the felony amounts to a new caption and asportation. Other States follow the English rule, and reject the idea of a new conventional taking.

Trespass.—At common law there can be no larceny without a taking and removal by trespass. In applying this doctrine the courts experienced great difficulty, and resorted to distinctions that were more subtle than satisfactory. TRESPASS (*q. v.*) to property consists "in the wrongful disturbance of another's possession." A bailee does not commit larceny by converting to his own use the property of the bailor, for the possession is in him at the time of taking. If prior to the conversion he does an act which terminates the bailment, then his taking may be felonious. A bailee who breaks bulk in converting the property to his own use commits theft, because, it is said, he had possession of the exterior casing of the goods, but not of the goods themselves; but the rule has been applied to bailments where the goods were not encased or wrapped up. (*Nichols* vs. *People*, 17 N. Y. 114.) An eminent English judge said of the cases on this topic, "the law has resorted to some astuteness to get rid of the difficulties that might arise in the case of a wrongful dealing with one or more of several articles, all of which, when intrusted, had been contained in one bulk."

A servant is not guilty of larceny who wrongfully converts his master's property to his own use before the master has become possessed of it (see EMBEZZLEMENT); but he is if the taking and removal occur while the property is in the master's actual or constructive possession. If the servant is sent by the master to buy and bring an article to the latter, and makes away with it before his return, he is not guilty of larceny, for the master had not acquired pos-

session of the article; but if having the master's carriage for the trip, he puts the article into that, it thereupon is in the master's constructive possession, and immediately a felonious taking and removal becomes possible.

A person may steal goods of which he is the general owner. For example, a sheriff levies an execution on the debtor's horse; the debtor thereafter sells and delivers the horse to a third person, and charges the sheriff with having disposed of the animal: the debtor is guilty of larceny.

While it is necessary that the taking and removal include a trespass, the act of trespass need not be felonious when committed. If one takes another's coat, honestly supposing it to be his own, and at a later time, upon discovering his mistake, wrongfully converts it to his own use, the inadvertent trespass will suffice to make the transaction larceny.

As trespass consists in the wrongful disturbance of another's possession, and it is immaterial whether such possession be lawful, larceny may be committed of stolen goods while in the control of the first thief. The same is true of property which the law prohibits a person from having, and subjects to forfeiture. Until it is forfeited and taken from him by due process of law, it is the subject of larceny. *Commonwealth* vs. *Smith*, 129 Mass. 104.

Common law carefully distinguished larceny from false pretenses. If a person asks another to give him small bills for a large one, and upon receiving them withdraws his bill and makes off with all the money, he is guilty of larceny. Had he obtained the bills on a check which he knew to be forged, his offense would have been false pretenses, but not theft. Wherever the owner intended the property to pass to the swindler, though he would not so have intended had he known the real facts, there is no larceny, because the taking is not by trespass. Where the owner intends not to pass the title but to transfer the custody, the taking is by trespass, and there is larceny. "The distinction," said Lord Blackburn, "is inscrutable to my mind, but it exists in the cases." (*Regina* vs. *Prince*, 11 Cox, *Criminal Cases* 193.) Even where the owner consents to the transfer of his property, his consent may be invalid if obtained by a trick. When two or more persons conspire to induce another to put his money into the hands of one of the confederates, on a wager between him and the other, and the stakeholder makes off with the money, he is guilty of larceny, as well where the bet is lost to the owner by a trick of the confederates as where he wins it. It does not matter that the owner, in case of winning, did not expect the return of the same money that he put up. Where the owner resorts to a decoy for the detection of a thief there will be no larceny if the owner or the decoy suggests or induces the act, or co-operates with the would-be thief in the act, as distinguished from facilitating the thief's execution of his own plan.

Knowledge of Ownership.—A person may commit trespass in taking and removing the personal property of another, and yet not commit larceny. He may honestly believe the property is his own, or that he has a right to take it, as in satisfaction of a debt. If he is mistaken, he is liable to a civil action for the trespass, but not to a criminal prosecution for stealing. The taking of another's goods under a *bona fide*, though legally groundless, claim of right is not larcenous.

Intention.—In order that one taking by trespass be guilty of larceny his purpose must be to deprive the owner indefinitely of his property. A person who wrongfully takes the horse of another to use for a time and to return him, converts, but does not steal him: but if one wrongfully takes railway tickets to use, though he intends to return them to the company through the conductor, he is guilty of larceny. He does not return the property that he took. He has not only used the property, but he has used it up. One who wrongfully takes another's goods and pawns them for his own debt commits larceny, though he may expect to be able to redeem and restore them. In submitting a case of this class to a jury an English judge remarked: "I confess I think that if this doctrine of an intention to redeem property is to prevail, courts of justice will be of very little value. A more glorious doctrine for thieves it would be difficult to discover, but a more injurious doctrine for honest men can not well be imagined."

The finder of property, who, honestly believing the owner can not be discovered, takes it with the intention to convert it to his own use, is not a thief; but he is if when taking it with such intention he had reason to believe the owner could be found. In the latter case his purpose is to deprive the owner of his property; in the former he has no such intention. This felonious intention must exist at the time of taking, unless such taking was by trespass. Hence where the finder knows the owner of lost property, and takes it, intending to restore it to him, such finder does not commit larceny by willfully converting it to his own use later.

There is some authority for the proposition that a larcenous taking must be *lucri causa*. It was accordingly ruled in *State* vs. *Hawkins*, 8 Porter (Ala.) 461, that one who took a slave from his master and secreted him simply to aid him in escaping to a free State did not steal the slave. However, the prevailing view is that a larcenous taking does not involve an intended gain or advantage to the thief. If the purpose of the wrongful taker is to deprive the owner of his property indefinitely, it is felonious, though the taker intends instantly to destroy it or present it to another.

Kinds of Larceny.—At common law the theft of property of a value exceeding twelve pence was grand larceny, while if the property was of twelve pence or less the crime was petit larceny. The former was punishable with death, the latter by fine and imprisonment. Modern statutes have in many jurisdictions abolished this classification, in others they have changed the limit of value separating the classes, and in all they have taken this crime out of the category of capital offenses. The common law also distinguished simple larceny from compound larceny, the latter consisting in stealing property which at the time of taking was under the protection of a person or a building. The former differs from ROBBERY (*q. v.*) in that no force or fear is applied to the possessor prior to the taking. The latter differs from BURGLARY (*q. v.*) in that it does not involve a breaking of a building.

Statutory Changes.—Both in Great Britain and the U. S. the rules governing larceny have been greatly modified by statutes. Many of the subtle distinctions established by the courts have been abolished, and simpler and more reasonable doctrines have been declared. FRANCIS M. BURDICK.

Larches [*larch* is from O. Fr. *larice* < Lat. *la'rix, la'ricis* (whence Germ. *lerche*) = Gr. λάριξ, larch]: coniferous trees with deciduous leaves belonging to the genus *Larix*. The *Larix europæa*, called Scotch larch in the U. S., is not a native of Great Britain, though extensively grown there. Its wood is valuable for a great variety of purposes. In Russia, Orenburg gum, a wholly soluble and edible product, is obtained from the charred trunks of this tree, as is Briançon manna in France. The Himalaya larch is *Larix griffithsii*. For the American larch, see HACKMATACK.

Larcom, LUCY: poet; b. at Beverly, Mass., in 1826. She was a mill-girl at Lowell, Mass., and afterward a teacher in Illinois and in Massachusetts. From 1866 to 1874 she edited *Our Young Folks*, a periodical published in Boston. Among her publications are *Ships in the Mist* (Boston, 1859); *Wild Roses of Cape Ann* (Boston, 1880); and an autobiography in prose, *A New England Girlhood* (Boston, 1889). An edition of her poetical works was published in 1885. D. in Boston, Apr. 15, 1893. Revised by H. A. BEERS.

Lard [M. Eng. *larde*, from O. Fr. *lard* < Lat. *lar'dum*, fat of bacon]: hog's fat extracted from the containing tissues by melting at a temperature slightly above the boiling-point of water, extensively used for culinary purposes and for the manufacture of candles, illuminating oils, pomades, unguents, and soaps. The ordinary lard of commerce is obtained from the entire fat of the animal; the best quality, known as leaf lard, is that derived from the fat which surrounds the kidneys. It is often adulterated to the extent of 25 per cent. or more by the addition of cottonseed oil, alum, lime, mutton suet, starch, potato-flour, or other farinaceous substance, while water may be employed for the same purpose up to 12 per cent. The presence of water is detected by the loss of weight under moderate heat; that of starchy substances by changing to a blue color in a solution of iodine. The composition of lard is 62 parts oleine to 38 of stearine and palmitine, the former, called lard oil, being used for lubricating machinery and for illumination, while the latter is chiefly employed for the manufacture of hard candles. The manufacture of lard is an important part of the business of pork-packing, and is largely carried on at the great slaughtering centers, notably at Chicago, Kansas City, and Omaha. The amount produced is nearly 250,000,000 lb. per annum, as shown by a comparison of the statistics of several years. Lard is the chief material employed in pharmacy, in combination with vegetable balsams and oils, for the preparation of unguents and cerates, for which purpose, however, only the best quality can be advantageously

used. Lard oil is exported from the U. S. in immense quantities, chiefly to France, where it is largely used for the adulteration of olive oil. Lard oil is often mixed with 25 per cent. of rosin, the latter substance forming an acid which protects the oleine from its tendency to rancidity when exposed to dampness, and also increasing its power of illumination. The melting-point of pure lard varies from 78° to 87° F. Revised by H. H. Wing.

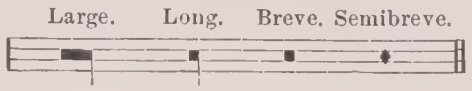
Lardner, Dionysius, LL. D.: writer on physical science; b. in Dublin, Apr. 3, 1793; graduated at Dublin University 1817; remained in his college, of which he was for a time chaplain, until 1827, and received many honors, mostly for excellence in mathematics and physics; abandoned the clerical profession; became in 1828 Professor of Astronomy and Physics in the University of London; resided 1840–45 in the U. S., and afterward in Paris. D. at Naples, Apr. 29, 1859. The greatest of his works was the *Cabinet Cyclopædia* in 134 vols., 12mo (1830–44), composed of a series of treatises, partly written by himself; he also produced an *Algebraic Geometry* (1823); a work on *Calculus* (1825); on the *Steam-engine* (1828); a series of *Handbooks* upon science (1851–56); the *Museum of Science and Art* (12 vols., 1824–56); and other works.

Lardner, Nathaniel, D. D.: clergyman; b. at the Hall House, Hawkhurst, Kent, England, June 6, 1684; studied at Utrecht and Leyden 1699–1703; was a private tutor; became assistant to his father; was from 1729 to 1751 assistant minister in the Presbyterian meeting-house in Poor Jewry Lane, Crutched Friars, London. He became partially deaf in 1723, and after 1753 could hear nothing. D. at the Hall House, Hawkhurst, Sunday, July 24, 1768. He is chiefly remembered as author of *The Credibility of the Gospel History* (14 vols., 1727–55), first delivered as a series of lectures at the Old Jewry, and still a standard work. As a supplement he issued a similar work on the apostles (3 vols., 1756–57). Other less known but important works are *Letter on the Logos* (1759, distinctly Socinian), a work which converted Priestley; *Jewish and Heathen Testimonies to the Truth of the Christian Religion* (1764–67, 4 vols.); a *History of Heretics of the First Two Centuries* (1780), etc. See his *Works* with biography by A. Kippis (11 vols., London, 1788; reprinted 5 vols., 1815; 10 vols., 1829; 10 vols., 1838).

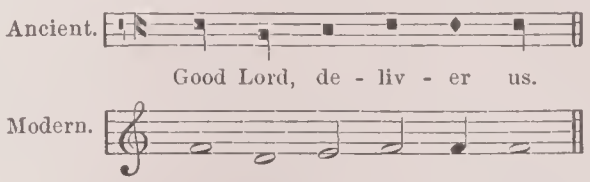
Lare'do: city; capital of Webb co., Tex. (for location of county, see map of Texas, ref. 7–G); on the Rio Grande river, and the Int. and Gt. N., the Mex. Nat. and the Rio G. and Eagle Pass railways; opposite Nuevo Laredo, Mexico, with which it is connected by two steel bridges: 153 miles W. of San Antonio. It is in the Rio Grande coal region; has an import and export trade with Mexico, averaging $12,000,000 annually; is about 13 sq. miles in corporate area; has an assessed property valuation of over $2,500,000, and city property valued at over $200,000; issues 3 daily and 3 weekly newspapers; and has a national bank with capital of $120,000, and a private bank. It was settled by Spaniards as a frontier town of Mexico, and on the annexation of Texas to the U. S. many of the Mexican inhabitants moved across the river and founded Nuevo Laredo. Pop. (1880) 3,521; (1890) 11,319; (1900) 13,429. Editor of "Times."

La'res [= Lat., plur. of *lar*, kind of tutelary spirit]: in the religion of ancient Rome, tutelary spirits or deities. The *lares familiares* were the protecting spirits of the household, but whether they were originally thought of as gods of the fields (and hence of the house and family of the Roman citizen as the possessor of landed property) or as the spirits of departed members of the household it is impossible to determine; but it is certain that the latter view came ultimately to prevail. The lares were the household gods *par excellence*, to whom prayers and sacrifices were offered at the daily meals, and to whom more especial gifts were presented on certain feast-days, particularly the kalends of each month. In every household celebration of joy or sorrow, however insignificant or important, the lares were remembered, and the dependence of the welfare of the family upon their favor recognized. Besides the household lares there were the *lares compitales* (of the cross-roads or streets), which in a certain sense may be called the public lares, since their worship was a matter of state concern, at least since their restoration by Augustus. The relation of the *lares compitales* to the community or district surrounding any particular shrine was practically only an extension of the relation of the household lares to the members of the family. So, for instance, the young wife offered sacrifice of an *as* to the *lares compitales* of the new district in which her husband's home lay, as well as to the lares of her new home itself. Along with the restoration of many ancient religious rites the *lares compitales* were brought to new honor by Augustus, and to their worship was joined the worship of the genius of Augustus, an institution which perhaps contributed most to the preservation of the memory of the first emperor in the minds of the people. The lares were usually represented as youthful figures with high-girt togas, holding cups or horns in their hands. See Preller, *Röm. Mythologie*, ii., p. 101 ff.; Jordan, *Vesta und die Laren* (Berlin, 1865). G. L. Hendrickson.

Large: one of the characters or notes in ancient music, and the longest in point of duration. The notes formerly in use were, in the order of their respective time-values, the large, the long, the breve, and the semibreve. They were commonly written thus:



The relative duration of these notes was, theoretically considered, equivalent in proportion to 8, 4, 2, and 1, the large being equal in time to two longs, or four breves, or eight semibreves; the long, to two breves or four semibreves; and the breve, to two semibreves. It may be considered certain, however, that these ratios were not very accurately observed in the practice of music, but were regarded only as approximate measures of slowness or rapidity, subject always to such variations and irregularities as might take rise from the feelings of the performer, or (in vocal music) from the accentuation, purport, and proper expression of the words. The actual length of time represented by each of these ancient notes was also much less than would be inferred from the names of the first two, which suggests a highly prolonged duration. It will be observed that while in modern music the breve is the longest note in use, yet in ancient music its duration was short, as indicated by its name and by comparison with the large and the long. A note such as the large, equal in length to four breves, eight semibreves, or sixteen minims, would, of course, be impracticable if the old time-table were not essentially different from our own as a measure of rapidity. Some idea of the rate or speed of the old notation may probably be derived from the hearing of Gregorian music as still in use in the Church of Rome, where the mode and velocity of chanting, as handed down by tradition, may be taken as a sufficiently correct representation of the time-value of the ancient note. Judging by such a standard the ancient large, long, breve, and semibreve would, at the longest, be only equivalent to our present breve, semibreve, minim, and crotchet; while this relative proportion might probably be still better represented by our semibreve, minim, crotchet, and quaver. In the absence of any positive rule for the translation of ancient notes into their equivalents under the modern system, the most common mode followed by musicians is to render the long by a semibreve, the breve by a minim, and the semibreve by a crotchet, as in the example following:



See Notation. Revised by Dudley Buck.

Lar'idæ [Mod. Lat., liter., those belonging to the gull family; *la'rus*, the genus of gulls proper (from Lat. *la'rus* = Gr. λάρος, a ravenous sea-bird) + Gr. patronymic ending -ίδαι, plur. of -ίδης, descended from]: a family of birds distinguished by the schizognath palate, lateral open nostrils, feet completely webbed between the three anterior toes, hallux or posterior toe rudimentary (and free) or obsolete, and wings elongated and pointed. The family embraces several well-marked minor groups, distinguished by most recent authors as sub-families—viz.: (1) the jagers (*Lestridinæ*), (2) the gulls (*Larinæ*), (3) the terns (*Sterninæ*), and (4) the skimmers (*Rhynchopinæ*). These groups are very definitely distinguished from each other, but the first two and last two are contrasted with each other, the jagers and gulls on one hand being closely allied, and on the other the terns and skimmers. A *Monograph of the North American Laridæ* was published by Dr. E. Coues in his *Birds of the Northwest* (1874). See also Gull. F. A. Lucas.

Laris'sa (in Gr. Λάρισσα, or Λάρῖσα): the name of eight cities of Grecian times. The chief ones were: (1) The capital city of Thessaly, on the south bank of the Peneus in the province Pelasgiotis. It is still a place of importance, and bears the name Larissa, though the Turks called it Yeni Shehir. (2) Larissa Kremaste, the hanging Larissa (now Gardiki), in the southern part of Phthiotis on a high hill whose slopes are covered with gardens, hence the name. (3) The Aeropolis of Argos. (4) A city on the eastern bank of the Tigris and the northern bank of the greater Zab. Its ruins were described by Xenophon. These ruins now bear the name of Nimrud, and were partially excavated by Sir Austen Layard in the interest of the British Museum.

J. R. S. Sterrett.

Laristan [liter., province of Lari. Cf. Pers. *stan*, place, province]: district of Persia, part of the provinces of Kerman and Farsistan: bordering on the Persian Gulf. It is mostly an arid, sandy waste, and the guinea-worm is a perpetual plague. The population is about 90,000, partly Arabs, who live almost independently, and partly various tribes of Iranian stock speaking an archaic form of Persian.

Revised by M. W. Harrington.

La Rivière, laa-rēĕ'vi-ār', Alphonse Alfred Clément: Canadian journalist; b. in Montreal, July 24, 1842; was educated at St. Mary's College, Montreal, and graduated at the military school there. He was for several years special correspondent of *La Minerve* (Montreal), and later became chief editor of *Le Manitoba*; a director of the Commercial Bank of Manitoba; has been a member of the council of the University of Manitoba, and president of the board of arts and manufactures for the Province of Quebec. He has held the offices of provincial secretary, minister of agriculture, and treasurer in the government of Manitoba, and has been a member of the Dominion Parliament since 1889.

Neil Macdonald.

Larivey, laă'rēĕ'vā', Pierre: French dramatist; b. about 1550 of an Italian family settled at Troyes. His life is very obscure. He was canon of the Church of St. Étienne in 1605; d. 1612. He was the most noticeable writer of comedy in the latter half of the sixteenth century. He published two collections of comedies, one (1579) containing six and the other (1611) three. They are all taken from the Italian, but are so completely adapted to the conditions of French society by the originality of the adaptation, and given in so firm and good a prose style, as to have almost the value of new works. Molière may have borrowed from them.

A. G. Canfield.

Larix: See Larches.

Lark [M. Eng. *larke*, contrac. of *laverock* < O. Eng. *lāferce*: M. H. Germ. *lēwerke* > Mod. Germ. *lerche*, lark]: the popular name for birds of the family *Alaudidæ*, a group of oscinine birds having the tarsi scutellated and rounded both before and behind, with a deep groove along the inner and a shallow groove on the outer face. The hind claw is straight and very long, the wings long and pointed, the bill varying according to the genus. Larks are practically restricted to Europe, Asia, and Africa; none are found in New Zealand, and but one out of the hundred recognized species occurs in Australia. No true lark (of the genus *Alauda*) inhabits America, but the shore-lark, a horned lark (*Otocoris alpestris*), so named from the pointed tuft of feathers over each eye, is widely distributed throughout North America (as well as Europe), forming several distinct races or sub-species. The most famous member of the family is the skylark (*Alauda arvensis*), noted for its powers of song. It is found so abundantly in Northern Asia and throughout Europe that many hundred thousand are annually brought to market. Ill-advised enthusiasts have endeavored to introduce it into the U. S., an effort which has unfortunately been at least partially successful. The bird is very destructive to growing crops and its successful acclimatization would be perhaps worse than that of the English sparrow. The titlarks belong to another family, the *Motacillidæ*, and the shore-lark is an oriole, one of the *Icteridæ*.

F. A. Lucas.

Larkspur: a popular name of the herbs of the genus *Delphinium* (family *Ranunculaceæ*), which are found in the cool regions of both hemispheres. The U. S. have eight or ten native species, and Europe as many. They are reputed to be poisonous herbs, and have a limited use in medicine. Several of these, together with some Asiatic species, are favorite garden flowers.

Lar'naka (anc. *Citium*): chief port of Cyprus, with a good roadstead on the southeast coast (see map of Turkey, ref. 7–F). It exports wine, oil, morocco leather, pottery, and cotton. Very attractive as beheld from the sea, it is nevertheless situated in the most bare and sterile part of the island. Pop. 7,593.

E. A. G.

Larned: city (founded in 1873); capital of Pawnee co., Kan. (for location of county, see map of Kansas, ref. 7–D); on the Arkansas and Pawnee rivers, and the Atch., Top. and S. Fé and the Mo. Pac. railways; 60 miles N. W. of Wichita, 300 miles W. of Kansas City. It has 8 churches, 4 public schools, a daily and 3 weekly newspapers, and is engaged in milling and agriculture. Pop. (1880) 1,066; (1890) 1,861; (1900) 1,583.

Editor of "Chronoscope."

Larned, Charles William: U. S. officer and educator; b. in New York city, Mar. 9, 1850; graduated at the U. S. Military Academy and was promoted second lieutenant Third Cavalry June, 1870; was transferred to Seventh Cavalry Oct. 10, 1870; served with his regiment in Kentucky and the Northwest; was assistant Professor of Drawing at the U. S. Military Academy 1874–76; becoming full Professor in 1876. He is a member of the American Philological Association and the New York Architectural League, and has published various articles upon art and education.

James Mercur.

La Roche, Marie Sophie (*von Gutermann*): author; b. at Kaufbeuren, Dec. 6, 1731. Her father being a highly learned physician, she received an excellent education. Wieland fell desperately in love with her, and remained an intimate friend during the whole of her lifetime. After her marriage to La Roche her home at Ehrenbreitstein became something of a literary center, as may be seen from Goethe's description of his visit in his autobiography. During this visit Goethe fell in love with Sophie's daughter Maximiliane, who afterward married a merchant of Frankfort, and who was the mother of Bettina von Arnim and Clemens Brentano, one of the founders of the Romantic school in Germany. Thus Sophie La Roche may be said to have been personally connected with Wieland, Goethe, and Brentano, the leaders of the most important periods in German literary life. She attained considerable fame as a writer of fiction, though her novels are now entirely forgotten. D. in Offenbach, Feb. 18, 1807.

Julius Goebel.

La Rochefoucauld, laa-rōsh'foo'kō', François VI., Duc de, Prince de Marcillac till his father's death in 1650: moralist; b. in Paris, Sept. 15, 1613. His education was very summary. At the age of fifteen he was married, and at sixteen he was in the army. The next year he appeared at court, and, winning the favor of Anne of Austria, soon became involved in the plots against Richelieu, whose displeasure repeatedly banished him from Paris. On the cardinal's death he hoped for advancement from the queen, and in his disappointment joined the leaders of the Fronde. After its suppression (1652), embittered by his failures, he passed several years in banishment upon his estates at Verteuil. Here he wrote his *Mémoires* of the years 1643–52, completed later by those of his youth, 1624–43, published with spurious additions in 1662, from the authentic manuscript in 1689. In 1659 he was permitted to return to Paris, and was granted a pension of 8,000 livres. He frequented the brilliant salons of Mme. de Montpensier and Mme. de Sablé, made friendships among literary people, and formed a deep attachment for Mme. de La Fayette. Here, from his experience and his acute observation of the manners and morals of the court, he composed the *Réflexions, ou sentences et maximes morales*, epigrammatic reflexions on human nature and conduct, expressed with the utmost conciseness and polished elegance, and dictated by the conviction that selfishness is the universal motive of conduct, and virtue only a more or less disguised form of calculation. These *Maximes*, which hold a place among French classics, appeared in 1665, and were constantly revised and added to in successive editions (1666, 1671, 1675, 1678). D. Mar. 17, 1680. The best edition of his *Œuvres* is by Gilbert and Gourdault (Édition des Grands Écrivains, 3 vols., Paris, 1868–83).

A. G. Canfield.

La Rochefoucauld-Liancourt, -lēĕ'ăăṅ'koor', François Alexandre Frédéric, de: publicist and philanthropist; b. in Paris, France, Jan. 11, 1747; was president of the National Assembly in 1789; emigrated in 1792; lived in England and the U. S.; returned to France in 1799; was much in public life under the Restoration as an advocate of liberal measures, and died in Paris, Mar. 27, 1827. He was a

very voluminous writer on different social topics, but his name is best known as that of a great practical philanthropist. He established the first model farm in France, introduced vaccination, founded at Liancourt a school for industry and art, which developed into the celebrated École des Arts et Métiers of Châlons, brought the method of mutual instruction into use, and established the first savings-bank in France. Revised by A. G. Canfield.

La Rochejaquelein, laa-rōsh′zhaăk′lăn′ (the name of an old noble family of La Vendée in France), Henri du Verger, Count de: b. at the château of La Durbellière, in Vendée, Aug., 1772; joined Lescure in the first Vendean war; became one of the ablest of the royalist leaders, and on the death of Lescure was chosen to the chief command. La Rochejaquelein is the noblest personification of those royalists who thought sincerely that only the return of France to the legitimist monarchy could give the country peace and happiness. He twice defeated the army of the National Convention around Autrain, and occupied Le Mans, La Flèche, Laval, and other cities, but was opposed by vastly superior forces, and could not retain his advantages. He was killed at the battle of Nouaillé, near Chollet, Mar. 4, 1794.—His brother, Louis du Verger, Marquis de, b. in 1777, was a general in the last Vendean war having persisted in his loyalty to the Bourbons in spite of Napoleon's attempts to win him over. He was placed by Louis XVIII. in command of the army in La Vendée, and during the Hundred Days maintained the king's cause in that region. He fell in battle near St.-Gilles, June 4, 1815.—His widow, Marie Louise Victoire (1772–1857) published *Memoirs of the War in La Vendée* (Bordeaux, 9th ed. 1881), which are of value to the historian of this period.—His son, Henri de la Rochejaquelein, gave up the ultra-legitimist opinions of the family, rallied to the imperial *régime*, was made a senator by Napoleon III., and died in 1867.—His son, however, Julien Marie Gaston de Verger de la Rochejaquelein, b. at Chartres, Mar. 27, 1833, returned to the legitimist traditions of his family. He was elected to the National Assembly of 1871, and has been several times a monarchist representative to the Chamber of Deputies. F. M. Colby.

La Rochelle, laa-rō′shel′: town of France; capital of the department of Charente-Inférieure; on an inlet of the Atlantic formed by the two islands Ré and Oléron (see map of France, ref. 6–C). It is fortified, well built, with handsome streets and many fine buildings, and has a large, deep, and perfectly safe harbor, a great arsenal, building-docks, extensive manufactures of glass, earthenware, iron and copper wares, sugar, and brandy, and considerable trade in wine, corn, and colonial products. In the sixteenth and seventeenth centuries it was the stronghold of the Huguenots, and played a very conspicuous part during the religious wars. It was one of the free cities granted to the Huguenots by the Edict of Nantes (1598), but upon the renewal of the war in Louis XIII.'s reign it fell into the hands of Richelieu after a long siege (1628), and its loss destroyed all power of effective resistance on the part of the Huguenots. Pop. (1891) 23,467. F. M. Colby.

Larousse, laă′roos′, Pierre: lexicographer and encyclopædist; b. at Toucy, Yonne, France, Oct. 23, 1817; began to be known as partner of Boyer, a celebrated Paris publisher of books for primary education. Many of these books are used in French schools, and were written by Larousse himself. In 1863 he conceived the idea of his universal dictionary (*Dictionnaire du XIX^e^ Siècle*), and set to work, surrounding himself with the best writers. The work was published by subscription, and had an immense success, though it slowly appeared in small *fascicules* in a pamphlet form of about fifty pages each. Larousse exhausted his strength in this stupendous work, and he died Jan. 3, 1875, leaving his encyclopædia at the letter M. The work was, however, completed, and has no rival in France. The tone of it is anti-classical.

Laromiguière, laa-rō′meĕ′gi-ār′, Pierre: philosopher; b. in Guienne, France, Nov. 3, 1756; d. Aug. 12, 1837, in Paris; was Professor of Philosophy at the College of Toulouse 1784–1790; made professor in the Lycée Louis XIV. in 1795, and in 1811 professor in the Faculty of Letters in Paris. He was a member of the Academy of Moral Sciences. His greatest work is *Leçons de Philosophie* (3 vols., 1815–18). J. M. B.

Larra, laa′raă, José Mariano, de: satirist and critic; b. in Madrid, Spain, Mar. 24, 1809; died by his own hand in Madrid, Feb. 13, 1837. When he was barely twenty-one certain of his productions fell into the hands of Ventura de la Vega, who proclaimed them the work of a genius, and within five years he had become the best-known and most popular writer in Spain. He was the boldest and most dreaded critic of the then existing order of things, and his satiric pictures of Spanish society, government, literature, and art, produced a deep effect upon the minds of his contemporaries. About 1732 he began to publish, under the name *Juan Pérez de Munguía*, his *Cartas del pobrecito Hablador*; and about the same time, under the name *Fígaro*, a long series of critiques and satiric sketches in various journals (*Revista Española*, *Observador*, *El Español*). His brief historical novel, *El Doncel de don Enrique el Doliente*, and his drama upon the same story, *Macías*, have real merit. His comedy *No mas mostrador* also won praise. A collection of his works appeared in Madrid in 1837 (13 vols.); another in Paris in 1848 (2 vols.). There have been numerous editions of particular pieces, both in Spain and in Spanish America. A. R. Marsh.

Larramendi, Manuel, de: philologist; b. at Andoain, Spain, province of Biscay, Dec. 24, 1690; died at the famous Jesuit monastery of Loyola, near San Sebastian, Jan. 28, 1766. He was the son of Domingo de Garagorri, but for some unknown reason assumed the name of his mother, Manuela de Larramendi. He studied at Bilbao, became a Jesuit, and was Professor of Philosophy and Theology successively at Palencia, Valladolid, and Salamanca. In 1730 he became confessor to the dowager queen, Maria Anna of Neubourg, and fulfilled this office till the end of 1733. His last years were spent in studious retirement at Loyola. He is famous as the first serious student of the Basque language. His theories with regard to this are most of them exploded, but the impulse given by him to the investigation of the Basques can hardly be overestimated. His first important work in this field was *El imposible vencido: Arte de la lengua Bascongada* (1729). This was followed by the *Antigüedad y Universalidad del Bascuence en España* (1728), and a *Diccionario trilingüe del Castellaño, Bascuence y Latín* (1745). See the periodical *Euskalerria* of San Sebastian for Dec. 30, 1890, entirely devoted to Larramendi, in commemoration of the bi-centenary of his birth. A. R. Marsh.

Larrey, laă′rā′, Dominique Jean, Baron: military surgeon; b. at Baudéan, Hautes-Pyrénées, in July, 1766; studied surgery with his uncle, Osear Larrey, a suceessful surgeon of Toulouse, under whose care the baron's elder brother, Charles François Hilaire Larrey, M. D. (1774–1819), an able surgeon and writer, also was trained. The younger Larrey went in 1787 to Paris; entered the navy; returned to Paris; studied under Dessault and Sabatier; joined the army in 1792; invented the *ambulance volante* 1793, and was made surgeon-in-chief; served in Egypt, Germany, Spain, everywhere displaying the grandest courage and perfect devotion to the comfort and health of the troops, and especially to the wounded, whether friends or enemies; was made a baron on the field of Wagram 1809; was wounded at Austerlitz and Waterloo; made numerous and exceedingly important improvements in operative and clinical surgery, and made important observations in general medicine. D. of pneumonia at Lyons, July 25, 1842. Author of *Mémoires de médicine et de chirurgie militaire*; *Clinique chirurgicale*. See the biography by Werner (1885).

Lar′va [from Lat. *lar′va*, mask, also ghost, specter, skeleton]: a term applied to the earlier stages of animals, and especially invertebrates, in which the young after issuing from the egg are very different from the adults, and undergo a great change of form, or metamorphosis, before assuming their perfect shape. The larva is so called because the form of the young masks or conceals that of the adult. The maggot is the larva of the fly, the caterpillar the larva of the butterfly or moth, the zoæa is the larva of the crab, and the tadpole the larva of the frog. See Entomology. F. A. Lucas.

Larva′lia [Mod. Lat.]: an order of Tunicata (*q. v.*) represented by *Appendicularia*, *Fritillaria*, etc., in which the animal retains throughout life the tail which in other tunicates is characteristic of the larval stages. They may be briefly described as tadpole-like forms, in which the tail is folded over the transparent body. Some species secrete a gelatinous case, the *Haus* of German naturalists, which they carry about with them. All are marine and almost microscopic in size. J. S. K.

Laryngi'tis [Mod. Lat., from Gr. λάρυγξ, larynx + Mod. Lat. medical affix *-itis*]: inflammation of the larynx. It is found in numerous forms which vary according to the producing cause—*Laryngitis catarrhalis*, *L. crouposa* or *diphtheritica*, *L. phlegmonosa*; one other form is recognized by the locality of the inflammation—*L. hypoglottica*. *Laryngitis catarrhalis* exists in the acute and in the chronic form. Acute laryngitis is produced by all those causes which give rise to inflammation of mucous membrane. Of these the most commonly accepted cause is that mythical entity called catching cold. Besides this, there is inhalation of irritating substances, either in the form of finely subdivided solids, dust, small particles of iron, or other metals, or in the form of irritating gases. Excessive speaking, singing, or shouting may produce acute laryngitis, but it is doubtful whether something more, as a predisposition to this disease, may not also be necessary. Of the infectious diseases, measles is the one which most commonly causes this affection; it is very much less common in typhoid fever, erysipelas, scarlet fever, and whooping-cough. Extension of an inflammation from the nose or pharynx to the larynx is a very common occurrence. The disease may be recognized by its symptoms, but a laryngoscopic examination in every case materially assists the physician in all directions. The general symptoms vary greatly with the individual affected. They are usually absent, though they are sometimes present as they would be in an acute inflammation of the respiratory tract—malaise, loss of appetite, chilliness, more or less febrile movement. The local symptoms are hoarseness; a hoarse, barking cough, at first dry, then accompanied with the expectoration of a small quantity of mucus; tickling dryness of the throat, sometimes pain, which can usually be elicited by pressure on the larynx. In children, and sometimes in adults, this condition produces the combination of symptoms known as croup. The patient is put to bed suffering with the symptoms of an ordinary cold; during the night he is awakened by a barking, hoarse cough, accompanied by prolonged, loud inspirations; with this there is decided pain in the larynx and great difficulty in breathing. The expression of the child becomes anxious, it cries with and after the cough, its color changes, sometimes being bluish, it sits up in bed or wants to be held up. With this all those symptoms characteristic of dyspnœa exist. After a varying length of time the attack passes over, and the patient again falls asleep, perhaps breathing rapidly, or in any event noisily. During the night one or more attacks may occur, but in the morning the patient seems comparatively well, with the exception of a cough which becomes looser during the day. Usually the second night is like the first, except that the attacks are less severe, and then no more attacks occur. Four or five days sees an end to the disturbance. The hypoglottic form is more serious, as more swelling occurs, which in the young child may cause suffocation. An uncomplicated attack may be readily distinguished from the catarrhal form, and prompt measures, intubation, or tracheotomy give absolute relief.

Acute laryngitis, when producing the croupish symptoms before described, is called false croup, to distinguish it from true croup, laryngitis diphtheritica, or crouposa. (See DIPHTHERIA.) It is a harmless affection, with a mortality so low that a physician may never in his whole experience see a fatal case. There are many children especially predisposed to croup; indeed, there are families in which all the children become croupy on the slightest provocation; however, the disease is not fatal. How great the suffering is may be seen in adults, who sometimes remain croupy, although the rule is that at the expiration of the tenth or twelfth year laryngitis no longer produces croup. It is only the first or second attack of croup in children that should cause uneasiness; in these it is sometimes difficult to determine whether one is dealing with true or false croup. After it has once been established that a child is predisposed to this condition, the attacks no longer cause alarm. Methods of treatment vary; possibly the most common one consists in giving emetics—ipecac, tartar emetic, or others. While it may be said of this method that it gives prompt relief, it may be unnecessary and do harm, as the remedy may do more injury than the disease. Local applications to the throat, hot compresses, the so-called Priessnitz application (a cloth wrung out in cold water and covered with flannel or oiled silk), the hot-water bag—all give relief. Inhalations of steam, not too hot, from an atomizer, or by means of filling the room with aqueous vapor from a croup kettle, are of great benefit. Medication is most valuable when directed against the production of increased reflex action; the bromides are therefore very useful, and by continuous use it is not uncommon to prevent a second croupy night. In the adult acute laryngitis seldom requires treatment; all that is necessary will be to give relief to the symptoms.

Chronic laryngitis, which may develop from the acute form, rarely affects children. It is produced by the same causes as the acute form, except that these must act for a greater length of time; therefore, speakers or singers are liable to it; also millers, tobacco-workers, masons; in short, all those whose occupation causes them to breathe air which contains irritating substances. This form is not uncommonly found in drinkers. It is recognized by the laryngoscope, and only by this instrument. The treatment must be local—i. e. all remedies to produce results must be applied to the affected parts. There is an exception to this rule, when it is found that laryngitis is produced by some general disturbance, rendering the larynx more liable to react upon local irritations; in these cases a removal of the cause facilitates cure by local remedies. In laryngitis chronica of long duration change of occupation or change of climate will do more than can be accomplished by any treatment.

F. FORCHHEIMER.

Laryngograph: See RECORDING APPARATUS, PSYCHOLOGICAL, in the Appendix.

Laryn'goscope [Gr. λάρυγξ, larynx + σκοπεῖν, examine]: an instrument proposed and in part introduced by ROBERT LISTON (*q. v.*) and employed by other eminent surgeons of his time; but greatly improved and first systematically used by Prof. Czermak (d. 1873). It is employed for examining the condition of the diseased larynx, and also for observing the action of the vocal cords during phonation. It consists of two mirrors; the larger one, concave, throws light upon the smaller, which is held in the throat of the patient and illuminates the interior of the larynx, at the same presenting a reversed image of the glottis, vocal cords, and surrounding parts. The laryngoscope is of great value in treating local diseases of the throat.

Lar'ynx [Mod. Lat., from Gr. λάρυγξ, throat, gullet, upper part of the windpipe]: the human organ which produces sound. It is situated at the beginning of the windpipe, is entered by way of the pharynx, and therefore communicates with the nose and the throat. Its essential structure is of cartilages, muscles, blood-vessels, and nerves; it is covered on the outside by the skin, and lined within by mucous membrane. The cartilages, of which there are nine, are for the purpose of giving rigidity to the whole, and also for attachment of various parts used for functional activity. The cartilages have derived their names from their forms; hence the thyroid, or shield-like cartilage; the cricoid, or ring-like cartilage; the arytenoid, or pitcher-like cartilage, etc. Their relations toward each other are such as to form a box-like apparatus, with forward and upward projections from its lower plane formed by the arytenoid cartilages, to which the vocal chords are attached. The opening to this box is protected by a special cartilage, the epiglottis, which partially prevents the entrance of foreign substances into the larynx. The thyroid cartilage, which, by means of one of its processes, rests and moves upon the cricoid cartilage, produces that projection in front which is known as the *Pomum adami*, or Adam's apple. Nearly all the parts of the larynx are so constructed as to have some bearing upon the vocal chords.

The vocal chords are two bands, elastic in nature and covered by mucous membrane. They are stretched across the interior of the larynx, attached anteriorly to the thyroid cartilage on either side of the median line and posteriorly to the arytenoid cartilages, the right vocal chord to the right and the left chord to the left arytenoid. The space between the vocal chords is called the glottis. For the purpose of breathing the glottis must be kept open, while for the purpose of phonation it must be more or less closed. The mechanism of the vocal chords, then, resolves itself into the production of motion. This is caused by muscles of which there are two kinds, intrinsic and extrinsic. These, by causing motion in the cartilages to which the vocal chords have attachment, thereby cause motion in the chords themselves. These muscles are under the control of nerves going from the larynx to the central nervous system, consequently all the processes that go on in the larynx are controlled by the nerve centers.

In addition to the closure of the glottis, it is necessary for the production of sound that the vocal chords can be

stretched and relaxed. The force which throws the vocal chords into vibration is supplied by air expelled from the lungs. One result, then, of bringing the entire mechanism into play is the throwing of the vocal chords into regular vibration, which, under the circumstances, produces sound.

The three qualities of sound, pitch, clang-tint, and quantity can all be produced by the larynx alone. Pitch is produced by the tension and proximity of the chords, clang-tint by their peculiar individual shape and the shape and size of the larynx and adjacent cavities, and quantity by the force of the expelled air acting upon the larynx. The character of voice, male or female, soprano, alto, tenor, or bass depends entirely upon the size and form of vocal chord, and the size, shape, and configuration of the larynx. The range of voice—i. e. the number of notes that can be sounded—also depends upon these factors, but largely also upon the muscles, and for this reason cultivation can do much in extending the number of notes which can be sung by the individual. During respiration the glottis becomes wide with inspiration and narrower with expiration; hence the difficulty in producing sound while breathing in air, and the ease with which phonation is accomplished in expiration. The muscles which control the respiratory movements of the glottis are controlled by nerves connected with the respiratory center, and as a result all these movements are synchronous.

The mucous membrane of the larynx is very sensitive in places, being endowed with a great number of nerve-endings, and acts as a protector to the remainder of the respiratory tract during respiration. During normal respiration the air first passes through the nose, where the first warning of impurity is given the individual, if given at all, then through the pharynx and larynx, where the next warning takes place. As a result of this nervous mechanism, very irritating substances, if finely divided, produce attacks of coughing, larger bodies produce spasmodic contractions (commonly called swallowing the wrong way), and it is only by a very unfortunate train of circumstances that bodies can pass the larynx and enter the bronchi, producing very dangerous conditions.

The diseases of the larynx may be classified upon an anatomical basis. There may therefore be diseases affecting all the tissues, or diseases affecting one or more. Malignant tumors, cancers, and sarcomata belong to the first class, while the second class is subdivided into diseases of the cartilages, of the muscles, of the mucous membrane, of the nerves, and finally of the nerve centers controlling those nerves. As most of the diseases affecting the larynx are carried to it by the air in its passage through it, the most common form of laryngeal disease is that which affects the mucous membrane. Inhalations of various poisons, of lower forms of life, or of irritating substances will produce inflammatory changes in the mucous membrane. Neither is it uncommon to find benign tumors in the larynx, which, when recognized, can be readily removed by skillful hands. In the laryngoscope we have an instrument by means of which every part of the larynx is made accessible to the eye. It is just as idle to treat a diseased larynx without looking at it as to treat a sore finger without examining it. The laryngoscope has made clear the subject of laryngeal disease, and much is done in daily practice which would have seemed miraculous years ago. F. Forchheimer.

La Salle: city; La Salle co., Ill. (for location of county, see map of Illinois, ref. 3–E); on the Illinois river, the Illinois and Michigan Canal, and the Chi., Burl. and Q., the Chi., Rock Is. and Pac., and the Ill. Cent. railways; 99 miles S. W. of Chicago. It is in an extensive and profitable bituminous coal region, at the head of river navigation. It contains several zinc-smelting works, manufactures glass and hydraulic cement, and ships annually to Southern markets a large quantity of ice. The city is connected with Peru, a mile W., by electric railway. Pop. (1900) 10,446.

La Salle, Jean Baptiste, de: See the Appendix.

La Salle, René Robert Cavelier, Sieur de: explorer; b. at Rouen, France, in 1643; became a Jesuit, but, renouncing his profession, embarked for Canada in 1666, and obtained a grant of territory at the head of the rapids in the St. Lawrence river above Montreal, where he seems to have intended to live as a resident seigneur, but, attracted by the reports of some Seneca Indians visiting his post in the winter of 1668–69, he set out in search of a great waterway which was thought to lead to the South Sea, and offer a route to China. He explored Lake Ontario, and reached the Illinois or some other affluent of the Mississippi, but probably did not penetrate as far as the main stream. He visited France in 1674; was ennobled and received important grants in Canada. Returning in 1678 from another voyage to France, he explored the Great Lakes, and attempted to colonize their shores; descended the Illinois and the Mississippi, reaching the Gulf of Mexico Apr. 9, 1682, and named the region Louisiana. In 1683 he went to France, and, having received a commission, endeavored in 1684 to plant a colony at the mouth of the Mississippi, but failed to reach this point, and landed early in 1685 on the coast of Texas, probably in the neighborhood of Matagorda Bay, where he built a fort. Dissension arose between La Salle and Beaujeu, the captain of one of the vessels, and ended in the latter's return to France. La Salle made two fruitless attempts to reach the Mississippi, death and desertion having in the meanwhile reduced the number of the colonists to forty-five. Leaving twenty of these behind, La Salle made a third attempt, in the course of which he was murdered by his companions near the Trinity river about the middle of March, 1687. The murderers were never apprehended, and nothing was ever heard of the few colonists left behind at the fort. See Justin Winsor, *Cartier to Frontenac* (New York and Boston, 1894); Sparks's *Life of La Salle*; and Parkman's *History of the Discovery of the Great West*.
F. M. Colby.

Lascaris: the name of two distinguished Greek grammarians, born of a noble Bithynian family. They emigrated to Italy after the fall of Constantinople (1453), and contributed greatly to the study of Greek in Italy and France. Constantinos, the elder of the two brothers (or cousins), became the tutor of the Princess Ippolita Sforza of Milan. Thereafter we find him teaching Greek at Rome, where he became intimate with Bessarion, at Naples, and Messina. D. about 1500. His famous Greek grammar (*Erotemata*) was the first Greek book ever printed (Milan, 1476).—Johannes lived for a long time at the court of Lorenzo di Medici in Florence, and was sent by him to Greece in search of new MSS. and works of art. He was called to Paris by Charles VIII. as a teacher of Greek, but recalled to Rome by Pope Leo X. to take charge of a Greek institute. He revisited Paris as a member of an embassy to Francis I. (1518), and founded the Royal Library. Thereafter he lived for a time in Venice till recalled to Rome by Pope Paul III., where he died in 1535. He is now chiefly remembered as the printer of five *editiones principes*, among them a long famous edition of the Greek Anthology. See Villemain, *Lascaris, ou les Grecs au XV^e^ Siècle* (Paris, 1825). Alfred Gudeman.

Lascars: an Anglo-Indian name applied to non-combatant native male followers of the army in India, and also to native seagoing crews on British ships.

Las Casas, Bartolomé, de: See Casas.

Las Cases, laas-kaaz', Emmanuel Augustin Dieudonné Marie Joseph, Marquis de: writer of memoirs; b. at Las Cases, Languedoc, France, in 1766; entered the navy; emigrated in 1791; served for some time in the army of the Prince of Condé; later on lived in London, where he published his *Atlas historique* (1803); returned in 1805 to France; held several offices in the civil and military service during the empire, and accompanied Napoleon to St. Helena in 1815. A letter to Lucien Bonaparte (Nov. 27, 1816), in which he spoke freely of the manner in which Napoleon was treated, caused him to be arrested and transferred to the Cape of Good Hope. After thirteen months' imprisonment he was liberated; settled in Belgium, but returned to France after the death of Napoleon. In 1824 he published his *Mémorial de Sainte-Hélène*, containing a record of the remarks which Napoleon had made to him in their conversations. D. at Passy, May 15, 1842.

La Serena, Chili: See Coquimbo.

La Serna é Hinojosa, laa-sär'nă-ā-ee'nō-hō'să, José, de: general and administrator; b. at Jerez de la Frontera, Spain, 1770. He entered the army as a cadet; served in the defense of Ceuta 1784, against the French in Catalonia 1795, and subsequently in many campaigns. At the second siege of Saragossa (1809) he was captured and carried to France, but escaped; returned to Spain in 1811, and served under Wellington until the French were expelled in 1813. In 1816, having attained the rank of major-general, he was sent to take command of the army in Upper Peru, relieving Pezuela, who had been appointed viceroy. La Serna reached his post in Nov., 1816, and was ordered by Pezuela to take

the offensive against the insurgents at Salta. He did so against his own judgment, and was twice defeated—at Salta and Jujuy. His ideas were so frequently opposed to those of the viceroy that he finally resigned, and in 1819 went to Lima with the intention of returning to Spain; but in view of the threatened invasion of Peru by San Martin, his partisans united in inducing him to remain; and the viceroy, to avoid disagreement, promoted him to lieutenant-general and made him president of the council of war. After San Martin had landed he was given command of the army. On Jan. 29, 1821, the officers of the army forced Pezuela to resign, and made La Serna viceroy, an irregular proceeding, which, however, was eventually ratified by the Spanish Government. On July 6 of the same year La Serna evacuated Lima, and made his headquarters at Cuzco. During the succeeding three years and a half he was practically cut off, with his army, from Spain, and was forced to combat not only the patriot forces of Peru, but those of the Platine states, and bands of guerrillas in Charcas. In the face of these difficulties he kept his army in good condition, and the prolongation of the struggle was largely due to his skill and resolution. He was finally defeated and captured by Sucre at the battle of Ayacucho (*q. v.*), Dec. 9, 1824. On the same day he had been created Count of the Andes. On his return to Spain he was well received, and subsequently held several important posts in the Peninsula. D. at Cadiz in 1832. Herbert H. Smith.

Lashkar: the southern of the two parts of Gwalior (*q. v.*), a city of India. Its name is properly Gwalior-Lashkar (i. e. camp of Gwalior). Pop. (1891) 85,040.

Las'ker, Edward: politician; b. at Jarocin, in the Prussian province of Posen, Oct. 14, 1829, of Jewish parents; studied jurisprudence and mathematics; spent three years in England studying English constitution and law; and received in 1856 an office in the Prussian Government. His creed, however, and his constitutional views, which he set forth in several excellent papers, prevented him from advancing in the service. In 1865 he was elected a member from Berlin to the Prussian House of Deputies, and thenceforward Lasker devoted himself with great energy and steadily increasing influence to his parliamentary career, regardless of his practice as an attorney and of other personal interests. Until 1868 he represented in the House of Deputies a district of Berlin, and then Magdeburg; in the North German and in the German diet he represented first a district of Berlin, and then one of Saxe-Meiningen. At first, his political conviction allied him with the progressive party, but when it became evident that Bismarck's policy aimed at the establishment of a united Germany, Lasker became one of the founders of the national liberal party, of which he was the most eminent member until he left it in 1880. He was appointed an attorney-at-law in Berlin in 1870, and on all important laws of a later date, especially on those concerning trade and traffic, usury, imprisonment for debt, loans with premiums, etc., he exercised a decisive influence. D. in New York city, Jan. 4, 1884. He wrote *Zur Verfassungsgeschichte Preussens* (1875); *Wege und Zielke der Kulturentwickelung* (1881). See the biography by A. Wolff (1884). Revised by C. H. Thurber.

Las Palmas, laăs-paal'maăs [Span., the palms]: town on the northeastern coast of Gran Canaria, one of the Canary islands. It is beautifully situated at the feet of lofty hills, with a spacious and good harbor. It is also well built, with a fine old cathedral and beautiful promenades. It has manufactures of glass, leather, woolens, and hats. Pop. 11,400.

Lassa, laa'saă, **Lhassa**, or **H'Lassa** [Tibetan *Lha-Sa*, liter., God's ground]: the capital of Tibet; situated in lat. 29° 39′ N. and lon. 91° 57′ E.; in a plain on the right bank of the Kichu, a tributary of the Brahmaputra, 11,580 feet above the sea; encircled by lofty barren mountains (see map of China, ref. 6–C). It is a well-built town, with broad and regular streets, and a population estimated at from 30,000 to 80,000 (nearly half of whom are Buddhist monks), and an extensive trade in precious stones, gold, velvet, silk, and cashmere. On the top of a hill adjoining the city is the Potala or palace of the Dalai Lama, the head of the Buddhistic hierarchy of Tibet and Mongolia. It forms "a group of fortifications, temples, monasteries, and schools, surmounted by a dome entirely covered with gilded plates, and surrounded by a peristyle of gilded columns." Thousands of pilgrims annually visit it; hundreds of them stay there to complete their theological and philosophical education; and all of them leave behind them a present to the Dalai Lama. Besides the Potala, the city contains many temples, convents, and schools, and the life of the city in all its phases is deeply colored with religious rites and symbols.

Lassalle, laă-saal', Ferdinand: social agitator and founder of the social democratic movement in Germany; b. at Breslau, Germany, Apr. 11, 1825; the son of a rich Jewish merchant; he studied philology and philosophy in his native city and in Berlin; and was a disciple of Hegel. In 1849 he was banished from Berlin on account of his participation in the riots of 1848, and lived for several years in the Rhine country. In the meanwhile he had been the champion of the Countess of Hatzfeldt in her famous suit against her husband, who after eight years of litigation was forced to a compromise most favorable to the countess. Down to 1862 he was chiefly known for the part that he had taken in this trial and as the author of *Die Philosophie Herakleitos des Dunkeln von Ephesus* (1858) and of *System der erworbenen Rechte* (1861); but in 1862 he suddenly turned his attention to politics, and became a social agitator of great influence. The problem which he set before himself was the emancipation of the workingmen from the tyranny of the capitalists, and the manner in which he proposed to solve that problem was by the formation of productive associations with capital furnished by the state. For this purpose he published a great number of pamphlets (*Ueber Verfassungswesen*, *Arbeiterprogramm*, *Zur Arbeiterfrage*, *Bastiat-Delitsch, oder Capital und Arbeit*, etc.), and founded the Allgemeiner Deutscher Arbeiterverein. Lassalle's idea was that the inevitable result of the present social system was the "iron law of wages" continually tending to reduce the wages of labor below the point necessary for subsistence. To remedy this he demanded state intervention. His career was suddenly broken off by his being mortally wounded in a duel. D. at Geneva, Aug. 28, 1864. See Buchner's *Meine Begegnung mit Ferdinand Lassalle* (Berlin, 1893), and Bernstein's *Lassalle as a Social Reformer* (Berlin, 1892; trans. by Eleanor Marx Aveling, London, 1893).

Revised by F. M. Colby.

Lassen, laa'sen, Christian: Orientalist; b. at Bergen, Norway, Oct. 22, 1800; studied at Christiania, Heidelberg, and Bonn; attracted great attention by his *Essai sur le Pali*, written in connection with Burnouf (Paris, 1826), and his edition of *Hitopadeça*, a collection of Indian fables, made in connection with A. W. Schlegel (Bonn, 1829–31); and became assistant Professor in Indian Languages at the University of Bonn in 1830; full professor in 1840. D. May 8, 1876. Lassen must be regarded as virtually the founder of Indian philology in Germany. In his *Altpersische Keilinschriften* (Bonn, 1836) he made also a most important contribution to the decipherment of the cuneiform inscriptions. His principal work is *Indische Alterthumskunde* (4 vols., Bonn, 1844–62; 2d ed. since 1866). Other works are *Institutiones linguæ pracriticæ* (1837); *Anthologia Sanscrita* (1838; new ed. by Gildemeister, 1865–68); *Zur Geschichte der griechischen und indoskythischen Könige in Baktrien, Kabul, und Indien* (1838); *Vendidad* (1852); and many highly important contributions to journals. Revised by Benj. Ide Wheeler.

Lassen, Eduard: composer and conductor; b. Apr. 13, 1830, at Copenhagen, Denmark, but was taken to Brussels when two years old, and educated there. He took many prizes in the conservatory, including the great Government prize in 1851. He composed a five-act opera, *Le Roi Edgard*, which was produced in 1857 at Weimar by Liszt with great success. This was followed by *Frauenlob* and *Der Gefangene*. He succeeded Liszt as director of the opera at Weimar, and produced Wagner's *Tristan und Isolde* in 1874. He has composed two symphonies, music to Goethe's *Faust* and *Pandora*, Sophocles's *Œdipus*, Hebbel's *Nibelungen*, a Fest-Cantate, a Te Deum, a violin concerto, and many songs. The University of Jena gave him the degree of Ph. D., and the King of Belgium decorated him with the Order of Leopold in 1881. D. E. Hervey.

Lassen Peak: a mountain of Shasta co., Cal., standing at the north end of the Sierra Nevada. It is of volcanic origin, and has an altitude of 10,437 feet.

Lasson, Adolf, Ph. D.: metaphysician; b. in Alt-Strelitz-Mecklenburg, Germany, Mar. 12, 1832; educated at the University of Berlin; was gymnasium teacher in Berlin (1858); head teacher (1861); docent in the university in 1877. His principal works are *F. G. Fichte im Verhältniss zu Kirche und Staat* (Berlin, 1863); *Meister Ekhart der Mystiker* (Berlin, 1868); *Princip und Zukunft des Völkesrechts* (Berlin,

1871); *System der Rechtsphilosophie* (Berlin, 1882); *Zeitliches und Zeitloses* (Leipzig, 1891). J. M. B.

Lassus, lăă'süs', Jean Baptiste Antoine: architect; b. in Paris, Mar. 19, 1807; pupil of H. Labrouste and Lebas. He was employed upon several important Paris buildings, and, as the interest in ancient structures increased, upon restorations, such as that of the Sainte-Chapelle, upon which he was engaged until his death. In connection with Viollet-le-Duc he was given charge of the restoration of Notre Dame, but relinquished this work in order to take charge of the cathedrals of Chartres and Le Mans, and to carry on the building of churches in Dijon, Belleville, St.-Aignon, and other towns. The Album of Villard de Honcourt was prepared for publication by him and published after his death, and the great Government monograph of the Cathedral of Chartres was also in a great measure his work. He was a member of the Legion of Honor, but the tendency of his teachings was contrary to those most in favor, and the highest honors were not likely to reach him. D. at Vichy, July 15, 1857. Russell Sturgis.

Lastarria, lăs-tăă-ree'ăă, José Victorino: publicist and author: b. at Rancagua, Chili, in 1817. He was educated at Santiago, and early became connected with various newspapers. In 1838 he was named Professor of Common Law and Literature in the National Institute. After 1843 he was several times elected deputy to Congress; Minister of Finance 1862–64, and of the Interior 1876-78; and was envoy to Peru, Argentina, and Brazil; later he was Minister of the Supreme Court. Lastarria is one of the most prolific of Chilian authors, his works including biography and criticism, history, descriptions of travel, civil and constitutional law, and two novels; his studies on the Chilian constitution and its history are especially valuable. Among his best-known works are *Elementos de derecho público constitucionál, Investigaciones sobre la influencia social de la Conquista, Bosquejo histórico de la Constitución*, and *Historia constitucionál de medio siglo*. He founded the first Chilian literary magazine in 1840, subsequently established others, and aided in the foundation of several literary societies. Herbert H. Smith.

La'sus (in Gr. Λάσος): son of Chabrinus or (according to Schneidewin) Charminus; a Greek dithyrambic poet and hymn-writer of Hermione in Argolis; flourished about 510 B. C. He was a contemporary and rival of Simonides, and the reputed teacher of Pindar. To him is ascribed the new development of the dithyramb, and famous among his *tours de force* was a poem composed without a single *sigma* (*s*). Of all his poems, only a fragment of a hymn to Demeter remains, which is given in Bergk's *Poetæ Lyrici Græci*.

Las Vegas, lăs-vā'găăs: city; capital of San Miguel co., N. M. (for location of county, see map of New Mexico, ref. 10–S); on the Pecos river, and the Atch., Top. and S. Fé Railroad; 70 miles E. of Santa Fé, the territorial capital. It is in an agricultural, stock-raising, and mining region, and has large jobbing and wool interests, gas and electric lights, street railway, 2 national banks with combined capital of $200,000, and a daily, monthly, and 4 weekly newspapers. Pop. (1880), not in census, about 1,500; (1890) 2,385; (1900) 3,552.

Latacunga, lăă-tăă-koong'găă (Tacunga by abbreviation): a city of Ecuador, capital of the province of Leon; on the Andean plateau; 56 miles S. of Quito, and 25 miles S. E. of the cone of Cotopaxi; 9,384 feet above the sea (see map of South Ameriea, ref. 3–B). It is built on a beautiful plain between two small rivers, affluents of the Pastaza. The average temperature is 59° F. Latacunga is the fourth city in Ecuador in population, but its importanee is mainly local; a large proportion of the inhabitants are Indians. A good carriage-road unites this plaee with Quito. The city was founded in 1535. It has suffered greatly from earthquakes, and was four times destroyed between 1698 and 1797. Nitrate of potash is obtained from volcanic deposits in the vicinity. Pop. about 12,000. Herbert H. Smith.

La Taille, laa-tăă'ĕĕl', Jean, de: poet and dramatist; b. at Bondaroy, France, about 1540. He studied humanities at Paris and law at Orleans, but was drawn away to poetry by the works of Ronsard and du Bartas, and divided his time between letters and arms. He wrote two biblical tragedies, *Saul furieux* (1562) and *Les Gabaonites* (1571), and two comedies after Italian models, *Le Negromante* and *Les Corrivaux* (1576). He was a voluminous writer of verse. D. in 1611. His works have been edited by René de Maulde (4 vols., Paris, 1878–82). A. G. Canfield.

Lataki'ah, lăă-tăă-kee'ăă, or **Ladiki'yeh** (anc. *Laodicea ad Mare*): a port of Syria, Asiatic Turkey, in the vilayet of Beyrout on the Mediterranean (see map of Turkey, ref. 6–G). The harbor is insecure, the commerce small, and the town dilapidated. *Débris* from ancient buildings abounds. The environs are fertile; their chief product is the famous Latakiah tobacco. Pop. 10,000 to 12,000, of whom 2,000 are Christians. E. A. G.

Latent Heat: See Heat.

Lateral Pressure: the horizontal pressure of water, mud, or earth upon a dam or wall, or upon the sides of an inclosing vessel. See Earthwork and Hydrostatics.

Lat'eran: the name of a place in Rome occupying the site of the estates of the ancient Roman family *Lateranus*. The two principal buildings in the plaee are the Church of S. Giovanni and the palace. The old Lateran palace became imperial property under Nero, who put Plautius Lateranus to death and confiscated his estates. Constantine the Great presented it to the pope, and it was the pontifical residence until, in 1309, the holy see was transferred to Avignon. On the return of Gregory XI. to Rome in 1377, he took up his residence in the Vatican. Having been burned down under the reign of Clement X., the Lateran palace was rebuilt in 1558 under Sixtus V., but it remained unoccupied until Innocent XII. in 1693 made it an orphan asylum. In 1843 Gregory XVI. established here the Museum Gregorianum Lateranense for antiquities, the Vatican and Capitoline museums affording no more space. The church, S. Giovanni in Laterano, was founded by Constantine the Great, overthrown by an earthquake in 896, rebuilt by Sergius III. 904–11, burned down in 1308, restored by Clement V., and subsequently much altered and modernized by Martin V., 1430, Pius IV., 1560, Borromini, 1650, and Galileo, 1734. For centuries it was the principal church in Christendom—*Omnium urbis et orbis ecclesiarum mater et caput*. Five great œcumenical councils were held there.

Lateran Councils: councils thus called because they were held in the Church of St. John Lateran in Rome. They comprise, besides six minor, five great œcumenical councils, namely: (1) that convened by Calixtus II., and opened Mar. 18, 1123, by which the long strife between the popes and the German emperors concerning investiture was ended on the following terms: "The emperor surrenders to God, to SS. Peter and Paul, and to the Catholic Church all right of investiture by ring and staff. . . . The pope agrees that the election of German prelates shall be had in the presence of the emperor, provided it is without violence or simony." (2) That convened by Innocent II., and opened Apr. 20, 1139, by which the anti-pope, Anacletus II., and all who had received office under him, were deposed. (3) That convened by Alexander III., and opened Mar. 2, 1179, by which it was established that henceforth "the election of the popes shall be confined to the college of cardinals, and two-thirds of the votes shall be required to make a lawful election, instead of a majority only, as heretofore." (4) That convened by Innocent III., and opened Nov. 11, 1215, by which a crusade was determined upon for the liberation of Palestine from the infidels, the heresy of the Waldenses was condemned, and the expression "transubstantiation" was sanctioned by the Church. (5) That convened by Julius II., and opened May 3, 1512, by which the acts of the Council of Pisa were annulled, and the concordat concluded in 1516 between Francis I. and Leo X., who succeeded Julius II., and closed the council in 1517, was substituted for the Pragmatic Sanction of Bourges. Revised by J. J. Keane.

La'tes [Mod. Lat., from Gr. λάτος, a fish of the Nile]: name of a genus of large perciform fishes, of which the type is *Lates niloticus*, from which Latopolis in Egypt took its name. This fish is the largest in the river Nile. It grows to a length of 3 feet, and is of fine flavor. *L. nobilis* is an excellent food-fish of the tidal parts of the Ganges.

La'tex [= Lat., liquid, juice]: scientific name for the thick, milky juice of certain plants, as the milk-weed, celandine, etc. It is distinct from the true sap, and is contained in a set of tubes called laticiferous vessels. Many important vegetable products, such as opium and caoutchouc, are the dried latex of some one or more species of plants. See Histology Vegetable.

Latham, John: ornithologist; b. at Eltham, Kent, England, June 27, 1740; studied medicine and natural history; established himself in 1763 as a physician at Dartford; aided Sir A. Lever in forming his museum, and was one of the

founders of the Royal Society and of the Linnæan Society. Besides papers on medicine and natural history, he was the author of a *General Synopsis of Birds* (8 vols., 1781–1801) and of an *Index Ornithologicus* (1791), both which were combined in a new edition under the title *A General History of Birds* (10 vols., 1821–24). D. at Romsey, Feb. 4, 1837.

Latham, Robert Gordon: philologian and ethnologist; b. at Billingsborough, Lincolnshire, England, Mar. 24, 1812; was educated at Eton and at Cambridge, where he became a fellow of King's College and received degrees in arts and in medicine; became a lecturer at Middlesex Hospital; published *Norway and the Norwegians* (1840); translations from the Swedish, etc.; became in 1841 Professor of English Literature in University College, London; after a tour in the north of Europe published a work on *The English Language* (1841); a series of English grammars (1843–50); *History of the English Language* (1849); a translation of Sydenham's *Works* (1848–49); *Natural History of Man* (1850); *Handbook of the English Language* (1851); *Man and his Migrations* (1851); a series of works on ethnology (1850–59), including *Ethnology of the British Colonies* (1852); *Ethnology of Europe* (1852); *Native Races of the Russian Empire* (1855); *Varieties of the Human Species* (1855); *The Ethnology of India* (1859); *Comparative Philology* (1862); a thoroughly revised edition of Johnson's *Dictionary*, in thirty-six numbers (1857–70); *The Nationalities of Europe* (1863); *Outlines of General Philology* (1878), etc. D. at Putney, Mar. 9, 1888. Revised by H. A. Beers.

Lathe, lāth [from Icel. *lödh*, plur. *ladhar*: Dan. *lad*, a smith's lathe]: a machine for shaping materials by the process called turning. It has a great variety of forms, as the foot-lathe, the engine-lathe, the lathe for turning irregular forms, or as classified by reference to the art to which the tool is peculiarly adapted. In the lathe the material to be shaped is sustained by two centers, between which it is given a motion of revolution, while a turning-tool, held by the workman or by a tool-holder attached to and moved by a slide-rest, cuts away the exterior, and gives the mass the shape required in the finished piece.

The lathe was known in very early times. Its invention is claimed by Diodorus Siculus for Talus, the grandson of Dædalus; Pliny ascribes it to Theodor of Samos (740 B. C.), and states that Phidias and Pericles were very expert in its use. Cicero called the workmen using the lathe *vascularii*. Phidias is supposed to have been the first to adapt the machine to turning wood. It had previously been used in turning vases and other forms in clay; and the potter's wheel, which is a kind of lathe, was in use among the ancients. It is mentioned in the Bible as used by the Hebrews. Very rude lathes were used in Europe at a period which antedates history, and they are still occasionally met with. Turned objects in wood were exhibited at the international exhibition at Vienna in 1873, made by the peasantry of Galicia, among the Carpathian forests, on these old lathes. Fig. 1 represents this tool. The workman selects two trees growing side by side, and close by a young maple or beech. Two maple cones inserted in the trees serve as centers, and the block to be turned is fixed between them, the end being first trimmed to cylindrical shape to take the bight of the rope, one end of which is attached to the end of the sapling and the other to the treadle seen below. The cross-bar *d* is a rest to support the turning-tool. The treadle being worked by the foot, the piece revolves, and the turning is readily performed.

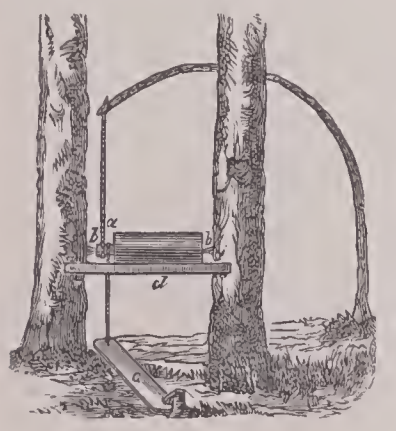


Fig. 1.

Lathes were adapted to other than cylindrical forms of revolution in comparatively modern times. Leonardo da Vinci, Jacques Besson, Salomon de Caus, and Jerome Cardan produced modifications and improvements, their object being the production of oval and other geometrical figures. The engine-lathe, with its slide-rest, was invented by Joseph Bramah, an English mechanic, in 1794. The lathe for turning irregular forms was invented about 1820 by Thomas Blanchard, an ingenious mechanic of Massachusetts, and was applied to turning gun-stocks and shoe-lasts.

The foot-lathe is driven by the foot of the workman operating a treadle beneath. When the tool is larger, and is driven by steam or water-power, it is called a power-lathe. Nearly every trade uses some form of lathe, which by some peculiarity of detail is especially fitted for its work. The forms of the lathe are therefore numerous, while the variety of attachments is enormous.

Fig. 2 represents a very complete foot-lathe. A horizontal shaft, extending beneath the bed of the lathe from end

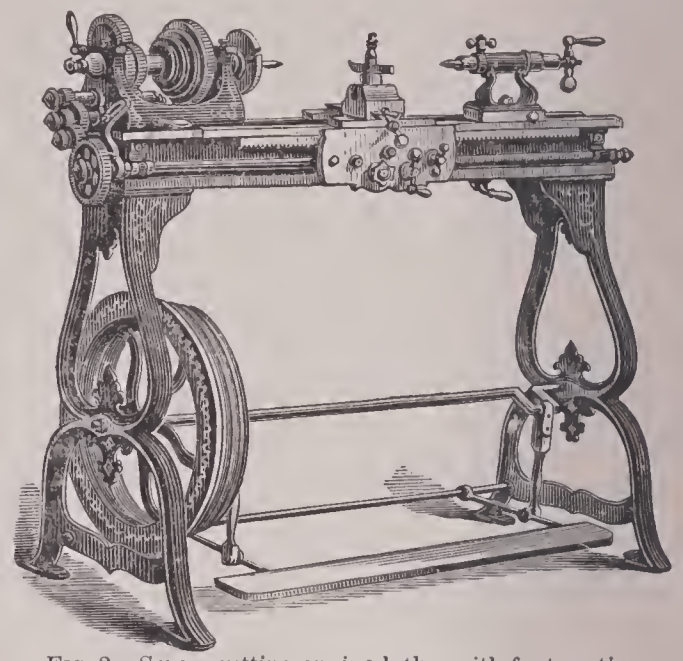


Fig. 2.—Screw-cutting engine-lathe, with foot-motion.

to end, carries a pulley balance-wheel, which by means of a belt not shown drives the spindle which runs in bearings in the head of the lathe at the left. This driving-shaft is turned by a treadle which is worked by the foot of the turner. The slide-rest, seen at the middle of the lathe between the two heads, is moved either by hand, or automatically, by a small shaft running from end to end of the lathe, and partly concealed by that portion of the slide-rest which carries the handle for attaching and detaching it. The tool is shown in its place in the tool-holder, which is mounted upon and carried by the slide-rest. The back center is shown at the right, and the back-head, in which it is carried, is adjustable in position at any distance from the fixed head, and is clamped by the nut and handle seen beneath it. The center is moved backward and forward by the handle at the right, which turns a screw within the shell, and when in adjustment it is clamped by a smaller set-screw or clamp, seen above it. The train of gearing at the end of the lathe adjacent to the driving-head is used to determine the relative motion of the tool and the work, when it is desired to secure an exact velocity-ratio, as in cutting screws. The gearing seen behind the driving-spindle takes its motion from the pinion on that spindle at the left, and, turning with the belt-cone, transmits it, with a reduced velocity-ratio, to the gear on the driving-spindle at the right. This gear drives the live spindle to which it is keyed. With this arrangement the driving-pulley and its attached pinion turn loosely on the driving-spindle. A rapid motion of the driving-wheel is thus converted into a slow, strong movement of the live center, and the lathe is thus adapted to turning metals. Throwing the back-gearing out of gear, the largest gear can be clamped to the belt-cone, and the

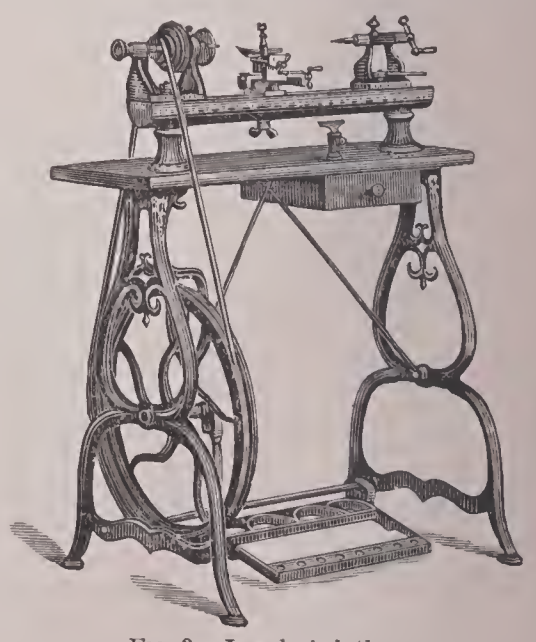


Fig. 3.—Jeweler's lathe.

driving-spindle then partakes of the rapid motion of the latter, turning with the higher velocity required in working wood and other soft materials.

Both the back-gearing and the screw-cutting attachment are usually dispensed with in lathes intended for turning wood only. Fig. 2 represents a large foot-lathe, capable of taking pieces 10 inches in diameter and 40 inches long. A more usual size turns pieces 6 or 8 inches in diameter and about 2 feet long. The jeweler's lathe, shown in Fig. 3, illustrates this style.

A good lathe must be capable of turning a truly cylindrical surface, and of producing a perfectly plane face upon the end of the cylinder, or of any piece secured in the lathe in such manner that the face to be finished shall lie in the transverse plane. These requirements are attained by skillful design and careful fitting. Lathes used in screw-cutting are driven by an arrangement of belting which permits them to be turned in either direction at pleasure. As the reversal of motion usually occurs very suddenly, friction-pulleys, which are not affected by shocks, are generally used. Lathes for turning metals are driven at speeds much less than those adopted in working wood. These speeds are:

Material.	Feet per minute.
Iron, chilled white cast	5
Iron, soft gray	15
Steel	15
Iron, wrought	20
Brass and bronze	50–60
Wood	1,500–4,500

In the rose-engine lathe the spindle carrying the work is movable, and is vibrated by a guide-wheel or pattern-wheel turned at a fixed rate of speed, and having an outline which is determined by the shape of the design to be cut. Several wheels being used in succession, intricate and beautiful geometrical combinations are obtained. The lathe is now made in immense variety of form and often of great size. The largest are those employed in turning marine engine shafts and in finishing heavy ordnance, the limit of size of the latter being at present about 120 tons.

Lathe-tools are usually of the finest crucible carbon steel. The self-hardening steels sometimes employed are commonly alloys of iron and chrome, tungsten, or manganese. They permit heavier cuts and higher speeds, and reduce costs of turning very considerably. Tools of chilled cast iron are sometimes used. See Holtzapffel's *Mechanical Manipulations*; *The Lathe and its Uses*; *Manuel du Tourneur*; *Materials of Engineering* (vol. ii.). R. H. Thurston.

Lathrop, George Parsons: author; b. at Oahu, Sandwich islands, Aug. 25, 1851. He was educated in New York city and at Dresden, Germany; was connected editorially with *The Atlantic Monthly* in 1875–77 and with *The Boston Courier* in 1877–79. He married a daughter of Nathaniel Hawthorne, and published in 1876 *A Study of Hawthorne*, and in 1879 he took up his residence at The Wayside, Hawthorne's old home in Concord, Mass., but later lived in New York and at New London, Conn. Among his publications are *Rose and Rooftree*, verse (1875); *Afterglow* (1876); *An Echo of Passion* (1882); *Spanish Vistas* (1883); *Gettysburg, a Battle Ode* (1888); *Would You Kill Him?* (1889); *Dreams and Days*, verse (1892). D. Apr. 19, 1898.

Lathrop, Rose (*Hawthorne*): poet; b. at Lenox, Mass., May 20, 1851. A daughter of Nathaniel Hawthorne, her childhood was passed mainly in Europe during her father's consulate at Liverpool and his travels on the Continent (1853–60). In 1871 she was married to George Parsons Lathrop. She has contributed stories and poems to the magazines, and published a volume of verse. In 1897 she founded a free cancer hospital in New York.

Laticif'erous Tissues: See Histology, Vegetable.

Latil'idæ [Mod. Lat., liter., those belonging to the Latilus tribe; *La'titus*, the typical genus (dimin. of Lat. *la'tus*, broad) + Gr. patronymic suffix *-ίδαι*, plur. of *-ίδης*, descended from]: a family of fishes of the sub-order *Acanthopteri*, distinguished by sub-jugular ventral fins, each of which has a spine and five branching rays; a more or less elongated body (the vertebral column having more than ten abdominal and fourteen caudal vertebræ), covered with scales, and with the lateral line sub-median along the tail; an elongated dorsal fin, of which the spinous portion is shorter than the soft; and a compressed head, with a snout truncated or moderately produced. These are the principal diagnostic characters of a group of fishes which have been variously placed by different naturalists. The species are few, and chiefly confined to tropical America. The species of *Caulolatilus* known as *Blanquitlos* or whitefish are valued as food. One species, the tilefish (*Lopholatilus*), of great beauty, is found in the Gulf Stream. Revised by D. S. Jordan.

Latimer, Hugh, D. D.: bishop and martyr; b. at Thurcaston, Leicestershire, England—it is generally said in 1491, but Demaus thinks the date should be 1484 or 1485. He was educated at Clare Hall, Cambridge, where he was chosen a fellow 1509; passed a bachelor 1510, and a master 1514; was cross-bearer to the university, and in 1516 became Greek professor; was ordained a priest at Lincoln; became interested in the principles of the Reformation through the labors of Bilney; was dismissed from the university as a heretic by Wolsey 1527; became chaplain to Henry VIII. 1530; became rector of West Kingston, Wilts, 1531; was excommunicated, but absolved on his submission, 1532; was chaplain to Anne Boleyn 1534; became Bishop of Worcester 1535; resigned his office 1539, not being able to accept the Six Articles (31 Hen. VIII., c. 14), and was imprisoned in the keeping of the Bishop of Chichester; was afterward silenced by authority and shut up in the Tower 1546–47; declined his former bishopric 1548; was preacher to Edward VI. 1549–50; was imprisoned in the Tower by proclamation of Queen Mary 1553; transferred to the Bocardo of Oxford, with Ridley, 1554; tried and condemned by order of Cardinal Pole 1555; and burned at the stake with Ridley in the ditch near Baliol College, Oct. 16, 1555. Latimer was one of the most influential and fearless of the English Reformers, and his admirable *Sermons* (4 vols., London, 1845) are models of forcible and witty speech. See his *Life* by Rev. R. Demaus (1869). Revised by W. S. Perry.

Latin Church: that portion—the Western—of the Roman Catholic Church which retains the use of the Latin language in its Church service; so called to distinguish it both from the schismatical Greek Church and from that other portion of the Roman Catholic Church which uses the Greek language in its liturgy. These are called United Greeks, and acknowledge the supremacy of the pope, in the same sense as those of the Latin rite. See Bergier, *Theologie*, in *Encyclop. Methodique* (1789, ii., 408); Millman, *Latin Christianity* (1854); Addis and Arnold, *A Catholic Dictionary*. J. J. Keane.

Latin Empire: the empire formed at Constantinople in 1204 by the crusaders under Baldwin IV., Count of Flanders, and Boniface II., Marquis of Montferrat. Turning aside from their original purpose of invading the Holy Land, they interfered in a dynastic quarrel in the Eastern Empire, and finally placed Baldwin on the throne. The rule of the Latins thus established was overthrown in 1261. See Byzantine Empire.

Lati'ni, lăă-tee'nĕĕ [Lat., liter., Latins]: originally the name borne by the inhabitants of Latium associated in the Latin league. After the dissolution of the league in 340 B. C., and the annexation to Rome of a number of the communities which had formed it, the name continued to be borne by the former members of the league which had maintained their independence, and was extended to inhabitants of Italian communities which were granted the same advantages over the other Roman allies, in their relation to Rome, as the members of the Latin league had enjoyed. Their position was a middle one between that of foreigners and Roman citizens; thus, for instance, they possessed the same business and judicial privileges (*commercium*) as the Roman citizen, but not the right of intermarriage nor political equality. From the Latin communities founded after the fifth century of the city the Latinus could be admitted to Roman citizenship only in case he had held a magistracy in the place from which he came, while from the original or older Latin towns it was only necessary for the individual to announce his intention of transferring himself probably at the time of the census. The revocation of this right by Rome (95 B. C.) precipitated the social war, which resulted, however, in the extension of citizenship to the whole of Italy. From this time on the privileges which the Latini had enjoyed were extended, under the same name (*ius Latii*), to communities outside of Italy, until by the edict of Caracalla in the third century A. D. citizenship was extended to the provinces. See Mommsen, *Abriss d. röm. Staatsrecht*, p. 56 ff. (Leipzig, 1893). G. L. Hendrickson.

Latini, Brunetto: writer; b. in Florence, Italy, between the years 1210 and 1230. In 1245 his name first appears

in public documents. He was a Guelph in politics, and in 1260 was ambassador to Alfonso X. of Castile. While he was absent in this capacity the Florentine Guelphs were defeated in the battle of Montaperti (Sept. 4, 1260), and he was obliged to live in exile for some years. Most of this time he spent in France, probably in Paris. The exact date of his return is unknown, but in 1269 he was prothonotary of the vicar-general of Charles d'Anjou in Tuscany, and in 1270 in the same capacity at Pisa. In 1273 he was *scriba*, or chancellor, of the Florentine commune, and from this date till his death (1294 or 1295) he held many important offices and took part in the deliberations of the chief governing bodies of Florence. He was a man of very great influence. Dante (*Inf.*, xv.) speaks of him with extraordinary respect, and his words have even given rise to the supposition that he himself had him for a teacher. This can hardly be true in the exact sense of the word. Giovanni Villani also attributes great importance to his influence in Florence. The chief works of Brunetto Latini that have come down to us are *Il Tesoro* (commonly known as *Il Tesoretto*, to distinguish it from the Italian versions of his large work in French), a poem in *settenarj* in rhymed couplets, describing an imaginary journey through the realms of Nature, Virtue, and Love; and *Li livres dou Trésor*, a vast encyclopædia of the history and science of the time, written during the author's exile, or between 1262 and 1266. It is in French, owing to Latini's belief in the greater excellence and wider diffusion of that tongue; but it was speedily rendered into Italian, both in prose and in verse. Besides these works we have two minor pieces and some bits of translation from Cicero. The *Tesoretto* has been edited by B. Wiese in the *Zeitschrift f. rom. Phil.*, vol. vii. (1883). The *Trésor* has been edited by P. Chabaille, (Paris, 1863). See T. Sundby, *Della vita e delle opere di Brunetto Latini, trad. dal danese da R. Renier* (Florence, 1884); also the notice in d'Ancona e Bacci, *Manuale della letteratura italiana*, vol. i. (2d ed. Florence, 1893). A. R. Marsh.

Latin Language: originally the language of the Latins, i. e. the inhabitants of the district of Western Italy known as Latium, the leading city of which was Rome. During the republican period of Roman history the Latin language remained practically confined to its original home, but with the inauguration of the imperial system it extended rapidly to the provinces, and soon became—at least in the cities and large towns—the language of the entire Roman empire.

Position of Latin in the Indo-European Family.—Relation to the other Languages of Italy.—Until recently scholars generally accepted the theory that Latin was historically more closely related to Greek than to any other group of the Indo-European family of languages. Supporters of this view assumed that at some era anterior to history there existed a Græco-Italic community, whose ultimate dissolution gave rise to the Greek and Italic races as separate linguistic groups. This theory seems to have been suggested rather by the intimate connection between the civilizations of the Greeks and Romans than by any valid linguistic data. Such data, in fact, are almost wholly lacking. So far as Latin has a definite historical relationship with any one division of the Indo-European family it is with the Keltic group. Thus Latin and Keltic stand alone in the possession of the peculiar passive formation in *r*, e. g. *amor*, *amatur*; in the future formation in *-bo*, e. g. *amabo*, and in the extension of *ti-* stems by an *n-* suffix, e. g. *da-ti-on-is*, Gr. δόσις (for δοτις). See Indo-European Languages.

As regards the connection of Latin with the other languages of Italy, it stands in the closest relationship to the Umbro-Samnitic dialects (Umbrian, Sabellian, and Oscan), being descended with these from a primitive Italic parent-speech. Of the other languages of ancient Italy, the Gallic, of Northern Italy, as a member of the Keltic group, was related to Latin. The Messapian of Southeastern Italy seems to have been at least Indo-European, but it is scantily known. The Ligurian was not Indo-European. The Etruscan still remains as much of a riddle as ever; some scholars, as Deecke, confidently assert its Indo-European origin, and associate it with Latin; others, however, dispute these conclusions. See Italic Dialects.

Stages in the Development of the Latin Language.

A. *Preliterary Period.*—From the earliest times down to the beginning of Roman literature, about 240 B. C. Only scanty remains of this period have descended to us. The chief of these are the Carmen Saliare, Carmen Arvale, Leges Regiæ, and Laws of the Twelve Tables. The text of the Carmen Arvale and Carmen Saliare is extremely uncertain, being constituted in radically different ways by different scholars, while the language of the Leges Regiæ and of the Laws of the Twelve Tables (the latter assigned to 450 B. C.) has become greatly altered in the course of transmission. More trustworthy than the foregoing are a few inscriptions. The most famous of these, the Manios inscription, on a fibula found at Præneste, is the oldest monument of the Latin language. Buecheler refers it to the sixth century B. C. Of later date (350 B. C.?) is the Dvenos inscription, on a curiously shaped earthen jar found at Rome in 1880. Later still are a few inscriptions on coins, drinking-vessels, and the like, ranging from 350 to 250 B. C.

B. *Archaic Period.*—From the beginning of the literature (about 240 B. C.) to Cicero (81 B. C.). This is the formative period of the language. The poet Ennius (239–169 B. C.) is a central figure here, from the point of view of the language as well as of the literature. He first introduced the quantitative meters of the Greeks in place of the native Latin meter known as Saturnian. He also enriched the vocabulary of the language, and added to its precision and flexibility. Inscriptions are found in this period in increasing number, and give testimony of the greatest value as to growth of the language.

C. *The Ciceronian Period.*—From the appearance of Cicero (81 B. C.) to the death of Augustus (14 A. D.). Cicero elaborated and perfected the prose of this era. As molded by him the language is characterized by the development of the periodic structure, great strictness of syntactical usage, and by regularity of idiom. There was one fixed standard of expression, admitting only the slightest deviations.

D. *Period of Silver Latin.*—From the death of Augustus (14 A. D.) to the death of Hadrian (138 A. D.). The chief characteristic of this period is a marked reaction against the restrictions of the preceding era. The strict prose of the Ciceronian age now shows the effect of two influences—the infusion of poetic words and constructions, and the admission of idioms from the colloquial language. Also a marked striving for rhetorical effect. Seneca, Pliny the Younger, and Tacitus are typical representatives.

E. *The Archaizing Period.*—From the death of Hadrian (138 A. D.) to 200 A. D. This period is characterized by the revival in the literary language of the diction of the Archaic Period. Fronto and his pupil, Aulus Gellius, are conspicuous representatives of the age.

F. *Period of Decay.*—From 200 A. D. to 600 A. D. In this period the language suffers extensively from the infusion of colloquial words and idioms. In the provinces, too, special dialectic peculiarities began to develop. These circumstances ultimately led to the complete decay of the literary Latin as a living language. It continued to be used by the clergy, by scholars, and for diplomatic intercourse; elsewhere it died out toward the close of this period, and its place was taken by the colloquial idiom (*lingua rustica*).

Alphabet.

The oldest Latin alphabet consisted of twenty-one letters, *a*, *b*, *c*, *d*, *e*, *f*, *z*, *h*, *i* (both vowel and consonant), *k*, *l*, *m*, *n*, *o*, *p*, *q*, *r*, *s*, *t*, *u* (both vowel and consonant), *x*. These characters were borrowed from the Greek alphabet of the Chalcidian colonies of Lower Italy and Sicily. The special type of the Greek alphabet employed by these colonists was that known as the West Greek. Peculiarities of this were C for Gamma, the use of Ϙ (Koppa), and the employment of X for *x* instead of *ch*. The Latin adopted all of these. As the Latin language lacked the aspirates (*ph*, *th*, *ch*), it was unable to utilize Greek Φ, Θ, Ψ (= *ch* in West Greek) as letters; it accordingly employed them as numerals—Φ = 1,000; Θ = 100; Ψ = 50. These characters subsequently underwent several changes of form, Φ becoming first Ⓕ, and later ↀ, whence M; Θ (perhaps through Ⓒ) became C; Ψ became ↓, ⊥, and finally L. In the earliest Latin alphabet K was used for *c*, and C for *g*. Subsequently K practically disappeared from use, C took its place, and a new character, G, was formed for *g*. Yet C for G survived in the abbreviations C and Cn for *Gaius* and *Gnaeus*. Z disappeared early (about 300 B. C.), but was introduced again, shortly before the time of Augustus, for the purpose of transliterating Greek words. Y was introduced from the Greek for the same purpose and at the same time. The Emperor Claudius endeavored to secure currency for three other characters, viz., ⊦, to designate the sound intermediate between *i* and *u*; ⅎ for *v*; ↄ for *ps*. These were employed to some extent during Claudius's reign, but do not appear later. Long vowels were denoted some-

times by doubling, e. g. *paastores*, sometimes by a mark like an accent, called the apex, e. g. ÁCTVS. Long *i* had a special form higher than the other letters, e. g. DIVO. Latin was nearly always written from left to right. The Manios and Dvenos inscriptions are written from right to left, and one inscription is written *βουστροφηδόν*. Capitals only were known in the classical period; the smaller letters arose later. See ALPHABET.

PRONUNCIATION.

The vowels had substantially the same sounds as in German or Italian. Long and short *e*, however, differed in quality; *ē* was close, *ĕ* was open. So also *ō* was close, *ŏ* was open. A similar difference of quality probably existed between *ī* and *ĭ*; *y* had the sound of French *u*, German *ü*. Of the diphthongs, *æ* was pronounced like *ai* in *aisle*; *œ* like *oi* in *oil*; *ei* as in *rein*; *au* like *ow* in *how*; *eu* with the two vowels pronounced in quick succession; *ui* like *we*. Of the consonants, *c* and *g* were always hard, as in *can*, *get*; *s* always voiceless, as in *sin*. In the early language final *s* is often omitted, indicating that its sound was weak. *V* was pronounced like English *w*; *j* (i. e. consonant *ı*) had the sound of English *y*; *z* was either *zd* or *dz*. The aspirates, *ph*, *th*, *ch* (occurring mainly in Greek words) were throughout the classical period pronounced like the simple *p*, *t*, *c*, with a following breathing, as in *chop-house*, *hot-house*, *block-house*; late in the history of the language (fourth century A. D.) *ph* seems to have developed into the spirant *f*. Final syllables in *m* in poetry in some way became absorbed in the initial syllable of the following word, if that began with a vowel, but the process is not understood.

PHONOLOGY.

A. *Vowels.*—Latin *a*, *e*, *i*, *o*, *u* correspond in the main to the same sounds in the parent-speech, but many special phonetic changes occur. Thus an originally unaccented *ă* becomes *ĕ* in close syllables, also when final or before *r*, e. g. *particeps* for *particaps*; *acceptus* for *áccaptus* (see below, Accent); *pede* for *peda*; *reddĕre* for *reddăre*; before a single consonant or *ng* unaccented *ă* becomes *ĭ*, e. g. *adigo* for *adăgo*; *contingo* for *cóntăngo*. Short *e* becomes *ĭ* in unaccented syllables before a single consonant (except *r*), e. g. *coltĭgo* for *collĕgo*; but *generis*, not *geniris*. Short *i* becomes *ĕ* before *r*, e. g. *sero* for *siso*; also often when final, e. g. *mare* for *mari*; *leve* for *levi*. Short *o* in unaccented syllables regularly changed to *u*, e. g. *filius* for earlier *fitios* (found in inscriptions); *vehunt* for *vehont*. Before *r*, *o* remained unchanged, e. g. *temporis*; so also after *u* and *v* until the Augustan age, e. g. *mortuos*, *servos*. Short *u* before labials, beginning about the Augustan age, becomes *ĭ* in many words, e. g. *optimus* for earlier *optumus*; *libet* for *lubet*.

B. *Diphthongs.*—In the earliest stages of the language preserved in inscriptions the Indo-European diphthongs are much better represented than later. Yet by 200 B. C. original *ei* had apparently already become a monophthong, and *eu* had passed into *ou*, e. g. *douco* for *deuco*. Of the other diphthongs *ai*, *oi*, *eu*, *ou* appear frequently in early inscriptions; *ai* subsequently became *ae*, or, in unaccented syllables, *ī*, e. g. *occīdo* for *óccaido*; *oi* became regularly *u*, e. g. *unus* for earlier *oinos*; in a few words the diphthong was retained and written *œ*, e. g. *fœdus*, *mœnia*; *au* was retained, but in unaccented syllables became *ū*, e. g. *conclūdo* for *cónctaudo*; *ou* soon passed into *ū*, e. g. *dūco* for *douco*. The Indo-European diphthongs, *āi*, *ēi*, *ōi*, *āu*, *ēu*, *ōu*, had, with the possible exception of *ōi*, disappeared before Latin became an independent language.

Ablaut.—The Indo-European ablaut (see ABLAUT) is much less perfectly preserved in Latin than in other languages of the Indo-European family, e. g. Greek or Gothic. Comparatively few Latin roots exhibit all of the phases which are theoretically possible in the different ablaut series. Examples are the following:

ē-series: *rē-ri*, *rĕ-tus* (*a* for *ə*);
ā-series: *stā-men*, *stă-tus* (*a* for *ə*);
ō-series: *dō-num*, *dă-tus* (*a* for *ə*);
ĕ-series: *gĕn-us*, *gi-gn-o*;
ă-series: *amb-āges*, *ăg-ilis*, *ăg-o*;
ŏ-series: *fōd-i*, *fŏd-ere*.

C. *Vowel-changes.*—1. Contraction. Like vowels regularly contract (frequently, too, even when separated by *h*), e. g. *cōpia* for *coopia*; *prēndere* for *prehendere*; *nēmo* for *nehemo*; *nīl* for *nihil*. For unlike vowels the following principles prevail: *ea*, *eo*, *ia*, *iē*, *ua*, *ue* remain unchanged; so also all combinations where the second vowel is long and accented. In case of other combinations contraction takes place, and the quality of the first vowel prevails. Thus *a* + *ĕ* give *ā*, e. g. *amāre* for *amaere*; *a* + *ŏ* give *ā*, e. g. *mālo* for *ma(v)olo*; *ae* + *ĭ* give *æ*, e. g. *prætor* for *præ-ītor*; *e* + *ă* give *ē*, e. g. *dēgo* for *deago*; *o* + *ă* give *ō*, e. g. *cōgo* for *coago*; *o* + *ĕ* give *ō*, e. g. *prōmere* for *proemere*. 2. Parasitic Vowels. Before the liquids and nasals a parasitic vowel frequently develops. Before *l* and *m* this takes the form of *u* (earlier *o*), e. g. *poculum* for *po-clum*; *sæculum* for *sæctum*; *dracuma* for *dracma*; *volumus* for *volmus*. Before *n* the parasitic vowel takes the form of *i*, and is found chiefly in Greek loan-words, e. g. *mina* (*μνᾶ*), *techina* (*τέχνη*). Before *r* we have a parasitic vowel in words of the type of *ager* for *agr*; *acer* for *acr*. 3. Compensative Lengthening. A short vowel was often lengthened in apparent compensation for one or more omitted consonants. This phenomenon is chiefly, if not exclusively, confined to cases where one of the two consonants is *s*; the other is usually a liquid or nasal. Examples are *equōs* for *equŏns*; *pīlum* for *pinslum*; *luna* for *lucsna*; *subtemen* for *subtecsmen*; *dimoveo* for *dismoveo*. 4. Syncope. Many words show the dropping out of a short vowel, e. g. *ardor* for *aridor* (*aridus*); *audere* for *avidere*; *valde* for *valide*. So also words of the type of *ager*, *acer* arose by syncope from *agros*, *agrs*, etc. 5. Apocope. Final short vowels frequently disappear, e. g. *et* (*ἔτι*); *aut* for *auti*; *quot* for *quoti*; *tot* for *toti* (*toti-dem*), and in the personal endings of the primary tenses of the verb, e. g. *est* for *esti* (*ἐστί*); *regit* for *regeti*, etc. This phenomenon was originally confined to these cases where the following word began with a vowel. Then the apocopated form became general. 6. Assimilation of Vowels. Instances are *tugurium* for *teguri-um*; *homo* for *hemo*; *purpura* for *porpura*. The phenomenon is not frequent.

D. *Consonants.*—1. Liquids (*l*, *r*). These frequently interchange in order to avoid the repetition of either *l* or *r* in successive syllables, e. g. *militaris* for *militatis*; *lucrum* for *tuclum*; *cæruteus* for *cætuleus* (*cælum*). Sometimes the repetition is avoided by dropping a liquid, e. g. *præstigiæ* for *præstrigiæ*. By ablaut the liquids sometimes became in I.-E. sonant, and then developed as Latin *or* (*ur*), *ot* (*ul*), e. g. *porta* for *prtá*; *curvus* for *crvós*; *occultus* for *occltós*. 2. Nasals (*m*, *n*). These present few peculiarities as consonants, but like the liquids they often became in I.-E. sonant, and then commonly developed as *en* (*in*), *em* (*im*), e. g. *septem* for *septm*; *decem* for *decm*; *militem* for *militm*; *simptex* for *smplex*; *pinguis* for *pnguis*. 3. Mutes. Most important here is the development in Latin of the Indo-European voiced aspirates, *bh*, *dh*, *gh* palatal, and *gh* velar. These appear as follows:

Indo-Eur.	*bh*,	*dh*,	*gh* (palatal),	*gh* (velar).
Latin	*f* (initial),	*f* (init.),	*h* (init.),	*f* (init.).
	b (medial),	*d*, *b* (med.),	*h*, *g* (med.),	*gu*, *v* (med.).

Examples are: *fui*, root *bhu-*; *albus* for *albhos*; *fumus* for *dhumos*; *medius* for *medhyos*; *rubro-* for *rudhro-* (*b* before *r*); *hiems* for *ghiems*; *veho* for *vegho*; *ango* for *angho*; (*g* after *n*); *formus* for *ghormos*; *ninguit* for *sninghit* (*gu* after *n*); *nivis* for *snighis* (*v* between vowels). The last three examples illustrate the velar *gh*. The other Indo-European mutes *p*, *b* (labial), *t*, *d* (dental), *k*, *g* (guttural, including both palatals and velars), present, for the most part, few peculiarities in Latin. Final *p* in *op*, *ap*, *sup* (by apocope for *opi*, *apo*, *supo*; cf. Gr. *ἀπό*, *ὑπό*) was assimilated to *b* before an initial voiced consonant, and then the forms with *b* became general. *D* shows a tendency to become *l*, e. g. *solium* for *sodium* (*sedere*); *lingua* for *dingua*; *lacruma* for *dacruma*. Palatal *k* and *c* regularly become *c* and *g* in Latin; but velar *k* gives regularly *qu*, e. g. *quis*, *sequor*, *-que*, while velar *g* gives *v*, if initial, e. g. *vorare*, from root *gor-*, but *gu* after *n*, e. g. *stinguo*. 4. Spirants. *S* is of chief importance. Between vowels this became *r* (rhotacism) about the close of the Preliterary Period. The tradition of the older spelling survived, however, and the grammarians cite *arbosem*, *pignosa*, etc. Some apparent exceptions to rhotacism occur, e. g. *misi*, *causa* (for *mīssi*, *caussa*); also some real ones, e. g. *miser*, *basium*, *cæsaries*.

E. *Consonant Changes.*—1. Loss of Consonants. Many cumbersome consonant groups are simplified. Thus at the beginning of words, e. g. *locus* for *stlocus*; *sternuo* for *psternuo*; *tilia* for *ptilia*. So also in the process of inflection or word-formation, when three or more consonants come together in the interior of a word, all were regularly dropped except two, e. g. *suesco* for *suedsco*; *disco* for *didcsco*; *asporto* for *absporto*; but a mute and liquid may

stand with another consonant, e. g. *illustris*. 2. Assimilation. In the interior of words a voiced mute (*b*, *d*, *g*) regularly becomes voiceless before another voiceless mute or *s*, e. g. *scriptum* for *scrib-tum*; *scripsi* for *scrib-si*; *actum* for *agtum*. Analogously the first of two mutes is assimilated to the second. e. g. *succenseo* for *subcenseo*; so *bg* = *gg*; *bf* = *ff*; *dg* = *gg*; *df* = *ff*; *dc* = *cc*; *tc* = *cc*. So further *dl* = *ll*; *tl* = *ll*; *bn*, *pn* = *mn*; *ld* = *ll*; *ls* = *ll*; *rs* = *rr*. Nasals also adapt themselves to the following consonant, e. g. *quendam* for *quemdam*, etc. 3. Final Consonants. At the end of a word many consonant combinations were simplified: e. g. *lac* for *lact*; *cor* for *cord*; *pons* for *ponts*; *puls* for *pults*. 4. Other changes. Metathesis occurs in *nd* for *dn*, e. g. *fundus* for *fudnus*; *unda* for *udna*. So also with change of *t* to *d* in *pando* for *patno*; *tendo* for *tetno*. Initial *dj* became *j*, e. g. *Jupiter* for *Djeu-piter*.

F. *Dropping of Syllables.*—If two successive syllables are similar in sound one is often omitted, e. g. *lapicida* for *lapidicida*; *veneficus* for *venenificus*; *calamitosus* for *calamitatosus*.

Accent.

The Latin accent was essentially a stress accent, and not musical like the Greek. In the historical period the following principles for its position prevailed: 1. The accent was strictly limited to the last three syllables of a word. 2. Polysyllables were never accented upon the last syllable. 3. The accent stood upon the next to the last syllable, if that was long; otherwise upon the syllable preceding. Although the Latin accent was essentially a stress accent, yet there are good grounds for believing that Latin was accented less energetically in the historical period than are English or German, for example. In the prehistoric period, on the other hand, there is clear evidence that the accent was more strongly stressed. The accent was also much less restricted in position at that time than later, regularly receding to the initial syllable of a word. Thus such forms as *peperci*, *cecīdi* point to an earlier *péparci*, *cécœdi*, with strong accent on the first syllable; so also *exerceo*, *contubernalis*, *conficio* point to an original *éxarceo*, *cóntabernalis*, *cónfacio*. The principles laid down by Roman grammarians for the employment of the acute, grave, and circumflex accents in Latin are probably mere inventions modeled after the Greek accents. See Accent.

Inflection.

A. *Nouns.*—1. Cases. Of the eight Indo-European cases, the Latin recognizes only six in the regular declension of nouns: nominative, genitive, dative, accusative, vocative, ablative. The locative is preserved in town-names of *ā* and *o* stems, and in a few other words, e. g. *Romæ*, *Corinthi*, *humi*, *militiæ*, while the instrumental appears in the so-called dative and ablative plur. of *ā* and *o* stems (*mensis*, *hortis*), and probably also in the ablative sing. of consonant stems, e. g. *pede*. Moreover, in the so-called genitive sing. of *ā* and *o* stems (*mensæ*, *horti*) we probably have original locatives that have assumed genitive functions. All, therefore, of the eight Indo-European cases are actually represented in the Latin noun inflection. 2. Stem Formation. The stems of Latin nouns end in *-ā* (1st declension), *-o* (2d declension), consonants, *ĭ*, *ī*, *ū*, and diphthongs (3d declension), *ŭ* (4th declension), and *ē* (5th declension). All of these are inherited from the Indo-European parent-speech, except the last, which is an independent development of the Latin. 3. Case-endings. As regards case-endings, Latin nouns show peculiarities of two kinds. First, certain endings originally belonging to the pronominal declension have become attached to the noun-declension, e. g. the nom. plurals *mensæ* (for *mensās*), *horti* (for *hortōs*); also the gen. plurals *mensarum*, *hortorum*. Secondly, the original case-endings, particularly as added to vowel stems, have become much disguised as the result of phonetic changes. The following are the case-endings as they originally existed: Sing. nom. *-s* or lacking; gen. *-es* (rarely *-s*, *-os*); dat. *-ai*; acc. *-m*; voc. wanting; abl. *-ed*; loc. *-ĭ*; instr. *-ă*. Plur. nom. *-ĕs*; gen. *-ŏm*; dat. *-bos*; acc. *-ns*: voc. like nom.; abl. *-bos*; instr. *-eis* (?). Neuters of *o*-stems have *-m* in the nom. acc. sing.; neuters of consonant stems have no ending in the sing.: all have *-ă* in nom. acc. plur. Of the dual number no certain traces survive in the Latin noun. See Declension.

B. *Pronouns.*—Personal pronouns are formed from the stems *me-* and *nos-* for the 1st person; *tve-* and *vos-* for the 2d person; *sve-* is the stem of the reflexive. From all of these are formed possessive pronouns. Demonstratives are formed from the stems *ho-*, *ei-*. The stem of the Indo-European pron. *so*, *sā*, *tod* is probably to be recognized as the second member of the Latin demonstratives *iste*, *ipse*, *ille*. The relative and interrogative stems are *quo-* and *qui-*, corresponding to Greek *πο-*, *τι-*. The inflection of all these stems is extremely complicated.

C. *Verbs.*—1. Conjugations. The original distinction, still well preserved in Greek, between verbs with and without the thematic (connecting) vowel (*-ω* verbs, and *-μι* verbs) has almost totally disappeared in Latin. Nearly all Latin verbs are inflected with the thematic vowel. Vestiges of the unthematic conjugation are seen in *esse*, and in some forms of *ferre*, *velle*, *dare*, and a few others, e. g. *es-t*, *fer-t*, *vul-tis*, *dă-mus*. 2. Voices. The Latin recognizes only two voices, the active and passive—the latter distinguished by the peculiar endings in *-r*. The passive is really a development from the middle; it originally represented the subject as acting upon itself or in its own interest. Traces of this primitive middle force frequently appear, e. g. *galeam induitur*, "he puts the helmet on (himself)." 3. Moods. The Latin has an indicative, subjunctive, and imperative mood. Yet these do not always represent corresponding Indo-European formations. Thus the fut. perf. ind. is in origin a subjunctive. So also the fut. ind. in *-am*. The perf. subjv. (e. g. *viderim*) is in origin an optative, as are also the pres. subjunctives in *-im*, as *sim*, *velim*, etc. The Indo-European optative as a recognized mode has disappeared. Latin also has an infinitive, which is in origin a verbal noun in the dat. or loc. case. There are two verbal nouns (gerund and supine), and four participles. 4. Tenses. There are six tenses: the present, imperfect, future, perfect, pluperfect, future perfect. Of these the plup. ind. and subjv. are new creations of the Latin, being really aorist formations. The fut. perf. ind. also is in origin an aor. subjv. The perf. ind. is the result of the fusion of the true perfect with the aorist. The Latin also has developed several new types of this tense, viz., in *-si*, *-vi*, *-ui*. The imperf. and fut. in *-bam* and *-bo* (root *bhu-*, become) are new formations. The imperf. subjv. is historically an aor.; so also the perf. subjv. 5. Augment and Reduplication. The Indo-European augment (*e-*), the sign of past time, has totally disappeared, and the reduplication is no longer largely represented. 6. Personal Endings. The earliest endings were: act., primary, sing.; 1st pers. *-o*, 2d pers. *-si*, 3d pers. *-ti*; plu., 1st pers. *-mos*, 2d pers. *-tes*, 3d pers. *-nti*. Secondary, sing., 1st pers. *-m*, 2d pers. *-s*, 3d pers. *-t*; plu., 1st pers. *-mos*, 2d pers. *-tes*, 3d pers. *-nt*. Passive, both primary and secondary, sing., 1st pers. *-r*, 2d pers. *-ris* (*-re*), 3d pers. *-tur*; plu., 1st pers. *-mur*, 2d pers. ——, 3d pers. *-ntur*. The perf. ind. act. originally had special endings of its own, but in the fusion of perfect and aorist these disappeared.

Word-formation.

Words are formed either by appending suffixes or by composition. Of noun suffixes the commonest are *o*, *ā*, *tro*, *clo* (for *tlo*), *io*, *vo*, *no*, *mo*, *ro* (*ero*, *tero*), *lo* (*ulo*), *bro*, *to*, *co*, (*ĭco*, *īco*), all with corresponding *ā*-forms; *li* (*ri*), *tion*, *tat*, *en*, *on* (*ien*, *ion*), *men*, *tor*, *nt*, *os* (*es*). The comparative suffix was *ios*, that of superlatives originally *tumo-*. Verbs form their present stem from the root by the suffixes *o*, *no*, *sco*, *to*, *io*, *ao*, *eo*, *uo*. The commonest types of noun and verb compounds are those in which the first part is a preposition or one of the inseparable prefixes *re*, *in*, *dis*, etc., e. g. *com-par*, *re-dux*, *in-figo*.

Syntax.

Latin syntax at all periods, in conformity with the prevalent tendency of the language, was much less free than Greek; at the same time its modes of expression were logically more correct. In the cases the prominent *rôle* played by the ablative is especially noteworthy. This case, which formally was a result of the fusion of the true abl., the loc., and the instr., also performed the various functions of these three cases. It also developed certain new uses specifically Latin, e. g. abl. of quality, abl. of comparison, the abl. absolute. The use of cases with prepositions is somewhat restricted in Latin as compared with Greek. Neither the gen. nor dat. is construed with prepositions, and but few govern the abl. In the moods the Indo-European opt. and subjv. have become fused into one, yet their original syntactical functions are preserved. Thus we have a volitive (hortatory and jussive) use, descended from the Indo-European subjv.; on the other hand, we have the subjv. to express wishes and the notion of contingency or

possibility (potential subjv.). These last represent the Indo-European opt. From these primary functions of the subjv. have been developed a variety of special uses. In fact, the wide employment and manifold uses of the subjv. constitute one of the most characteristic features of Latin syntax. Noteworthy, too, is the great extension in use of the subjv. within the historical period, the climax being reached in Silver Latin. The aorist, though no longer recognized as such, nevertheless still survived in the so-called historical use of the perf. ind.; certain uses too of the perf. subjv. show the aor. origin of that tense.

Vocabulary.

One of the most significant features of the Latin vocabulary is the great number of Greek words which it has admitted—a natural result of Rome's great indebtedness to the Hellenic civilization. These loan-words, which entered the language early in Rome's history, in time were numbered by thousands, and came from every department of life and thought. Less numerous are loan-words from other languages. A few have been drawn from Keltic sources, e. g. *petorrita*; a few from other Italic dialects, e. g. *bos*, *popina*; from Etruscan, e. g. *histrio*; also from Oriental sources, chiefly Semitic and Egyptian.

Prosody.

The Latin within historical times gives clear evidence of the existence of two radically different metrical systems. The earliest Latin verse of which we have any knowledge—the so-called Saturnian—was, like English, an accented one, i. e. the essence of the verse lay in the succession of accented and unaccented syllables. This is in harmony with the theory above set forth concerning the strongly stressed character of the early Latin accent. The Saturnian verse was still in vogue at the dawn of Roman literature; but almost at the very outset of the literary period we note the rise of a metrical or quantitative verse, i. e. one in which the basal principle was a succession of long and short syllables. While there can be no doubt that the predominant influence of Greek literature had much to do with the rapid extension of the quantitative verse, yet it seems probable that the greatest cause of this was the change in the language itself, which had apparently largely lost its strongly accentuated character and become essentially quantitative.

Dialects.

As compared with Greek, Latin practically presents no dialectic variations. Like the Roman state, the Roman speech was, during its flourishing period, in the main homogeneous. In its earlier stages the only dialectic differences were those existing between the literary language and the language of common life, *sermo cottidianus*. The distinction between these two of course began to exist as soon as there was a literature, and was early recognized by the Romans themselves. Beginning with the days of Plautus and Terence the divergence between them became more and more pronounced with successive centuries until it culminated, in the latest period of the language, in the establishment of two independent idioms—the literary language and the *lingua rustica*, or the language of the people. The former of these remained the possession of scholars and the Church; the latter developed into the Romance, assuming a different character in the different provinces, Gaul, Spain, etc. Our sources of knowledge of the popular language are inscriptions and the later writers, particularly from the third century on. An earlier source of great value is Petronius's *Satiricon* (60 A. D.). Earlier still we find scattered specimens of the popular language in the comedians and the satirists.

The best general Latin grammar is that of Kühner, *Ausführliche Grammatik* (2 vols., 1877 f.). The grammars of Madvig and Roby are also of value. On pronunciation the most valuable work is that of Seelmann, *Die Aussprache des Latein* (1885); valuable too is that of Ellis, *Quantitative Pronunciation of Latin* (1876). On phonology and inflections the standard works are Brugmann's *Grundriss der vergleichenden Grammatik* (3 vols., 1886-93, incomplete) and Stolz's *Lateinische Grammatik* (vol. ii. in Müller's *Handbuch der Klassischen Altertumswissenschaft*, 2d ed. 1889). On syntax the leading special works are Schmalz in vol. ii. of Müller's *Handbuch*; Dräger, *Historische Syntax der Lateinischen Sprache* (2 vols., 2d ed. 1878 f.); and Delbrück in Brugmann's *Grundriss* (vol. iii., 1893, incomplete).

Charles E. Bennett.

Latin Literature: the literature of the people of Latium, especially of Rome. The literature of Rome is less original and complete than that of Greece, with which it stands most closely connected, but it can hardly be said to be less important. Roman law everywhere underlies the constitutions of Europe; the language of Rome is the parent of several of her chief tongues; her literature has always been the chief study of the schools; she has given to Christianity its nomenclature; and from her great power of assimilation and adaptation she has preserved to us whatever was most valuable of the Greeks, and probably of all other nations with which she came in contact.

The literary life of the Romans may be divided into three periods: (1) The Archaic Period, beginning A. U. C. 514 (B. C. 240), when Livius Andronicus exhibited the first regular drama in Latin at Rome; (2) the Middle Period, the Ciceronian and the Augustan age, which begins A. U. C. 671 (B. C. 83); (3) the Imperial Age, beginning A. D. 14.

The Archaic Period.—The earliest literature proper of the Romans, as of other nations, was poetic, and the earliest author Livius Andronicus, A. U. C. 470–550. He translated the *Odyssey* of Homer into Saturnians, and also rendered from the Greek tragedies, imitating the easier Greek meters. Cn. Nævius began to exhibit plays A. U. C. 519, and with more originality than Andronicus; he also wrote an epic in Saturnians, the *Bellum Pœnicum*. T. Maccius Plautus (*circa* A. U. C. 500–570) was a prolific writer of comedy. Of the plays ascribed to him, twenty-one were considered by Varro certainly genuine, of which we have twenty, with considerable fragments of the *Vidularia*, and nineteen others were probably genuine. He borrowed his plots from the Greeks, but worked them up with great ability. His measures are skillfully handled, and sometimes with harmonious effect; his diction is of great importance in the history of Latin. His plays long maintained their popularity, and have been extensively studied and imitated in modern times. Q. Ennius (A. U. C. 515–585) had a higher social and political position than the literary men that preceded him, and was the first to attain the full privileges of a Roman citizen. Cicero was very fond of him, and largely quoted him in his writings, and Horace styles him *Pater Ennius*, as the founder of Latin poetry. His greatest work was the *Annales*, or history of his nation, from the arrival of Æneas in Italy down to the poet's own time. He also wrote tragedies, mostly after Euripides and *Saturæ*—that is, probably, miscellaneous poems in various measures. We possess them only in fragments. M. Pacuvius (A. U. C. 534–622), the nephew of Ennius, was a painter and a poet. There are extant fragments of his tragedies imitated from Sophocles and Euripides; we have the titles of thirteen of his plays. To this period belong Statius Cæcilius, an able imitator of the Greek New Comedy, and Luscius Lanuvinus, the rival of Terence, against whom all the Terentian Prologues are directed except those of the *Hecyra*. P. Terentius (died A. U. C. 595) at an early age came from Carthage to Rome, where he was a slave of the senator Terentius, by whom he was educated and set free. He was intimate with Scipio Africanus the Younger, and hence the rumor that Scipio was the author or elaborator of the plays of Terence. Six comedies are extant, and probably these are all that he wrote. They were great favorities with the ancients, as they have been with the moderns. He has not the versatility of Plautus, neither has he his extravagance; his verse is not so varied, but it is more melodious; his language is truly Roman, and his phrases often reappear in the best works of the best period of the literature. His plays also have often been imitated in the modern drama. Roman prose, like English, was reached by an intermediate step, the earliest Roman historians employing the Greek language. These were Q. Fabius Pictor (*circa* A. U. C. 525) and L. Cincius Alimentus. M. Porcius Cato (A. U. C. 520–605) was the first real Latin prose-writer. His writings were numerous and various. He wrote *Origines* in seven books, an account of the Italian tribes, and published instructions on agriculture, health, and eloquence, but only his *De Agri cultura* has been preserved entire. There were orators of this period, as Q. Fabius Maximus, M. Cornelius Cethegus, the Gracchi, and others; and also jurists, as Sextus Ælius, who wrote the first Roman treatise on law. L. Accius or Attius (A. U. C. 584–668) wrote tragedies after the Greek, and dealt also with purely Roman subjects. He wrote other works, and resembled Ennius in the varied character of his writings, but he was more polished and accurate in style. L. Afranius (b. about A. U. C. 605) wrote *Fabulæ Togatæ*, of which we

have the titles. He combined the popular manner of Plautus with the elegance of Terence. C. Lucilius (A. U. C. 574–651) was the father of satire proper (*Hor. S.* ii. 1 and i. 10). His writings of this class were numerous, of which there have been preserved upward of 900 fragments, very valuable in the study of early Latin. An important literary work of Sulla's time, and one much copied and used in the Middle Ages, has come down to us in the *Rhetorica ad Herennium*, a complete manual adapted from Greek sources. It is by an unknown hand, not Cornificius.

The Middle Period.—This is the golden age of Latin literature, and may be subdivided into two periods, in the first of which, the Ciceronian, prose culminated; and in the second, the Augustan, poetry was pre-eminent.

The Ciceronian Age.—M. Terentius Varro (A. U. C. 638–727), styled by Quintilian *vir Romanorum eruditissimus*, of ancient family and senatorial rank, was an extensive writer, versatile in matter and in form. The total number of his works was seventy-four, of which four were written in verse. His prose-writings embraced literature, eloquence, history, jurisprudence, grammar, philosophy, geography, husbandry, and other subjects. M. Tullius Cicero (A. U. C. 648–711) was born near Arpinum in Latium; his father was a Roman knight. He was endowed with great talents, had iron industry, was kind and generous in his disposition, and cherished the loftiest aims. His tone of mind qualified him to become the interpreter and transplanter of Grecian culture and refinement. He was a true patriot and full of good intentions, but was without calmness and that courage which might have carried him safely through all the dangers and distractions which beset him. Cicero possessed, to a marvelous degree, the Roman power of appropriating and assimilating foreign ideas. He thus enriched Roman literature by introducing into it several new departments not previously attempted. He became the creator of a standard prose so refined and so suited to the genius of the Latin language that it was never afterward surpassed. The real business of Cicero's life appears in his legal and political speeches, and here his ability shows to the greatest advantage; the knowledge and experience gained in this career were turned to the highest account in the rhetorical treatises which he composed toward the end of his life. His later compositions also included political science, ethics, the philosophy of religion, and theoretic philosophy. Beside all this his extensive personal connections and his social disposition led to a voluminous correspondence. Of his speeches fifty-seven have come down to us; we have fragments of about twenty, and we know of thirty more delivered by him, making in all about 107. Of these the most famous are those against Catiline, for Milo, against Verres, and the second against Antony (*Tac., Dial. de Or.*, 37; *Juv., Sat.* 10, 125, *seq.*). In the case of Verres, Cicero prosecuted, and Hortensius, his great rival, defended; and Cicero by his success became head of the bar, *rex judiciorum.* The extant rhetorical works of Cicero are *Rhetorica*, or *De Inventione*, an immature work; *De Oratore*, written A. U. C. 699, composed, after the manner of Plato, in a dialogue, and between the two greatest orators of the preceding period, L. Crassus and M. Antonius, and several others; this work is one of the most elaborate productions of Cicero, varied in its contents and grand and eloquent in style; *De Claris Oratoribus*, or *Brutus*, a history of Roman eloquence; *Orator ad M. Brutum*, giving his ideal of an orator; *Partitiones Oratoriæ*, a sort of catechism of rhetoric; *Topica ad C. Trebatium*, an explanation of Aristotle's Τοπικά, written down from memory during a sea-voyage—a marvelous feat; *De Optimo Genere Oratorum*, forming the introduction to his translation of Demosthenes's and Æschines's speeches for and against Ctesiphon, which translation is lost. The four collections of letters that have come down to us, if we count in ninety addressed to Cicero, contain altogether 864, and are a treasure of contemporaneous history, and on some matters the sole authority extant. They consist of *Ad Familiares*, 16 books (A. U. C. 692–711); *Ad Atticum*, 16 books (A. U. C. 686–711); *Ad Quintum Fratrem*, 3 books (A. U. C. 694–700); *Ad M. Brutum*, 2 books (questioned by Markland, London, 1745, Meyer, 1881; defended by C. F. Hermann, Göttingen, 1844; Cobet, 1879, and others). Cicero studied philosophy originally to perfect himself as an orator, and in his later years wrote on the subject partly as a matter of ambition, and partly as a solace amid his troubles and in the thoughtfulness of declining life. Admirable as the matter sometimes is, and important as it sometimes is from the circumstance that it is our only means of knowing the system or view in question, the form is scarcely less admirable or important. Being the first Roman writer who treated philosophical subjects in a clear and elegant manner, he created the philosophical style in Latin. The following is a list of his extant works in this department: *De Republica*, 6 books, of which scarcely a third has reached us; *De Legibus*, perhaps in 6 books originally, of which we now possess only three and some fragments; *Paradoxa*, an exposition of six striking maxims of the Stoics; *Consolatio*, on his daughter's death, of which only fragments exist; *Hortensius*, on the praise of philosophy, now fragmentary; *De Finibus Bonorum et Malorum*, in 5 books, a compilation on the doctrines of the Greek sects concerning the Supreme Good and Evil, perhaps the most carefully elaborated of all his philosophical works; *Academica*, or doctrines of the Academy, originally in 2 books, afterward rewritten in 4 books; we have now the second book of the 1st ed., and of the 2d ed. the first part of the first book and some fragments; *Tusculanæ Disputationes*, in 5 books, on certain metaphysical and moral points; *Timæus*, a free rendering of Plato's dialogue of this name; *De Deorum Natura*, in 3 books, mainly excerpts from the Greek philosophers on this subject; *Cato Major*, or praise of old age, containing materials drawn from Plato, Xenophon, and others, with a careful delineation of Cato's character, finished in style and important in matter; *De Divinatione*, in 2 books, a supplement to *De Deorum Natura*; *De Fato*, now in mutilated form, attacking the views of the Stoics and defending those of the Academics; *Lælius*, or praise of friendship, largely drawn from Greek sources, composed in a highly interesting manner; *De Gloria*, in 2 books, now lost; *De Officiis*, in 3 books, addressed to his son to form his morals, hastily written and practical, containing some just and profound views and enlivened by illustrations from Roman history; *De Virtutibus* and *De Auguriis*, both lost. In the department of jurisprudence he wrote *De Jure Civili.* He made some attempts in history, as *Commentarius Consulatus Sui* and *Admiranda*, which are lost. In poetry this great prose-writer was little more than a versifier, and only subjected himself to the ridicule of the great poets, as Juvenal (*Sat.* 10, 124, *seq.*) and Martial (2, 89, 3, *seq.*). Cicero's freedman and friend, Tiro, survived him, and published his orations and letters, at least in part. C. Julius Cæsar (A. U. C. 654–710) had the most varied talents; he was second as an orator only to Cicero—was a historian, a grammarian, a great statesman and general. Of his literary works the most important has come down to us, *Commentarii de Bello Gallico*, in 7 books, and *De Bello Civili*, in 3 books; and after his death the last year in Gaul was narrated by Hirtius, and the Alexandrine, African, and Spanish wars by some unknown hands. Cæsar's style is a model of simplicity, precision, and directness, with little rhetorical ornament. Cornelius Nepos (A. U. C. 655–730), the friend of Cicero and Atticus, and also of Catullus, was a somewhat voluminous writer of history and biography, but only a portion of his *De Viris Illustribus* is extant. His style is graceful, but deviates in some points from classic usage. T. Lucretius Carus (A. U. C. 658–699) in his *De Rerum Natura*, in 6 books, treated of physics, of metaphysics, and the Epicurean ethics, in imitation of Empedocles and Ennius. This work is important as being the fullest exponent of the doctrines of Epicurus, and though written in an archaic style, it was composed with great mastery of thought and expression. He received little attention in his own age, but the Augustan poets admired and copied him. His work has been edited by the great Lachmann (Berlin, 1850), and by the accomplished English scholar, Munro (Cambridge, 1860; 4th ed. 1886). C. Sallustius Crispus (A. U. C. 668–720) devoted the last years of his life to history. Of his works we have *Bellum Catilinæ* and *Bellum Jugurthinum* complete; of his *Historiæ*, in 5 books, we have only fragments. Sallust was the first Roman historian who wrote according to fixed rules. Like his great model, Thucydides, he was sententious and concise, sometimes even to obscurity. He deviated from the usages of his time, perhaps largely through hatred of Cicero, and affected archaic diction. C. Valerius Catullus (A. U. C. 667–700), called by Teuffel the greatest lyric poet in Latin, and by Niebuhr the greatest poet Rome ever possessed, except perhaps some few of the earlier ones, followed at first the track of the Alexandrine poets, but afterward developed rich lyrical talent which was ripened by love and a bitter experience of life. The 116 pieces that have come down to us refer to such a variety of topics, are composed in so many different styles and meters, that it is hardly possible to classify them. Some

are strictly lyrical, one is a legendary heroic, two epithalamia, four may be called elegies, and several epigrams. His genius adorned whatever it touched, but many of his poems are defiled by gross coarseness and sensuality. P. Vergilius Maro (A. U. C. 684–735), by way of eminence the Roman poet, was alike distinguished for ability, learning, delicacy, and amiability. His extant poems are ten *Eclogæ* or bucolics, imitations and partly translations of Theocritus; *Georgica*, in 4 books, in which he partly availed himself of his own experience in youth and partly drew on the Greek writers, especially on Nicander and Hesiod, and partly on the Roman writers *De Rebus Rusticis*; the masterly diction of this work makes it the most perfect Roman poem as a work of art; the *Æneid*, in 12 books, on which Vergil spent the last ten years of his life, and dying regarded as in an unfinished state. In this poem, which has taken its place among the great epics of the world, Vergil partly availed himself of Greek models, and partly relied on his extensive studies in Italian legends, history, and localities. Beside these undoubtedly genuine works, we have several *Carmina Minora*, perhaps wrongly attributed to him. As to the form of his name, the inscriptions of the time of the Republic and of the first centuries of the Christian era are in favor of *Vergilius*; the earliest dated instance of the use of the form *Virgilius* belongs to the fifth century after Christ. Q. Horatius Flaccus (A. U. C. 689–746) has shared with Vergil the greatest popularity among all the Roman poets. The branch of poetry he first cultivated was satire; of this we have two books or eighteen pieces; his *Epodon Liber*, of about the same date, a sort of satire of a more special character, contains seventeen pieces. He afterward resolved to transplant Alcæus and Sappho into Roman soil, and the result is the three first books of the *Carmina* or odes, to which he added a fourth after an interval of about ten years. These are the most elaborate of all his works. The *Epistulæ*, 23 in number in 2 books, are of the same general character as the *Satiræ*, but being written in the maturity of his learning and ability, have higher qualities and are in a more perfect form; the third of the second book, the *Ars Poetica*, treating of æsthetic questions in the Greek style, is the most famous of the Epistles. Albius Tibullus (*circa* A. U. C. 700–735) followed the Alexandrine poets in his choice of amatory subjects; his representations are natural and his style very simple. We have four books of *Elegies* under his name, of which the third and part of the fourth are undoubtedly spurious; the third being by an imitator of Tibullus; Lygdamus is his real or fictitious designation. Sextus Propertius (*circa* A. U. C. 705–739) was also an elegiac poet, and a disciple of the Alexandrines, learned and often obscure, but lively and original. Five books of *Elegies* are extant. P. Ovidius Naso (A. U. C. 711–770), the most prolific of the great poets of Rome, was carefully bred as a pleader, but from natural bent turned off into the path of poetry. The following are his works now extant: *Heroides*, 21 letters in elegiac verse, feigned to have been written by ladies or chiefs in the heroic age; *Libri Amorum*, 49 elegies, chiefly amatory pieces; *Ars Amatoria*, a didactic poem in elegiac verse; *Remedia Amoris*, of the same character and form; *Metamorphoseon Libri XV.*, a collection of the most remarkable fables of classic mythology, in dactylic hexameters; *Fastorum Libri VI.*, an exposition in elegiacs of the festivals in the Roman Calendar; *Tristium Libri V.* and *Ex Ponto Libri IV.*, the former consisting of 50 elegies and the latter of 46, describing his sufferings on his way to exile and while he was in exile; *Ibis*, a poem in elegiacs written against an enemy whose name is concealed; *Halieutica*, a fragment in hexameters on fishes. Ovid had a most fertile mind, possessed great mastery of form, and treated his subjects with inimitable ease and grace, and had he been as refined as Vergil, he would have rivaled him in fame. T. Livius of Patavium (A. U. C. 695–770) was the most important prose-writer of the Augustan age. He wrote on philosophy and on rhetoric, but his great work was his *Ab Urbe Condita Libri*, or history of Rome from the foundation of the city to A. U. C. 745, in 142 books, of which only 35 are extant, being the first decade and books 21–45; but we have a summary, *Periochæ*, of most of the lost portion. For his matter he drew especially on Polybius and the later annalists; but his manner, eminently natural and lively, of relating events and of depicting moods and characters, was his own. His diction was wanting in strict classical Latinity; and its provincial characteristics were designated as *Patavinitas* (*Quint.* 1, 5, 56). Justinus, who probably lived early in the third century, abridged the *Universal History* of Trogus, a work in 44 books, written in the age of Livy. Vitruvius Pollio composed (c. A. U. C. 740) *De Architectura Libri X.*, and dedicated it to Augustus.

The Imperial Age, the Silver Age of Roman Literature. The First Century, A. D. 14–117.—C. Velleius Paterculus (A. D. 30) treated the history of the empire in his abridgment of Roman history in two books. His words are classical, but his style is affected and pompous. To the same period belongs Valerius Maximus, whose *Factorum et Dictorum Memorabilium Libri IX.*, addressed to Tiberius, is a compilation made without taste or discrimination. A. Cornelius Celsus, of the time of Nero, wrote on various practical matters, and composed an encyclopædia, of which the eight books treating of medicine alone have reached us. Phædrus, partly under Tiberius and partly under his successor, published his book of *Æsopean Fables* in good iambic senarii, and in good literary style. L. Annæus Seneca (4 B. C.–A. D. 65), the most brilliant figure of his time, in genius and culture may be compared with Ovid. His works were on a great variety of subjects, but composed with an aim to brilliancy rather than accuracy. Many of them are known only in fragments or by quotations. Among those extant may be mentioned *Epistulæ ad Lucilium*, *Apocolocyntosis*, a satire upon Claudius, *Dialogi*, and *Naturales Quæstiones*. We have also certain epigrams and tragedies attributed to Seneca. The latter, nine in number, agree in the main with one another and with the prose works of Seneca. Q. Curtius Rufus, under Claudius, wrote *Historiæ Alexandri Magni*, in 10 books, the two first of which are lost. He is rather a rhetorician than a historian, and in his style somewhat resembles Seneca. Contemporary with Seneca was Columella of Gades, who wrote *De Re Rustica*, in 12 books. Under Caligula or Claudius, Pomponius Mela wrote his *De Chorographia*, in 3 books, the earliest geography we possess. A. Persius Flaccus (A. D. 34–62) wrote some compositions that have been lost, and six satires, which are mostly reflections on tenets of the Stoics, with extensive employment of Horatian words and phrases. M. Annæus Lucanus, a friend of Persius and nephew of Seneca (A. D. 39–65), wrote on various subjects in prose and verse. We have his *Pharsalia*, in 10 books, an unfinished epic on the civil war between Pompey and Cæsar. It is historically accurate, but the style is artificial and pathetic, possessing great beauties and great defects. In Nero's time arose that ethical novel which we have under the name of Petronius Arbiter. Originally a large work, it is now a heap of fragments, the largest of which is the *Cena Trimalchionis*. C. Plinius Secundus, Pliny the Elder (A. D. 23–79), an officer and inspector of finance, was also a person of great and diverse literary activity. Of his works there is extant only his *Naturalis Historia*, in 37 books, a sort of encyclopædia of natural science. It was compiled from a great number of authors, and is remarkable for the extent of its information, but bears marks of haste, and is composed in an uneven style. It long enjoyed great authority. The only poet of the time of Vespasian that has come down to us is Valerius Flaccus, whose *Argonautica*, in 10 books, is an imitation of Apollonius of Rhodes. The style is pretentious and the phraseology mostly derived from Vergil. Under Domitian wrote C. Silius Italicus (A. D. 25–101), originally a politician, then a literary man. He wrote the *Punica*, a poem in 17 books, deriving his matter from Livy and Polybius, and in style imitating Homer and Vergil. At the same period (A. D. 40–96) lived P. Papinius Statius. His earliest and largest work was the *Thebais*, in 12 books, drawing on Antimachus for material and following Vergil in form; he left his *Achilleis* unfinished; his *Silvæ*, in 5 books, are very interesting, forming valuable sketches of the time. Mostly under Domitian also flourished M. Valerius Martialis (A. D. 40–104); we have by him fifteen books of epigrams, turning on the social life of Rome in those days, with all its grossness and servility. Martial appears in these writings almost equal to Ovid in ease and elegance of poetic form, but sinks quite below him in moral degradation. M. Fabius Quintilianus (A. D. 35–95) holds a high place among the prose-writers of this period. Educated at first for the bar, he afterward became the most distinguished teacher of eloquence in Rome. He composed a work, which is lost, on the causes of the decay of oratory; we happily still possess his great work *Institutio Oratoria*, in 12 books, on the complete training of the orator. This work is very valuable for its matter, and treats the subject in an interesting and judicious manner. Quintilian was sensitive to the faults of the diction of his period, and continually reverts to the earlier and better usage, never wearying of

praising and recommending Cicero; but Quintilian's own style seems artificial and ungraceful to the admirers of that consummate writer. Sextus Julius Frontinus (A. D. 40–103), a distinguished engineer, has left records of his experience and studies; we have extant *Stratagemata*, a work on tactics, and *De Aquis Urbis Romæ*, in 2 books, written in a concise and refined style. The most eminent poet of the time of Trajan is D. Junius Juvenalis (A. D. 56–140), who turned from the study of oratory and the pursuits of war to the study of poetry. We have by him sixteen satires, the last of which betray the infirmities and faults of age. The earlier satires depict the vices of Roman society in a manner always interesting, and sometimes horribly vivid. His style is concise, energetic, and always suited to his theme, only he indulges now and then in a flash of sarcastic wit even in his most grave passages. Among the prose writers of the time of Trajan, the first place has been conceded to P. Cornelius Tacitus (A. D. 55–119). His extant works are *Dialogus de Oratoribus*, composed with a fullness and grace not found in Tacitus's other writings; *Agricola*, a valuable biography of his father-in-law, reminding us now of Sallust, now of Cicero; *Germania*, written in a sympathetic spirit and with a highly rhetorical coloring; *Historiæ*, a narrative chiefly of the Flavian dynasty (A. D. 69–96), originally in fourteen books, of which only the four first and the first half of the fifth have come down; *Annales*, or *Ab Excessu Divi Augusti*, in 16 books, a history of A. D. 14–68, of which we now have only the first and the last third. His style is peculiar; it is concise often to harshness, audacious in its irregularities, and withal of a poetic coloring; it is commonly sententious, but on occasions grand and sonorous, and then reminds us of the best periods rounded by the hand of Cicero. C. Plinius Cæcilius Secundus, Pliny the Younger, nephew and adopted son of Pliny the Elder (A. D. 62–113), was a fluent, smooth, and interesting writer. We have of him the speech, commonly called *Panegyricus*, in which he returned thanks to Trajan for the consulate; *Epistulæ*, composed with a view to publication, in 9 books; and *Epistulæ Plinii et Trajani*, belonging chiefly to the years 111–113, when Pliny was governor of Bithynia.

Of the second century of the Christian era are Suetonius, the author of the *Lives of the Twelve Cæsars*; Florus, who wrote an abridgment of Roman history; Terentius Scaurus, the grammarian; the jurists Ulpius and Gaius; the antiquary Aulus Gellius, author of the *Noctes Atticæ*; Apuleius, author of the *Metamorphoses*; Minucius Felix, whose *Octavius* is the earliest extant work of Christian Latin literature; Tertullian, a defender of Christianity; Acron and Porphyrion, the classic commentators; Terentianus Maurus, a writer on meters; the *Versio Vetus* of the Bible, afterward revised and called the *Vulgata*. In the third century we find the jurists Ulpian and Julius Paulus; Cyprian, Bishop of Carthage, chiefly an apologist; Arnobius, a Christian apologist, and Lactantius his pupil, the most elegant of all the Christian Latinists. To the fourth century belong Nonius the lexicographer; the grammarians Victorinus and Donatus; Eutropius the historian; the theologian Hilary; the poet Ausonius; Damasus, one of the earliest writers of Christian hymns; Ammianus the historian; the grammarian Servius; St. Ambrose, whose hymns approach classical perfection; St. Jerome, the translator of the Bible and reviser of the earlier version; Prudentius, the greatest of the Christian poets; Claudian, the last classic poet; and St. Augustine, the theologian, the greatest of the Latin Fathers (the last four extending also into the fifth century). This period, the period of decay, can not well go beyond the time of the philosopher Boethius, *circa* A. D. 524, and certainly not beyond the age of Justinian, under whom the great *Corpus Juris* was drawn up, toward the middle of the sixth century. Later writers will be found considered under their respective names.

Authorities.—Teuffel, *Geschichte der Römischen Literatur, neu bearbeitet von L. Schwabe* (Leipzig, 5th ed. 1890; English translation by Warr, London, 1891–92); Schanz, *Geschichte der Römischen Literatur bis zum Gesetzgebungswerk des Kaisers Justinian* (1st part, Munich, 1890; 2d part, 1892); Ribbeck, *Geschichte der Römischen Dichtung* (Stuttgart i., 1887; ii., 1889; iii., 1892); Manitius, *Geschichte der Christlich-lateinischen Poesie* (Stuttgart, 1891); Ebert, *Allgemeine Geschichte der Literatur des Mittelalters im Abendlande* (Leipzig, Bd. i., 2d ed. 1889); Patin, *Études sur la poésie latine* (Paris, 1883); Simcox, *A History of Latin Literature from Ennius to Boethius* (2 vols., London and New York, 1883); Sellar, *The Roman Poets of the Republic* (Oxford, 1892), *Vergil* (1891), *Horace and the Elegiac Poets* (1892); and Mayor's *Bibliographic Clue to Latin Literature*.

Revised by M. Warren.

Latin Union: an international monetary association formed by the treaty of Dec., 1865, between France, Switzerland, Italy, and Belgium; Greece and Roumania afterward became members. The convention prescribed the denomination, weight, and fineness of coins to be struck by each of the contracting parties in general conformity to the French system as then modified. By the terms of the treaty the coinage of gold and of five-franc silver pieces of full legal-tender value was unlimited at the ratio of $15\frac{1}{2}$ kilogrammes of silver to a kilogramme of gold. All other silver coins were to be coined on government account, and made subsidiary. While silver was redeemable in gold, the chief object of the union was to establish an identical coinage to be taken as legal tender in each country, and the introduction of bimetallism was only incidental. On account of the depreciation of silver the coinage of the five-franc silver pieces was limited in 1874, and suspended in 1876. In the subsequent conferences of the union other important modifications were made in the treaty, which was renewed in 1885 by France, Italy, Greece, and Switzerland for five years, and has since been renewed. Upon the expiration of the convention each country may return the silver which it has received from the other members of the union, but must accept its own silver in return. A system of coinage similar to that of the Latin Union is employed in Finland, Roumania, Spain, Servia, and to a certain extent in several of the South American republics.

Lati'nus: a King of Latium; according to the common tradition, a son of Faunus and the nymph Marica, and the father of Lavinia, whom he gave in marriage to Æneas. Besides this there were many other different traditions concerning his descent and history.

Latitude [viâ O. Fr. from Lat. *latitu'do*, breadth, width, deriv. of *la'tus*, broad, wide]: on the earth, the distance of a place from the equator measured on the meridian passing through the place, and expressed in denominations of circular measure. To the ancient geographers the largest dimension of the known world was that which lay in the direction E. and W. Hence distances measured E. or W. from a meridian assumed as an axis of reference were called longitudes (Lat. *longitudo*, length), and those measured in the transverse direction, latitudes (Lat. *latitudo*, breadth). Geographical or astronomical latitude is the angle which the vertical line (or perpendicular to the horizon) at the place makes with the plane of the equator; but as the earth is not truly spherical, this vertical is not coincident in direction with the radius drawn to the place from the earth's center except on the equator and at the poles. The angle made by this radius with the plane of the equator is called the geocentric latitude. The astronomical latitude is also equal to the elevation of the pole above the horizon. Hence, if there were a star situated truly in the pole of the celestial sphere, the latitude of any place at which such star could be seen could be determined by the simple observation altitude of that star, correction having been made for the effect of atmospheric refraction. As the star called the pole-star is not truly in the pole, when it is observed for latitude further and more important corrections are necessary for its position at the time of observation relative to the true pole. A meridian observation of any star or other celestial body, whose declination (distance from the equinoctial or celestial equator) at the time of observation is known, affords an easy means of determining latitude. Meridian observations of stars passing near the zenith furnish the most satisfactory results, being but little affected by refraction. See Earth.

Latitude in the heavens is the distance, in angular measure, of any celestial object from the ecliptic, or plane of the earth's orbit, measured on a secondary (that is, a circle perpendicular) to the ecliptic. The latitude is called geocentric if given as it would seem if observed from the center of the earth, and heliocentric if given in like manner as if observed from the center of the sun.

Revised by S. Newcomb.

Latitudinarians [from Mod. Lat. *latitudina'rius*, embracing a wide circle, having free scope, deriv. of Lat. *latitu'do*, breadth, deriv. of *la'tus*, wide, broad]: a term applied to a party in the Church of England, corresponding to what is styled the Broad Church party. Their chief seat was Cambridge, and the reign of Queen Anne was their most

flourishing period. The Latitudinarians attempted to unite the Puritan and Presbyterian elements with the national church. They were strongly Protestant and Low Church in feelings, and generally Arminian or indifferent in doctrine. Burnet, Whiston, Tillotson, Chillingworth, Cudworth, More, Gale, and Wilkins were among their greatest names. The modern Broad Church party is sometimes called Latitudinarian. Revised by W. S. Perry.

La'tium: the region of Italy lying between the Apennines, the Tiber, and the Mediterranean, and eventually stretching to the S. as far as the Liris, the boundary of Campania. It is a plain of volcanic origin, from which arises an isolated mountain range, of which the Mons Albanus is the most conspicuous elevation. The other eminences of this plain, such as the hills on which Rome is built, are due to erosion. By neglect of the watercourses a large portion of Southern Latium had even in antiquity become transformed into vast marshes, while the region about Rome, the so-called Campagna, which in antiquity was the most fertile part of Italy, is now a barren and unhealthful waste for the same reason. See Latini. G. L. Hendrickson.

Lato'na: See Leto.

Latop'olis: See Esneh.

La Tour d'Auvergne, laă'toor'dō'vărñ', Théophile Malo Corret, de: soldier; b. at Carhaix, Brittany, France, Nov. 23, 1743; was educated at the college of Quimper; was a captain at the outbreak of the Revolution; fought with brilliant success in the republican armies of the Alps and the Pyrenees, and became the commander (although still retaining the title of captain) of a vanguard of 8,000 men, composed of grenadiers, which soon became famous as the Infernal Column, and more than once decided the battle by its irresistible impetuosity. In 1795 he retired from service on account of ill-health, and making a sea-voyage he was taken by a British cruiser and held as a prisoner of war till 1797. He re-entered the army as a substitute for the last son of one of his friends; fought under Masséna in Switzerland, and then at the head of his own company in Germany, where he fell at Oberhausen, Bavaria, June 27, 1800. His indomitable courage, his noble pride, and the generosity and simplicity of his character made him the idol of the soldiers. After death his heart was embalmed and carried in a silver vase by his company, and his name called at roll till 1814, the oldest sergeant answering, "Died on the field of honor." Revised by C. K. Adams.

La Trappe, laa-traăp': a retired valley in the department of Orne, Normandy, France; 8 miles N. of Mortagne. Here in 1140 a Cistercian abbey was founded with very severe rules, from which originated the celebrated religious order known as the Trappists (*q. v.*).

Latreille, laă'trā'eel', Pierre André: naturalist; b. at Brives, in the department of Corrèze, France, Nov. 29, 1762; studied first theology, and was ordained priest in 1786, but devoted himself afterward to the study of entomology; became superintendent of the entomological division of the Museum of Natural History at Paris in 1798, member of the Academy of Sciences in 1814, and professor of zoölogy after the death of Lamarck in 1829. D. Feb. 6, 1833. The most prominent of his numerous and voluminous writings are *Histoire naturelle des Crustacés et des Insectes* (14 vols., 1802–05); *Genera Crustaceorum et Insectorum* (4 vols., 1806–09); *Cours d'Entomologie* (1831). He also wrote parts of Buffon's *Natural History* and the entomological part of Cuvier's *Règne animal*.

La'tro, Marcus Porcius: orator and author; of Spanish birth; flourished in Rome in the time of Augustus. He is highly spoken of by Quintilian, and also by the elder Seneca, who had known him from boyhood, and who has given in his *Controversiæ* interesting details of his personal and professional character, and specimens of his declamations. Among his pupils was the poet Ovid. He died B. C. 4, having taken his own life, according to Jerome, while suffering from a severe fever. His writings have perished. The *Declamatio in C. Sallustium Crispum* and the *Declamatio in Ciceronem* have been ascribed to him without sufficient reason. See Lindner, *De M. Porcio Latrone Commentatio* (Breslau, 1855); Froment, *Porcius Latro, ou la déclamation sous Auguste* (Bordeaux, 1882). Revised by M. Warren.

Latrobe, la-trōb': borough; Westmoreland co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Loyalhanna creek, and the Ligonier Valley and the Penn. railways; 41 miles E. of Pittsburg. It has coke, coal, steel, mower, reaper, and brick works, machine-shops, paper-mill, brewery, and a daily and a weekly newspaper. In the vicinity are St. Vincent's monastery and St. Xavier's convent. Pop. (1880) 1,815; (1890) 3,589; (1900) 4,614.

Editor of "Evening Clipper."

Latrobe, Benjamin Henry: architect and engineer; b. in Yorkshire, England, May 1, 1764 or 1767; was educated at the University of Leipzig; served in the Prussian army (1785); returned to England; studied architecture; became surveyor of public offices of London (1788); removed to the U. S. in 1796, built the bank of Pennsylvania, the Schuylkill water-works, the cathedral and exchange at Baltimore, completed the Capitol of the U. S. in Washington, and began the work of rebuilding it after its destruction by the British in 1814; built steamboats at Pittsburg in the same year. D. at New Orleans, Sept. 3, 1820. He published *Anniversary Oration before the Society of Artists of the United States, May 8, 1811* (Philadelphia, 1811).

Latter-Day Saints: See Mormonism.

Lauban, low'băn: town of Prussia, province of Silesia, on the Queiss; 15 miles by rail E. of Görlitz (see map of German Empire, ref. 4–H). It has a bell-foundry, several breweries, and manufactures of cotton and linen goods, cloth, and tobacco. Pop. (1890) 11,958.

Laube, low'be, Heinrich: b. at Sprottan, Silesia, Sept. 18, 1806; studied theology at Halle and Breslau, but soon devoted himself to journalism and literature. In 1832 he settled in Leipzig and edited the *Zeitung für die elegante Welt*, in which he defended the revolutionary ideas of Young Germany, a literary movement which was led by Heine and Gatzkow. He was in consequence of his participation in this and other revolutionary movements expelled from Saxony, and later on imprisoned. As soon as he was set free he turned to Paris, where he stayed for several years, traveling much in France in the meantime. After his return to Germany he resumed the editing of the journal mentioned above, but this time devoted his attention chiefly to the drama. In 1848 he was elected to the Frankfort Parliament, but resigned his seat as soon as he was convinced that the political regeneration of Germany could not be attained by that body. He was in 1849 appointed director of the famous Burgtheater of Vienna, and entered upon the most successful period of his literary and artistic activity. From 1867–70 he occupied a similar position as director of the Stadttheater of Leipzig. In 1871 he returned to Vienna and founded a new theater, which he successfully conducted until 1879, when he retired into private life. He died Aug. 1, 1884. Laube's earlier writings, in which he proclaims the gospel of Young Germany, and which are characterized by a frivolous sensuality, must be distinctly separated from his later productions, which are chiefly dramatic. Though his dramas (*Monaldeschi*, 1845; *Rococo*, 1846; *Struensee*, 1847; *Die Karlsschüler*, 1847; *Graf Essex*, 1856; *Demetrius*, 1872, etc.) are not the works of a genius of the first order, they display, nevertheless, great plastic power and a perfect mastery of the technicalities of the stage. As the artistic manager of the Burgtheater, Laube became a reformer of dramatic art in Germany. Possessing the rare gift of detecting and developing individualities among the actors, he was able to surround himself with the best talent, carefully trained by himself. It was chiefly due to his untiring efforts that the Vienna Burgtheater became the leading stage of Germany and the best school for German actors.

Julius Goebel.

Laud, William: archbishop; b. at Reading, Berkshire, England, Oct. 7, 1573; was the son of a rich clothier; entered St. John's College, Oxford, in 1589; became a fellow in 1593; became master of arts in 1598, and was ordained a priest in 1601. From 1601 to 1621, when he was consecrated Bishop of St. David's, he held several minor positions. In 1607 he was appointed vicar of Stanford, Northamptonshire; in 1609 rector of West Tilbury, Essex; in 1611 president of St. John's College, Oxford; in 1615 archdeacon of Huntingdon, and in 1616 dean of Gloucester. In all these positions he plainly showed his character and ability, and by degrees he attracted the attention of James I. He was a learned man and a liberal supporter of learning; an exemplary clergyman, energetic, dignified, and benevolent to the poor; but he thoroughly distrusted the Puritans, and the fearlessness and consistency with which he resisted their encroachments upon the establishment gained for him the implacable hatred of this powerful

body. He was a churchman as well as a theologian. In 1617 he accompanied King James to Scotland, and an attempt was made to introduce episcopacy into the government of the Scotch Church, but it failed. By Charles I. Laud was made dean of the chapel royal, then dean of Westminster, and in 1626 was transferred to the see of London. In 1624 he was made a member of the court of high commission, in 1627 a privy councilor, and after the assassination of Buckingham he became Prime Minister (1628). In 1630 he was chosen chancellor of the University of Oxford, and in 1633 he was made Archbishop of Canterbury. These powerful and influential positions he used with more zeal than prudence to carry out his ecclesiastical views. The Puritans were everywhere and in every way repressed. Those who would not conform to the Established Church were fined, imprisoned, branded on the forehead, and exiled; in some cases they even had their ears cut off and their noses slit open. This was the work of the court of high commission, of which the primate was a member. Besides these harsh measures, in order to compel people to conform to the Established Church, that which the archbishop did to perfect the institution itself was rather of a character to increase its ceremonial and make its worship more beautiful than to bring it into conformity to the prevailing simplicity of religious service, which the Puritan party sought to bring about. Laud issued regulations with respect to the proper place of the altar, the manner in which the altar ought to be railed in, the republication of the *Declaration of Sunday Sports*, etc. The result was a deep and implacable hatred on the part of the Puritans, which was not appeased even with the archbishop's blood. In 1635 a new attempt was made to introduce the episcopacy into the Scotch Church, and this time it led to the Scotch rebellion, which ushered in the English revolution. When in 1640 the Long Parliament met, the archbishop was impeached for high treason, and by order of the Commons was brought to the Tower. There he remained three years, exposed to many indignities. At last his trial came on, and although he defended himself admirably, and was not found guilty by the Lords, the Commons sentenced him to death, and gave orders for his execution, which took place Jan. 10, 1645, on Tower Hill, London. He died, as he had lived, for the Church of England, and he is regarded by High Churchmen as a saint and martyr. He was a friend of learning, and in his controversy with Fisher, the Jesuit, on the claims of the Papal Church he showed his freedom from any tendency toward Rome. His life-work, to quote his own words, was a continued effort "that the external public worship of God—too much slighted in most parts of this kingdom—might be preserved, and that with as much decency and uniformity as might be, being still of opinion that unity can not long continue in the church when uniformity is shut out at the church doors." His *Diary* and his letters are of great historical interest. The best source of the biography of Laud is in the last two volumes of his works (published in the Anglo-Catholic Library, Oxford, 1847–57), edited by Dr. James Bliss. The opposite view of his character and measures will be found in Prynne's *Canterbury's Doom*. See also the *Life* by A. C. Benson (London, 1887), and that by "A Romish Recusant" (London, 1894). Revised by W. S. Perry.

Laudanum [orig. variant spelling of Ladanum (*q. v.*)]: the tincture of opium, made by percolating the dried and powdered drug in alcohol. It is a valuable opiate, though of variable strength. It ought never to be given to young children as a domestic remedy. It has a more stimulant and astringent effect than morphine, and frequently causes headache. See Opium.

Lauder, William: author; b. early in the eighteenth century; was educated at Edinburgh University; published in 1739 a collection of modern Latin verse; and, becoming a teacher of Latin in London, contributed to *The Gentleman's Magazine* in 1747 a series of articles attempting to prove that Milton had in his *Paradise Lost* borrowed largely from modern Latin poems by Grotius, Masenius, and others. These essays were reprinted in a volume in 1751, with a preface by Dr. Samuel Johnson, but it was soon ascertained that the work was an imposture, the parallel passages quoted being either forged or taken from a Latin translation of *Paradise Lost*. Lauder confessed his offense and went to Barbados, where he died in 1771.

Lauderdale, James Maitland, Eighth Earl of: statesman and economist; b. in Scotland in 1759; entered Parliament in 1780; was one of the managers of the impeachment of Warren Hastings in 1788; succeeded to the title in 1789, and was elected one of the sixteen representative peers of Scotland; favored the French Revolution; visited France and formed an intimacy with Brissot and the leading Girondists; energetically opposed all the war measures of Pitt; resigned his seat as representative peer; became a citizen of London, and ran unsuccessfully for sheriff; wrote much upon finance and Indian affairs, and on the accession of the Whigs in 1806 became a baron of the United Kingdom, privy councilor, and chancellor of Scotland. In Aug., 1806, he was charged with an unsuccessful mission to France to treat for peace; resigned the chancellorship the next year; continued in the House of Peers to oppose the war policy; in 1816 endeavored to obtain the release of Napoleon from St. Helena by act of Parliament. He published in 1804 a very popular work, *An Inquiry into the Nature and Origin of Public Wealth*, in 1809 a treatise on the system of government for India, and several pamphlets, chiefly on questions of public finance. D. Sept. 13, 1839.

Lauderdale, John Maitland, Duke of: statesman; b. at Lethington, Scotland, May 24, 1616; was educated as a rigorous Covenanter; was commissioner to treat with Charles I. in his prison in the Isle of Wight, and obtain the signature of the treaty known as the "Engagement" (Dec. 26, 1647), by which the king was again recognized in Scotland; was the chief favorite of Charles II. during his brief rule in Scotland (1649–51); was taken prisoner at the battle of Worcester (Sept., 1651), and remained nine years in the Tower and other prisons; was made Secretary of State and high commissioner in Scotland by Charles II. in 1660; received in rapid succession all the highest posts in Scotland, of which kingdom he was the virtual ruler for many years; was created Duke of Lauderdale in 1672; raised to the English peerage in 1674 as Earl Guilford, and sworn to the privy council, forming a member of the celebrated *Cabal* ministry. He was a flatterer of Charles, and has been painted in the darkest colors by Macaulay in his *History of England*. D. at Tunbridge, Aug. 20, 1682.

Laudon, low'dōn, Gideon Ernst, von, Baron: Austrian general of Scottish descent; b. at Trotzen, Livonia, in 1716, and entered in his fifteenth year the Russian military service, but was dismissed after the Peace of Belgrade (1739) with the rank of lieutenant. He offered his services to Frederick II. of Prussia, but was not accepted, because, it is said, his personal appearance was displeasing to the king. He then went to Vienna, was employed as a captain, and fought in the Bavarian and in the second Silesian war with distinction, but without promotion. After the peace he was removed to a regiment stationed on the Turkish frontier, and here he was nearly forgotten. In the first year, however, of the Seven Years' war he distinguished himself as colonel of a regiment of Uhlans, and in 1757 was made a general. At Kunersdorf (Aug. 12, 1759) he decided the battle and turned the victory which the Prussians had gained over the Russians into a complete rout of the Prussian army. Having been made a field-marshal and placed at the head of an independent corps of 30,000 men, he defeated the Prussians once more at Landshut (June 23, 1760), and took Schweidnitz (Oct. 1, 1761). His strategical skill in the conduct of his troops won the admiration of Frederick the Great, who considered him a master in the art of making a retreat serve the purpose of victory. After the Peace of Hubertsburg he lived in retirement on his estates, engaged in studies, until Joseph II. placed him in command of the whole Austrian army in the war against the Turks. The campaign was a most brilliant one; the Turks were repeatedly defeated and Belgrade was taken. In the Bavarian war of succession he commanded the Austrian army, and succeeded in placing the Prussian armies in a very difficult position when peace was concluded. The Austrian empire gave him the title of generalissimo. D. at Neutitschein, July 14, 1790. See Janko, *Leben des Feldmarschalls von Laudon* (Vienna, 1869). Revised by F. M. Colby.

Lauenburg, low'en-boorch: district in Schleswig, Prussia; on the right bank of the Elbe, between Holstein and Mecklenburg. Lauenburg was founded as a duchy in 1260 by Johann, son of Albrecht I. of Saxony, and in 1702 came into the possession of Duke Georg Wilhelm of Celle, who paid to Saxony an indemnity of 1,000,000 thalers. It was incorporated with the French empire in 1810, was restored to Hanover after the battle of Leipzig in 1813, was ceded to Prussia in 1815, and transferred to Denmark. In 1864 it

was ceded to Austria and Prussia, in the following year was acquired by the King of Prussia on payment of 1,875,000 thalers, and in 1876 was merged in Prussia. Area, 456 sq. miles. Pop. (1890) 48,874. B. B. Holmes.

Lauenburg: town; in the province of Pomerania, Prussia; on the Leba; 38 miles N. W. of Dantzic (see map of German Empire, ref. 2–I). It has manufactures of linen and woolen fabrics, and valuable fisheries. Pop. (1890) 8,050.

Laughing-gas: See Nitrous Oxide.

Laughing Jackass: See Dacelo.

Laughlin, lawch'lin, James Laurence, Ph. D.: professor of political economy; b. at Deerfield, O., Apr. 2, 1850; educated at Harvard College; appointed instructor in Political Economy at Harvard 1878; assistant professor 1883–87; president of Philadelphia Manufacturers' Mutual Fire-insurance Company 1888–90; Professor of Political Economy and Finance at Cornell 1890–92; became head Professor of Political Economy at University of Chicago 1892. He has published *Saxon Legal Procedure* (1871); Mill's *Political Economy* (abridged edition, 1884); *The Study of Political Economy* (hints to students and teachers, 1885); *The History of Bimetalism in the United States* (1885); *The Elements of Political Economy* (1887). C. H. Thurber.

Laughter, läf'ter [M. Eng. < O. Eng. *hleahtor*: O. H. Germ. *hlahtar* > Mod. Germ. *ge-lächter*]: the expression, principally through the muscles of the face and of respiration, of pleasurable emotion. The angles of the mouth are drawn backward and upward, the upper lip is slightly raised, the lower eyelids are partially closed, and to a lesser extent the upper lids, smoothing the brows and wrinkling the skin at the outer angle of the eyes. The latter acquire a bright appearance. With an increase of emotion the mouth opens and the facial movements mentioned become more decided. A deep inspiration occurs, followed by short, jerky expiratory movements, particularly of the diaphragm, producing, by the expulsion of air between the vocal chords, the voice-sounds recognizable to the ear as a laugh, differing from a cry of distress, in that the latter has a short inspiratory and a prolonged expiratory sound. When laughter becomes violent, the respiratory movements are greatly increased; the heart beats excitedly; the face becomes congested; tears flow; the whole body may be arched forward, more frequently backward, and various purposeless movements are made by the arms and legs, while involuntary excretions may take place. See Spencer, *The Physiology of Laughter*, in *Illustrations of Universal Progress*; Darwin, *The Expression of the Emotions in Man and Animals*; Bell, *Anatomy of Expression*; Mantagazza, *La Physionomie et l'Expression*. Revised by J. Mark Baldwin.

Laugier, lō'zhi-ā', Auguste Ernest Paul: astronomer; son of André Laugier, chemist (1770–1832); b. in Paris, Dec. 22, 1812; studied astronomy under Arago; obtained a post in the observatory at Paris; made important discoveries in regard to magnetism, comets, eclipses, meteors, and solar spots; made improvements in astronomical clocks; determined the exact latitute of the Paris observatory (1853), correcting previous errors; published a catalogue of fifty-three nebulæ, and another (1857) of the declination of 140 stars, and contributed astronomical papers to the *Connaissance du Temps*. He was long associated with Arago in researches on terrestrial physics, and was for some years president of the Academy of Sciences. D. in Paris, Apr. 5, 1872.

Launceston, laans'tŭn: parliamentary and municipal borough of England; formerly capital of the county of Cornwall; on the Kensey river, a tributary of the Tamar, 22 miles N. E. of Plymouth, with which it is connected by railway (see map of England, ref. 14–D). It is situated on a steep hill, at the top of which are the ruins of Castle Terrible, built by the ancient princes of Cornwall; has elaborately carved gates, several public buildings, and a grammar school founded by Queen Elizabeth. The original name was *Dunnehevel* (the swelling hill); Launceston—anciently *Lanstephen*—is derived from an old monastery dedicated to St. Stephen. Pop. (1891) 4,345.

Launceston: the second town of Tasmania or Van Diemen's Land; capital of the county of Cornwall; on the river Tamar at its confluence with the Esk; 32 miles S. E. of Port Dalrymple (see map of Australia, ref. 9–I). It has many churches and schools, several banks and newspapers, commodious government buildings, a mechanics' institute, a convent, a theater, and exports wool, timber, and fruits, importing manufactured goods. Pop. (1891) 17,108.

La Union: See Union.

Laura'ceæ [Mod. Lat., deriv. of *Lau'rus*, name of the principal genus, from Lat. *lau'rus*, laurel]: the Laurel Family (*q. v.*).

Laurel: town; Prince George's co., Md. (for location of county, see map of Maryland, ref. 3–E): on the Balt. and Ohio Railroad; 20 miles N. W. of Annapolis. It is in a choice building-stone and valuable iron-ore region, and has several quarries, iron-foundries, and mills, and two weekly newspapers. Pop. (1880) 1,206; (1890) 1,984; (1900) 2,079.

Laurel [M. Eng. *loral*, *loryel*, appearing also as *laurer*, *loryzer*, from O. Fr. *laurier* and Provenç. *laurel*, from Lat. *lau'rus*, bay-tree, laurel]: a name properly belonging to the *Laurus nobilis* or bay-tree of Europe, Asia, and Africa. In the warmer parts of Europe it becomes a large tree. Its wood has a limited use in the arts; its essential oil is employed in perfumery; its fruit yields a fixed oil, used in veterinary medicine; its flowers afford rich bee-pasture; its leaves were the material of the laurel crown of victors in war and of successful poets and artists. The name is often loosely extended to all the *Lauraceæ*, to which this tree belongs. Shrubs of the genus Kalmia (*q. v.*) are called laurels in the U. S. Some of the larger rhododendrons of the U. S. are called mountain-laurels. The evergreen cherry-trees are called Cherry Laurel (*q. v.*). In Great Britain they are often simply called laurel. The Portuguese laurel is one of the cherry laurels. Several kinds of magnolia are known locally in the U. S. as laurel-trees. In England the *Daphne laureola* is called spurge laurel. It is a handsome European evergreen shrub, sometimes planted in the U. S., and is of the family *Thymelæaceæ*. It has a poisonous bark. Among the ancients the laurel found many symbolical and superstitious applications. It was a sign of truce, like the olive-branch; and it was a sign of victory. It was believed that lightning could not strike it.

Revised by Charles E. Bessey.

Laurel Family: the *Lauraceæ*, a group of about 900 species of dicotyledonous trees and shrubs, for the most part natives of warm climates. Their flowers are apetalous, 3- or 4-merous, with a single, simple, superior ovary, containing one ovule. The laurel (*Laurus nobilis*) is a well-known member of this family; its American representative is the California laurel (*Umbellularia californica*). Cinnamon, cassia-bark, camphor, and sassafras-bark are produced by trees of this family, the last named from *Sassafras officinale* of the Eastern U. S. Charles E. Bessey.

Lauremberg, low'rem-bărch, Johann: b. Feb. 26, 1590, at Rostock, where his father was Professor of Medicine. He studied at Rostock, traveled in Holland, England, France, and Italy, studied medicine at Paris, and received the degree of M. D. at Reims in 1616. Returning to Rostock in 1618, he was made Professor of Poetry, which position he held until 1623, when the King of Denmark appointed him Professor of Mathematics at the newly established University of Soroe. He died Feb. 28, 1658. Lauremberg's chief works are the *Niederdeutsche Scherzgedichte*, written in Low German. They belong to the best satires of the German language, showing a poet of deep moral and patriotic pathos, who ridicules successfully the imitation of French customs, language, and dress on the part of his contemporaries. See W. Braune's critical edition of the *Scherzgedichte* (Halle, 1879); E. Müller. *Zu J. Lauremberg* (Cöthen, 1870); L. Daae, *Om Humanisten og Satirikern Johann Lauremberg* (Christiania, 1884). Julius Goebel.

Laurence, Richard, D. C. L.: archbishop; b. at Bath, England, in 1760; graduated at Corpus Christi College, Oxford, in 1782; took orders in the Church of England; preached the Bampton lectures 1804 upon the theme *An Attempt to Illustrate those Articles of the Church of England which the Calvinists Improperly Consider Calvinistical* (Oxford, 1805; 3d ed. 1838); was appointed to the rectory of Mersham, Kent, 1805; became Regius Professor of Hebrew and canon of Christ Church, Oxford, 1814; Archbishop of Cashel, Ireland, 1822. D. in Dublin, Dec. 28, 1838. Archbishop Laurence was one of the restorers of Oriental studies in England, and perhaps the only high dignitary of his times who made a study of the dialects of the Semitic languages. His most important service to theology was the recovery from Ethiopic manuscripts of several interesting apocryphal works, often quoted by the early Fathers, but supposed to have been lost. These were the *Ascension of the Prophet Isaiah*, edited with Latin and English versions

in 1819, and *The Book of Enoch the Prophet* (1821; 3d ed. 1838). He brought out a new version of Fourth Esdras (1820), also from the Ethiopic; published *A Dissertation on the Logos of St. John* (1808); *Critical Reflections upon some Important Misrepresentations contained in the Unitarian Version of the New Testament* (1811); *On the Existence of the Soul after Death* (1834); and numerous occasional essays and sermons.—His elder brother, FRENCH LAURENCE, LL. D., b. at Bath, Apr. 3, 1757; was educated at Oxford, and became Regius Professor of Civil Law there in 1796. D. at Eltham, Kent, Feb. 26, 1809. He was author of *Critical Remarks on Detached Passages of the New Testament, particularly the Revelation of St. John* (Oxford, 1810) and other works, but is best known for his interesting *Correspondence with Edmund Burke*, whose literary executor he was, published in 1827. The *Poetical Remains* of the two brothers, with memoirs by H. Cotton, was privately issued in Dublin in 1872. Revised by S. M. JACKSON.

Laurens, HENRY: statesman; b. at Charleston, S. C., in 1724; received a business training in Charleston and London; acquired an ample fortune in mercantile business, and was conspicuous in the contests with the crown admiralty judges, whose decisions were often unjust. He served as a major against the Cherokees; went to England in 1771, and while there strove to avert war; became in 1775 member of the South Carolina Congress, and president of the council of safety; in 1776 was sent to the General Congress, of which he was president 1777–78. In 1779 he was sent as U. S. minister to the Netherlands, but was made a prisoner by the British while at sea, and kept a close prisoner in the Tower for fifteen months. In 1781 he was released, and appointed by the Congress one of the commissioners to negotiate a peace, with Franklin and Jay as his colleagues. D. Dec. 8, 1792, at Charleston, S. C. By a direction in his will his body was burned. Some of his pamphlets and other papers have been reprinted.

Laurens, lō′raȧn′, JEAN PAUL: historical painter; b. at Fourquevaux, Haute-Garonne, France, Mar. 28, 1838. He was a pupil of Léon Cogniet and of Bida; was awarded a first-class medal at the Salon of 1872; medal of honor, Salon of 1877; became an officer of the Legion of Honor 1878; member of the Institute 1891. He is a strong draughtsman and colorist, whose work is essentially virile. *Excommunication of Robert the Pious* (1875) and *Release of the Prisoners Walled up at Carcassonne* (1879) are in the Luxembourg Gallery, Paris; *Honorious* (1880) is in the collection of D. O. Mills, New York. One of his finest works, *Death of General Marceau*, is in the Museum at Ghent. Studio in Paris. WILLIAM A. COFFIN.

Laurens, JOHN: soldier; "the Bayard of the American Revolution"; b. in Charleston, S. C., in 1753; a son of Henry Laurens, statesman; was educated in England; returned to South Carolina on the outbreak of hostilities; in 1777 joined the army and was placed upon the staff of Washington. From Monmouth to Yorktown he was in all of Washington's battles, and displayed the utmost valor, so that Washington is reported to have checked him for rashness. Col. Laurens was badly wounded at Germantown and Coosahatchie. In 1781 he went as a special minister to France, and successfully negotiated a loan. Returning, he served with great activity under Greene, and was killed in the contest on the Combahee, Aug. 27, 1782. See his *Life and Correspondence*, by W. G. Simms (New York, 1867).

Laurent, lō′raȧn′, PAUL MATHIEU: historian; b. at Bourg-Saint-Andéol, Ardèche, France, Sept. 14, 1793; studied law, practiced as a lawyer at Privas, was appointed a judge in 1840, but retired in 1851, and was in 1853 made administrator of the library of the arsenal. He was an adherent of Saint-Simon, but disagreed with Enfantin. D. in Versailles, Aug. 7, 1877. His most widely known work is his *Histoire de Napoléon* (1828), illustrated by Horace Vernet and often reprinted. Among his other works are *Du principe d'autorité en politique, des causes de sa décadence et des moyens de la relever* (1844); *Coup d'œil philosophique sur la revolution du 2 décembre, 1852* (1852); *Réfutation de l'Histoire de France de l'abbé de Montgaillard*, in which he undertakes to explain and justify Robespierre's conduct (3d ed. 1843), etc.

Laurentian Hills, otherwise called THE LAURENTIDES: an upland belt of Eastern and Central British America. From Eastern Labrador it runs southwestward and then curves westward and northwestward, approaching the Arctic Ocean E. of the Coppermine river. It separates Hudson's Bay from a line of depressions holding the Gulf of St. Lawrence, the Laurentian Lakes, the Lake of the Woods, and Winnipeg. Nelson, Reindeer, Athabasca, Great Slave, and Great Bear Lakes, and holds the main water parting except at two points where it is traversed from W. to E. by the Nelson and Churchill rivers. In general it is a plateau from 1,000 to 3,000 feet in altitude, with an uneven surface, abounding in rocky hills and in lakes. Climate and soil conspire to render it unfertile, and it is almost uninhabited. G. K. GILBERT.

Laurentian System: in geology, the lowest and oldest division of rocks. The name was first applied by William Logan in 1854 to rocks in the Laurentian Mountains of Canada, which had previously been called metamorphic, and which are separated by a great unconformity from the overlying Potsdam sandstone. Subsequently the name Huronian (see HURONIAN SERIES) was applied to portions of the pre-Potsdam rocks, and Laurentian was restricted to portions believed to be older. In a general way the rocks grouped together as Laurentian were paler and more siliceous than those called Huronian, and from this fact sprang a petrographic classification of pre-Cambrian rocks which was widely adopted and applied to the formations of all countries. The subsequent discovery that many of the Laurentian gneisses are altered granites, and that many of the granites classed with the Laurentian are really newer than the dark schists classed with the Huronian, has tended to discredit the classification, and has stimulated the endeavor to base a chronology of the older rocks on their physical relations. See ALGONKIAN PERIOD and ARCHEAN ERA. G. K. GILBERT.

Lauren'tius, SAINT: according to tradition, a Spaniard by birth and a pupil of Sixtus II., who made him deacon, and afterward archdeacon and treasurer at Rome (257 A. D.). In 258 A. D. the magistrate, during the Valerian persecution, commanded Laurentius to reveal the treasures of the Church; accordingly, the saint collected a company of poor, sick, lame, and blind persons and presented them as the required treasures, for which act he was condemned to be roasted alive on a gridiron over a slow fire. He underwent martyrdom with great courage and resignation Aug. 10, 258. In his honor Philip II. of Spain erected the Escorial, because it was upon his day, Aug. 10, 1557, that he won at St.-Quentin his great victory over the French, and built it in the form of a gridiron because that was the instrument of his martyrdom. Revised by S. M. JACKSON.

Laurianu, AUGUSTU TREBON: Roumanian historian; b. in 1810 in Transylvania; studied there and at Vienna; became teacher of Philosophy at the College of St. Sava at Bucharest in 1842; took part in the political movements of 1848; was appointed inspector of schools in Moldavia in 1851; went to Bucharest in 1859 as professor at the university; became a member of the Roumanian Academy in 1867. D. in 1880. Among his published works are: *Tentamen criticum in originem, derivationem et formam linguæ Romanæ in utraque Dacia vigentis* (1840); *Magazinu istoricu pentru Dacia* (with Balcescu; 5 vols., 1845–47); *Istoria Romaniloru* (1853); with J. C. Massimu, or Maxim, *Dictionarulu limbei romane* (2 vols., 1871–76, for the Roumanian Academy, a work which was very unfavorably received, as not being really a Roumanian dictionary in any proper sense on account of incompleteness and excessive introduction of Latin words and etymological spellings); and (with the same) *Glossariu care coprinde vorbele d'in limb'a romana straine*, etc. (1871). E. S. SHELDON.

Lauric Acid, Laurostear'ic Acid, or **Pichu'ric Acid** [*lauric* is from Lat. *lau'rus*, laurel; *laurostearic* is from Lat. *lau'rus* + Gr. *στέαρ, στέατος*, tallow; *pichuric* is from the *pichurim* bean]: an acid (($C_{12}H_{24}O_2$) belonging to the fatty acid series ($C_nH_{2n}O_2$). It is obtained from the fat of the bay-tree (*Laurus nobilis*), and from the fat and the volatile oil of the pichurim bean (*Fabæ pichurim maj.*). It exists as a glyceride (laurostearin or laurin), from which it is prepared by saponifying these fats or the wax by caustic alkaline solutions, and after the soap is separated by common salt, decomposing the soaps thus formed by hydrochloric or tartaric acids. Lauric acid also exists in other like vegetable bodies, sometimes in connection with myristic acid ($C_{14}H_{28}O_2$), as in *Myrica cerifera* and the so-called Dika bread (*Mangifera gabonensis*), and in a salve-like fat obtained from *Coccus axin*, the *Age* or axin of the Mexicans. In connection with many other fatty acids, it exists in spermaceti

and in the oil of the cocoanut. It fuses at about 43° C. to a colorless oil, and solidifies to a scaly crystalline white mass, and crystallizes from its alcoholic solution in white tufts and silky needles, or sometimes in nearly translucent scales. It dissolves readily in alcohol, and yet more freely in ether. Its alcoholic solution has a feebly alkaline reaction. It is quite insoluble in water, but when boiled in it volatilizes with the vapor. The sodium, potassium, and barium salts of lauric acid are soluble in water. The salts of the heavy metals with lauric acid are insoluble, or sparingly so. Revised by IRA REMSEN.

Lauricocha, low-rē̆e-kō′chä̆: a lake of Peru, in the department of Huanuco; on the Andean plateau, 50 miles N. N. W. of Cerro de Pasco and 137 miles N. N. E. of Lima; near lat. 10° 10′ S. (Exact astronomical position and altitude undetermined.) It is only 3 miles long, but has been celebrated as the source of the Marañon and Amazon; on old maps it was represented as a large body of water. It is doubtful if Lake Lauricocha should be regarded as the true head of the Amazon, or even of this branch of it. After flowing about 20 miles the rivulet which forms its outlet joins the Nupe, a larger stream, which has already flowed 40 miles from its source. The Nupe therefore must be regarded as the most distant head of the upper Marañon; while the Ucayali, which joins the Marañon far below, is considered by many as the upper portion of the Amazon. Such discussions are in fact trivial; the Amazon has many sources scattered through hundreds of miles of the Andean region. HERBERT H. SMITH.

Laurie, law′rē̆, SIMON SOMERVILLE, A. M., LL. D., F. R. S. E.: educator and philosopher; b. in Edinburgh, Scotland, Nov. 13, 1829; was educated at the Edinburgh High School and Edinburgh University; after graduating he taught in Europe for about five years, till in 1855 he was appointed secretary and visitor of schools to the Church of Scotland education committee, which up to the passing of the Education Act in 1872 had control of the majority of schools in Scotland. He was appointed Dick bequest visitor of schools in 1856, and in that position did more than any other man in Scotland to uphold the best traditions of Scottish education; was made secretary to the endowed schools commission in 1873; and in 1876 was appointed to the newly established chair of Education in the University of Edinburgh. His activity in this chair is especially known through the following important educational works: *Primary Instruction in Relation to Education*; *The Training of the Teacher and other Educational Papers*; *Life and Educational Writings of John Amos Comenius*; *Occasional Addresses on Educational Subjects*; *Language and Linguistic Method in the Schools*; *Teachers' Guild Addresses*; *Lectures on Mediæval Education and the Rise of Universities*; *Institutes of Education* (1893); and a *History of Education* in *The School Review* for 1894 (Hamilton, N. Y.). He has also written *Notes on British Theories and Morals*; *Metaphysica Nova et Vetusta* by *Scotus Novanticus*; and *Ethica, or the Ethics of Reason* by *Scotus Novanticus*. He was the first president of the Teachers' Guild of England.

Laurie, THOMAS: See the Appendix.

Laurier, lō′ri-ā′, Sir WILFRID, LL. D.: statesman; b. at St.-Lin, L'Assomption, Province of Quebec, Canada, Nov. 20, 1841; educated at L'Assomption College, and admitted to the bar in 1865. He edited *Le Défricheur* for a short time; was a member of the Quebec Assembly 1871–74; in 1874 he became a member of the Dominion Parliament; and was Minister of Inland Revenue 1877–78. After having been for some time leader of the Canadian Liberals, he became Premier in July, 1896. He was knighted in 1897.

Lau'rium (in Gr. Λαύριον, or Λαύρειον): a range of hills in Southern Attica, Greece, famous in ancient times for rich mines of silver, lead, zinc, and antimony. At the beginning of the Christian era these mines were deserted, being considered exhausted. In 1863 a French company began to rework with profit the refuse left by the ancient miners, and now the mines themselves have been reopened. At present (1894) five companies (two Greek and three French) are mining the hills of Laurium. The chief products of the mines are lead and zinc. A village (Ergastiria) of more than 5,000 inhabitants has sprung up around the furnaces at the old harbor, and is connected with the mines and with Athens by railways. J. R. S. STERRETT.

Laurvig, lowr′vich: town of Norway; on an inlet of Christiania Fiord; 65 miles by rail S. S. W. of Christiania (see map of Norway and Sweden, ref. 11–C). It has a good harbor, large distilleries, some trade in timber, and very important iron-works in its vicinity. Pop. (1891) 11,269.

Lausanne, lō′zaan′ (in Lat. *Lausonium*): capital of the canton of Vaud, Switzerland; on the northern shore of the Lake of Geneva; built on two hills, connected by a splendid bridge of granite (see map of Switzerland, ref. 6–B). It has a beautiful Gothic cathedral, begun about 1000, completed in 1275, a library of 60,000 volumes, many good educational institutions, and several manufactories of tobacco, leather, and gold and silver ware. On account of its beautiful situation on the southern slope of the Jura Mountains, and near the Lake of Geneva, it attracts yearly a great number of tourists. Lausanne is famous in literary annals from having been the residence of Haller, Voltaire, and Gibbon. The house occupied by the latter while writing his celebrated *History* is still shown, and visited by multitudes of travelers. Byron wrote here his *Prisoner of Chillon*. An ecclesiastical council was held here in 1449, a conference between Calvin, Farel, and Viret in 1536 leading to the adoption of the creed of the Reformed faith, and in modern times it has been the scene of a noted peace congress (Sept., 1871) and a Masonic universal convention (1875). The city is of ecclesiastical origin. When Bishop Martin of Aventicum chose the place as the seat of his new bishopric, a town grew rapidly, and it remained an ecclesiastical domain until 1596. Communal pop. (1897) 40,671.

Laussedat, lō̆s′daa′, AIMÉ: colonel of engineers and savant; b. at Moulins, France, in 1818; graduated from the Polytechnic School into the Corps of Engineers in 1840; was employed on the fortifications of Paris and later upon the defenses along the Spanish frontier. In 1851 he became Professor of Astronomy and Geodesy in the Polytechnic School; in 1865 Professor of Applied Geometry at the Conservatoire des Arts et Métiers. During this time he retained his military position, and was made colonel in 1874. Col. Laussedat has made most interesting discoveries in the sciences, especially as applied to military art. He invented the application of photography to the making of maps and plans of inaccessible places. He designed many instruments for the observatory of the Polytechnic School, established by him. In 1879 he succeeded Gen. Morin as director of the Conservatoire des Arts et Métiers. To him is due the collection and arrangement of the section of liberal arts of the Exposition of 1889. It was upon his recommendation that Paris time was adopted for the whole of France. He is commander of the Legion of Honor, member of the superior council of public instruction, and of that of technical instruction, vice-president of the council of the observatory, president of the commission on aërial transportation, and president of the Polytechnic Military Society; also member of the Société des Ingénieurs Civils. WILLIAM R. HUTTON.

Lauzun′, ANTOINE NOMPAR DE CAUMONT, Duc de: courtier of Louis XIV.; b. in Gascony in 1633 of a poor but noble family; gained the favor of the influential women of the court by his cleverness and attractive manners, and rose rapidly in the official service. He was appointed governor of Berri and mareschal de camp, with the promise of the grade of grand master of artillery, but boasting of his influence over the king lost favor at court, and for a time was imprisoned in the Bastile. On regaining his liberty he sought to marry Mlle. de Montpensier, the granddaughter of Henry IV., but a court intrigue prevented the marriage, though by some writers Lauzun is thought to have secretly effected the union. Having offended Mme. de Montespan, Lauzun was again imprisoned, and this time for several years. He was free again at the time of the English revolution of 1688, and is said to have accompanied the queen of James II. and her son in their flight to France, and to have taken part in the expedition against Ireland. Though Lauzun never played a great part in politics or war, his name constantly recurs in the memoirs of his contemporaries, and is associated with many romantic but improbable stories. D. 1723.

Lauzun, ARMAND LOUIS DE GONTAUT, Duc de: soldier; b. in Paris in 1753; commanded a naval expedition which captured Senegal and Gambia from the English (1779); fought on the side of the North American colonies against Great Britain; afterward succeeded to the title of Duc de Biron; was a deputy to the States-General; a confidant and secret agent of the Duke of Orleans; appointed general-in-chief of the army of the Rhine July 9, 1792, of the army of the coasts of La Rochelle May 15, 1793; took Saumur, and

defeated the Vendeans at Parthenay. He then tendered his resignation, but being accused by Carrier before the committee of public safety of too great lenity to the Vendeans, he was deposed, thrown into the Abbaye prison, condemned for conspiracy by the revolutionary tribunal, and executed on Jan. 1, 1794, meeting his fate with cynical courage. Lauzun had great ability, but was dissolute and unprincipled. His *Mémoires* were published at Paris in 1822 and 1858.

Lava [from Ital. *lava*, stream, espec. of molten rock, deriv. of *lavare*, wash < Lat. *lava're*, wash, whence Eng. *lave*]: the rock which issues from a fissure or volcanic vent. Volcanic products are both fragmental and solid. The former are distinguished according to their degree of fineness as volcanic dust, ash, lapilli, rapilli, tuff, and bombs. The term lava is reserved for the non-fragmental volcanic products which form continuous flows, sheets, or dykes. Such lavas differ very much in their chemical and mineralogical composition, structure, and texture. Some are acid, light in color, and of low specific gravity, like rhyolite, trachyte, or pumice; others are basic, dark in color, and of high specific gravity, like basalt; still others are intermediate in character, like andesite. Again, some lavas are altogether crystalline, while others are wholly glassy; most, however, contain more or less glass, in which crystals of various sorts are imbedded. Lavas differ most of all, at least to external appearances, in their degree of compactness or porosity. This is called their texture. All lavas in a molten condition contain large amounts of gases, principally aqueous vapor. When they rise so far in the volcanic vent as to be relieved from pressure, these gases tend to escape, giving rise to explosive action, more or less intense, according to their amount. As the molten mass solidifies during this process, it is rendered more or less scoriaceous or vesicular by the escaping and imprisoned gas-bubbles. If these are very abundant, the lava may be a pumice light enough to float on water; if they are less numerous, the lava is called a scoria, or slag. Such cavities when filled with secondary minerals produce an amygdaloid. Some lavas, whether glassy or crystalline, are only slightly porous, or may even be dense and compact. The production of these is usually accompanied by a minimum of explosive action, and indicates relatively little absorbed gas. A lava stream is most porous at or near its surface, and more compact in its center.

Molten lava flows like molten iron, and usually carries imperfectly fused portions of its substance, or crystals which have already formed within it. The escape of gases from lava as it cools often produces a boiling or explosive action. The rapid solidification of a lava stream at its surface quickly forms a crust which is a poor conductor of heat. Hence it is often possible to walk on the surface of lava which is still molten and in motion a short distance below. The flowing away of the lava from such crusts frequently produces caverns of considerable size.

Mud lava (*lava d'acqua*) is a name applied to torrents of water, due either to the sudden melting of snow on a volcano or to the disruption of a lake, mingled with fine volcanic *débris*. Such streams, because of their more rapid motion, are often more destructive than flows of real lava.

The compact gray substance sometimes called lava, and used in the manufacture of ornaments, is not true lava, but a fine variety of limestone, hardened by the action of volcanic heat. G. H. Williams.

Laval, lăă'văăl': town of France, the capital of the department of Mayenne; on the Mayenne river; 46 miles by rail E. of Rennes (see map of France, ref. 4–D). It is one of the loveliest towns in France. It consists of two parts of very different appearance. On the right bank of the river—here spanned by three beautiful bridges—stands the old town with its somber antique castle, now used as a prison; its gayer new castle, now used as a court-house; its cathedral, partly from the twelfth and partly from the sixteenth century, etc. On the left bank, which is lower and almost level, stands the new town, with its broad avenues and its modern structures. The place is noted for its linen manufactures, which were introduced from Flanders in the fourteenth century; linen goods to the value of 500,000 francs are sold at each of its monthly markets. Among its other manufactures are paper and earthenware, and it has a considerable trade in grain, timber, and cattle. Pop. (1891) 30,374; (1896) 29,853.

Laval, François de Montmorency, de: ecclesiastic; b. of an ancient and noble family, at Laval, France, Mar. 23, 1622; became a priest in Paris 1645; declined the bishopric of Cochin-China in 1651; became Archdeacon of Évreux in 1653; Bishop of Petræa *in partibus* and vicar-apostolic of New France in 1658. In 1663 he founded the seminary of Quebec, and in 1666 consecrated the parish church of Notre Dame. In 1674 he was bishop of the new see of Quebec, from which he retired in 1688 to his seminary, to which he gave his worldly possessions. He was *de facto* ruler of Canada, in civil as well as ecclesiastical affairs. The Laval University at Quebec commemorates his name. D. at Quebec, May 6, 1708. See his *Life* by Louis Bertrand de la Tour (Cologne, 1751).

Lavalle, lăă'văăl'yā, Juan: general; b. at Buenos Ayres, Argentine Republic, Oct. 16, 1797. He joined the patriot army in 1813, fought in Uruguay, Chili, Peru, and Ecuador; returned to Buenos Ayres in 1823, and from 1825 to 1828 took part in the campaigns against the Brazilians, distinguishing himself at the battle of Ituzaingó Feb. 20, 1827. On Dec. 1, 1828, he headed a military revolt at Buenos Ayres, in favor of the Unitarian party; Dorrego, the federalist governor, was deposed, and shortly after captured and shot (Dec. 13). Lavalle was made governor of Buenos Ayres, but a congress of the provinces declared his government illegal, and a civil war ensued. Lavalle ultimately resigned and retired to Brazil, and on Dec. 6, 1829, Rosas was elected governor of Buenos Ayres, thus opening the way to his dictatorship. Gen. Lavalle, sometimes with the Brazilians and sometimes in command of provincial forces, made determined efforts to overturn Rosas, and became the acknowledged leader of those opposed to his tyranny. In 1838 he marched on Buenos Ayres, but was compelled to retreat; and after repeated defeats fled to Jujuy, where he was assassinated Oct. 9, 1841. Herbert H. Smith.

Lavalley, lăă'văăl'lā', Alexandre: civil engineer; b. at Progny, Aisne, France, Nov., 1821; studied at Tours, and 1840–42 at the Polytechnic School, from which he graduated as sub-lieutenant of military engineers. At this time there were only 200 miles of railway in operation in France. He resigned, went to England, and entered a machine-shop in Liverpool, where with hammer and file in hand he passed through all the branches from the forge to the erecting-shop. He also served a term as fireman of locomotives, in order to study the details of their operation. Returning, he was employed on the Northern Railway of France under Clapeyron. In 1846 he became engineer and manager of the works of Ernest Gouin & Co., constructors of machines, and especially of locomotives. In 1852 he built the first wrought-iron railway bridge in France, and afterward built others in Hungary, in Italy, and in Russia. When the construction of the Suez Canal (*q. v.*) was threatened by the withdrawal of the Egyptian forced labor, de Lesseps applied to Lavalley to undertake its completion. He accepted, and, associated with Paul Borel (d. 1869), completed the canal three months in advance of the stipulated time. Upon the completion of the canal in 1869 Lavalley was made its chief engineer, a post he retained until 1875. 1874 he planned a harbor and railway on Île de la Réunion (formerly Île Bourbon), and from 1878 to 1886 was engaged in their construction. He was elected senator from Calvados in 1885. He was an officer of the Legion of Honor, and a past president of the Société des Ingénieurs Civils. D. July 20, 1892. He published descriptions of the methods of constructing the Suez Canal and harbor and railway of Île de la Réunion in *Comptes rendus de la Société des Ingénieurs Civils* (1866, 1867, 1868, 1869, and 1886).

William R. Hutton.

Lavater, lăă'văă'tăr', Johann Caspar: founder of the art of physiognomy; b. at Zurich, Switzerland, Nov. 15, 1741; studied theology, and in 1764 was appointed preacher, first of the orphan house, then of St. Petri church in his native town, and held this position till his death in 1801. Truth was with him not a duty, but a passion—not the honor of his soul, but the necessity of his nature. Wherever he found truth he acknowledged and accepted it unconditionally. The consequence was that his adversaries took the opportunity to accuse him of almost every kind of heresy which ever had appeared in the history of Christianity. His talent corresponded with his character. In theology and philosophy he was a mystic, but in all his writings there was a charm which gained for him the friendship of many of the prominent writers of his day. In 1775–78 his *Physiognomische Fragmente*, which has made his name famous, appeared in four volumes. The work started a new idea, or, rather, it

described a natural and necessary process which takes place whenever man meets man, with such exactness and felicity as to raise this process from a dull and sluggish practice to a conscious and free mental activity. He held that where there is combination there is significance, where there is movement there is character. Consequently the human figure must signify something of its nature, and the motion of its parts, the play of its features, must express something of its character. He asserted that the soul, the character, the history of an individual, was painted on his face, that a human face might be read like a printed leaf. The work produced the profoundest sensation. He died from a wound received at Zurich at the time of its capture by Masséna. See *Lives*, by Heiseh, 1842; Muncker, 1883; Steck, 1884; and Von der Hellen, 1888. Revised by C. K. Adams.

Laveleye, laăv'lā', Émile Louis Victor: political economist; b. at Bruges, Belgium, Apr. 5, 1822; studied at the Athenæum of his native city, and at the Collège Stanislas in Paris, and took high honors in the law course at the University of Ghent. From 1848 he was entirely occupied with those economical studies which gave him so great a reputation. At first he wrote in the Belgian periodicals, defending liberal principles against the Ultramontanes; became from 1858 a constant contributor to the *Revue des Deux Mondes*; was in 1864 appointed Professor of Political Economy at the University of Liège; and in 1867 represented Belgium as member and secretary of the international jury upon paintings at the Paris Universal Exposition. Among his numerous works that on *Property and its Primitive Forms* (1873) has already become a classic. In June, 1875, he published a volume on the *Religious Conflict in Europe*, with a preface by W. E. Gladstone, and in the same year his *Du respect de la propriété privée en temps de guerre*. He published also *Le Socialisme contemporain* (1881); *Le parti clérical en Belgique* (1874); and *Le gouvernement dans la démocratie* (1891, 2 vols.). D. Jan. 3, 1892.

La Vendée: See Vendée, La.

Lavender [from O. Fr. *lavendre*, from Ital. *lavanda*, lavender, liter., a washing, deriv. of *lavare*, wash]: popular name of a labiate shrub (*Lavandula vera*), a native of the south of Europe, very extensively cultivated for its fragrant flowers, which yield a volatile oil much used in perfumery. Lavender water, spirit of lavender, etc., are of considerable service in pharmacy and medicine.

La'ver: any one of several edible seaweeds, such as *Ulva latissima*, *Porphyra laciniata*, and *P. vulgaris*. These are commonly eaten as luxuries in Europe, either pickled or stewed.

Laveran, Alphonse, M. D.: discoverer of organism causing malaria; a son of Louis Laveran; b. at Metz, France, 1843; studied medicine under his father; entered the medical corps of the French army; during a tour of duty in Algeria he discovered in the blood of persons suffering with malarial or paludal fevers a micro-organism, the *Hæmatozoon malariæ*, and in 1881 he announced his discovery in a brochure, *Nature parasitaire des accidents de l'impaludisme*. At first but slight importance was attached to this publication, as the scientific world was committed to a supposed *Bacillus malariæ* of Klebs and Tommasi-Crudelli; but later the existence of this organism within the blood-corpuscles of persons affected with these fevers was confirmed by observers in various parts of the world, and to Laveran is due all credit for the persistency with which he pursued his observations and sustained his discovery. He was appointed professor at the school of Val-de-Grâce and is the author of a number of important communications to scientific societies. Among his works are *Traité des maladies des armées* (Paris, 1891); *Traité des fièvres palustres* (Paris, 1884); *Du paludisme* (Paris, 1891). S. T. Armstrong.

Laveran, Louis, M. D.: epidemiologist; b. at Dunkirk, France, May 30, 1812; graduated M. D. from the Paris Medical School in 1835, having been a pupil of the military instruction hospital at Lille; entered the medical corps of the French army; was professor at the Metz military hospital from 1841 until 1850, then served a number of years in Algeria; in 1856 appointed to the chair of Military Medicine in the Val-de-Grâce school, subsequently becoming director of the school; during the Franco-German war served as medical inspector in the Army of the North; in 1872 went to Montpellier to organize the military school there, subsequently returning to Val-de-Grâce. He was the most prominent French author on military epidemiology of the century. His most important work is *De la mortalité des armées en campagne*. D. Aug. 7, 1879. S. T. Armstrong.

Laverdiere, laă'vār'di-ār', Claude Honoré: educator and author; b. at Château-Richer, Canada, Oct. 23, 1826; was ordained a Roman Catholic priest in 1851; became a professor in the seminary and librarian of Laval University. He took part in the publication of three volumes of *Jesuit Relations* (1858) concerning early missions in Canada; edited the voyages of Champlain (5 vols., 1870), with notes and a biography; the *Journal des Jésuites* (1871); wrote *Histoire du Canada* for schools, and several treatises upon subjects connected with early Canadian history, and edited several books of songs and hymns. D. at Quebec, Mar. 27, 1873.

Lavigerie, laa-veĕ'*zhe*-ree', Charles Martial Allemand, Cardinal: b. at Bayonne, France, Oct. 31, 1825; studied theology, and was ordained priest in 1849; was called to the chair of Ecclesiastical History in the Sorbonne 1854, and held that position till 1861. In 1863 he was appointed Bishop of Nancy, but in 1867 was transferred to the see of Algiers, which was afterward made into an archbishopric. In Algiers he sought to combine the propagation of Christianity among the colonists, with works of active benevolence toward the Arabs, but in his charitable endeavors came into conflict with the military authorities, and was notified that his duty was to attend to the spiritual needs of the Catholic colonists, and to leave the care of the Arabs to the Government. Lavigerie persisted in his work in spite of these commands. Under the republic he came out boldly in favor of the monarchy, addressing a letter to the Comte de Chambord urging him to return in person to France and claim his hereditary right. Lavigerie's greatest distinction lies in his earnest efforts to suppress the slave-trade. He addressed large audiences on this subject in the various European capitals, and secured from the British and German Governments a promise rigidly to enforce the anti-slavery clause of the Congo conference. In 1890 he published a letter showing a complete change of faith in political matters. In it he declared that it was the best policy of the Church to accept the republic. D. in Algiers, Nov. 26, 1892. F. M. Colby.

Lavin'ium (now *Pratica*): an ancient city of Italy, in Latium; situated 17 miles S. of Rome, near the sea. It was founded, according to tradition, by Æneas, on his arrival in Italy, and named after his wife Lavinia. In historical times it had already lost any importance it may have possessed earlier.

Lavisse, laă'vēēs', Ernest: historian; b. at Nouvion-en-Thiérache, France, Dec. 17, 1842; studied at the Superior Normal School in Paris, where he was afterward one of the professors, and was called in 1888 to the chair of Modern History in the Paris Faculty of Letters. In 1892 he was elected a member of the French Academy. M. Lavisse has devoted his attention chiefly to the history of Germany. His more important works are *Étude sur l'une des origines de la monarchie prussienne* (1875); *Études sur l'histoire de Prusse* (1879); *Questions d'enseignement national* (1885); *Essais sur l'Allemagne impériale* (1887); *Trois empereurs d'Allemagne* (1888); *Études et étudiants* (1889); *Vue générale de l'histoire politique de l'Europe* (1890; English translation by C. Gross, New York, 1891); *La jeunesse du grand Frédéric* (1891; English translation, London, 1892).

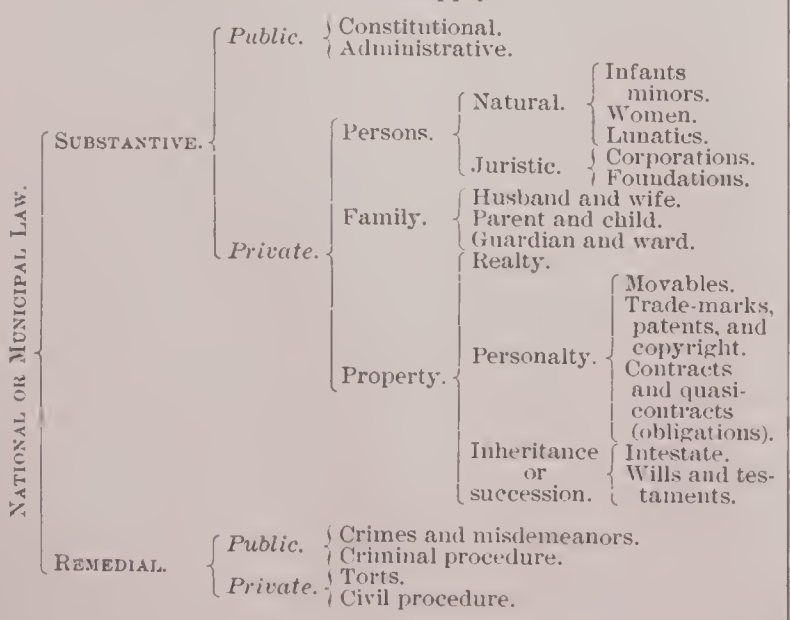
Lavoisier, laă'vwaă'si-ā', Antoine Laurent: chemist and savant; b. in Paris, France, Aug. 16, 1743; studied at the Collège Mazarin; pursued astronomical knowledge under La Caille; studied botany under Bernard de Jussieu; worked in Rouelle's chemical laboratory in the Jardin des Plantes; became an associate of the Academy in 1768; obtained a farmer-generalship in 1769, in order to increase his income, his expenditures in chemical research requiring a large outlay of money; took a prominent part in public affairs, writing numerous and able papers on state questions; discovered the composition of water in 1783; and made many important researches in physics. In chemistry, the science to which his attention was chiefly directed, he made not only important discoveries and great inventions in apparatus and in methods of work, but he was one of the first and ablest of philosophical chemists, the destroyer of the false theories of Stahl and Priestley, and was the principal inventor of the system of chemical nomenclature which prevailed exclusively for more than fifty years after his death. Lavoisier was guillotined by the Jacobins May 8, 1794, on account of his former connection with the farming of the taxes. The

most important of his works are *Traité de Chimie* (1789) and *Mémoires de Physique et de Chimie*, which includes his principal occasional scientific papers.

Law: in the physical sciences, a term used, as Dr. Holland observes (*Jurisprudence*, 5th ed., p. 17), to designate "the abstract idea of the observed relations of phenomena, be those relations instances of causation or of mere succession and co-existence." Thus we speak of the "laws" of astronomy, of chemistry, etc. In the social sciences, on the other hand, the term is used to express "the abstract idea of the rules which regulate human action." It should be noted, however, that in the social sciences also we associate with the term ideas of cause and effect. This is clearly the case when we speak of "economic laws," but it is also the case when we speak of laws, in the most usual and proper sense, as *rules of social conduct declared and enforced by political authority*. Such rules are commonly defined by English jurists as *commands*; but many of the most important rules of law, particularly in the field of private relations (property, family, etc.), simply state that certain facts shall be attended with certain legal results. Thus a deed drawn in a certain way, and registered in a certain public office, will convey all the rights of the grantor to a piece of land. A deed properly drawn but not registered will be ineffective against third parties. A deed improperly drawn will perhaps have no result whatever. Such rules as these are commands only in a very remote and indirect sense: on their face they are statements of cause and effect or occasion and result, and in so far they are similar to natural laws. What really differentiates them from natural laws is that the result is arbitrarily determined by human volition. Hence the customary German definition of laws as *declarations of public will* is more accurate than the English definitions.

Double Meaning of the Word Law.—In all the various uses above noted the word law has a double meaning. It sometimes indicates a particular rule, i. e. a particular sequence of fact and result, and it sometimes indicates the totality or sum or "abstract idea" of a body of connected or associated rules. In the latter sense the word carries with it ideas of harmony, order, etc.; and in the field of human law, further ideas of an ethical nature—ideas of right and justice. Hence the system of social order which we call law is called by the Germans, French, Italians, Spanish, etc., "right" (*Recht*, *droit*, *diritto*, *derecho*, etc.). Words analogous to our "law" in derivation or in etymological significance (*Gesetz*, *loi*, *legge*, *ley*, etc.) are used by them, as the Romans used *lex*, to describe single rules of law, particularly those of a statutory character. English-speaking peoples always employ the word in this sense when speaking of *a* law, and usually when speaking of *laws*; and always use it in the more general sense when they speak of *the* law.

Law in General.—The conception of law, in the general or abstract sense, has been discussed in the article on Jurisprudence. In that article also the various kinds of law, public and private, substantive and remedial, are indicated, and the principles on which they are classified explained. The following table presents a list of the different branches of national or municipal law, and also a classification of the objects to which these branches apply:



Across all this classification, based on the nature of the relations with which each portion of the law deals, run other lines of historical and national division. Of the various systems of national or municipal law which have existed or still exist, the most important are the Roman and the English. From the historical point of view, again, the system of law established by the Roman Catholic Church, during the centuries in which it exercised really sovereign powers, and the body of customary law established by the merchants of Europe, at a time when their usages were everywhere accepted as binding, are of great importance. These are treated under Canon Law and Mercantile Law (*qq. v.*).

Sources of Law.—The law, as a system of social order, is composed of rules partly customary and partly statutory. The part played by custom in making law is treated in the article on Jurisprudence (*q. v.*); but something remains to be said of statutory rules. It is, in fact, to these rules that we commonly restrict the term "laws." Rules of custom constitute a part of the law, but we seldom call them laws. We draw nearly the same distinction in other words, when we divide all law into *written law* and *unwritten law* (*jus scriptum* and *jus non scriptum*). These terms, accurate enough in early society, have become somewhat misleading to-day; for when we seek to discover the rules of unwritten law, we have recourse to works written and printed (particularly to judicial reports). At the same time, the writing is here simply evidence of the rule: it is not, as in the case of a written law, itself the rule.

Written Law.—All written or statutory law proceeds from the political sovereign or some authorized organ of the sovereign. (1) The organic or *constitutional law* theoretically proceeds directly from the sovereign; but in the U. S., where the sovereignty is in the people, constitutional amendments are drafted and proposed by a representative body (Congress, or a national convention) and accepted by representative bodies (State legislatures or conventions). In nearly all of the commonwealths included in the U. S., constitutional amendments are proposed by the ordinary legislature and accepted by direct popular vote; but in most of the commonwealths the constitution may be revised by a convention, and in some of them the revision may become law without being submitted to the people. In most European countries the constitution is made and amended by the ordinary legislature, and such acts and amendments are called "constitutional laws." (2) Ordinary *legislation*, in modern states, usually proceeds from a representative body; but in Switzerland laws passed by the legislature may require popular approval, and provision is also made for legislation on popular initiative (the so-called *referendum*: see Law-making, Methods of.) In the U. S., in many of the State constitutions, and especially in the more modern constitutions, there are numerous provisions that trench upon the field of ordinary legislation; and, of course, new legislation on the matters covered by the constitution can be obtained only by the process of constitutional amendment; so that, as in Switzerland, there is a tendency to legislation by popular vote. (3) A subsidiary or supplementary power of making rules may be vested, by the constitution of a country, or by act of its general legislature, in the executive or judicial branches of government, or in special organs of local government, like a city council. The *ordinance power* of the chief executive may (and in most modern states actually does) amount to an independent or at least a supplementary power of legislation. In the U. S., however, the power of making law by ordinance is usually obtained only by specific delegation of authority from the legislature; but, within a more or less strictly limited domain, executive orders or decrees and the ordinances of local authorities, as well as the rules of court laid down by judicial tribunals, have the force of laws. The authority from which the rule proceeds must of course be a competent authority, and the regulation issued must be within its competence. A rule enunciated by an incompetent authority, or by an authority which has exceeded its powers, is null and void, and it is the duty of the judiciary to refuse to enforce it. This principle governs alike the case of an unconstitutional statute and that of an illegal ordinance. In some countries, however (e. g. France and Prussia), the judiciary is forbidden to question the constitutionality of a law properly published by executive authority; and in Great Britain, of course, acts of Parliament can not be unconstitutional, because the Parliament is unlimited in its powers.

All the classes of written law above noticed differ mainly in the degrees of authority possessed by the organs from which they proceed. In a broad sense they are all laws, but the word is not commonly used in so broad a sense. We

habitually distinguish "the constitution and the laws" on the one hand, and "laws and ordinances" on the other, thus confining the term laws to acts passed by the ordinary legislatures. We are in the habit, also, of using the term statutes in the same limited sense.

Special or Private Acts.—Some writers insist upon a further limitation, asserting that the so-called *special* or *private acts* passed by a legislature—acts, that is, whose operation is confined to a single person, or a narrow group of persons, or to a single locality—are not properly laws. This assertion is evidently due to a feeling that laws ought to be general in their scope, and to the observed fact that special legislation is open to great abuse. For this reason many State constitutions in the U. S. prohibit the passage of special or private acts. It has been found difficult, however, to enforce such prohibitions. In the first place, it is almost impossible to say *a priori* what a special act is. Some acts are more general in their character than others, and some are less general: it is a question of degree. Back of this technical difficulty, however, is one that is more serious. In a highly civilized society—i. e. in a society that has reached a high degree of differentiation and specialization of functions—equality is anything but equity; it is right and expedient that different classes of persons and different kinds of relations should be governed by different rules; and it is not easy to draw a scientific line of demarkation between such special legislation as is just and desirable and such as is unjust and injurious. For these reasons the courts have regularly avoided definition of the term "special" as applied to laws, and have rendered their decisions on the merits of each case. From the standpoint of scientific jurisprudence, the contention that a special law is not a law seems to be indefensible. Some special laws are good and some are bad, but all have the criteria of laws. They are declarations of public will enforced by public authority.

Methods of Abrogating Laws.—For the methods in which laws are made, see LAW-MAKING. Laws are *abrogated* or put out of force (1) by constitutional amendment, as was the case in the U. S. with all laws regarding slavery after the adoption of the Thirteenth Amendment to the Federal Constitution. (2) By the exercise of a superior legislative authority. Thus where concurrent legislative power exists in the national and in the local (state, provincial, or cantonal) legislatures, the enactment of a national law covering matters previously regulated by local laws deprives the latter of legal force. This will be the case, for example, with all the State bankruptcy laws in the U. S. whenever Congress shall again adopt a national law. In cases of this character, however, it is possible to hold that the State laws are not abrogated by the national law, but that their operation is simply suspended, so that they regain full force with the repeal of the national law. (3) By repeal, i. e. by a contrary statute enacted by the same legislative authority. Repeal need not be expressly declared: a new law whose provisions are incompatible with those of an older law effects *pro tanto* the repeal of the older law. In case of doubt as to whether the old and the new law are contradictory and incompatible, the presumption is always in favor of the survival of the older rule.

It was maintained by the Roman jurists that statutory law was capable of being abrogated by contrary custom or by non-user. This is generally denied by modern jurists; but their denial seems due to the fact that they think of usage only as popular usage, and do not recognize the law-making force of governmental usage. (See JURISPRUDENCE.) It certainly seems true that even statutory laws may be practically abrogated by an executive or judicial non-user. In many modern states the statute-books contain laws that are never enforced, and that are generally regarded as "dead letters." An examination of these laws will show that their enforcement is regularly dependent upon governmental initiative, and that an executive custom of non-enforcement has been developed with the general approval of the community. Cases have also occurred where the courts of a country have so interpreted a statute as either to rob it of all force or to attain a result other than that contemplated by the legislature; and in such cases it certainly might be said that statutory law had been abrogated by the custom of the courts. Cases of the last sort, however, do not occur in modern times; modern judges are not in the habit of exercising such a power.

The Domain of Law.—In early times and in semi-civilized communities the *domain* of law is regularly determined by race or by religion; so that the law of a certain tribe or that of a certain confession or sect follows the members of the tribe or sect everywhere, and governs them only. Such, for instance, was the operation of tribal law in the Frankish empire. Until a very recent period most European countries recognized that the peculiar laws of the Jews governed their marriages and family relations; and in British India the courts still recognize and enforce the laws and customs of the different confessions. In the U. S. Indians living under tribal government are largely ruled by their own tribal laws. In most non-Christian countries (e. g. in the Turkish empire, in China, and in Japan) Europeans and Americans are regularly exempted from the local law, and are governed by their own national laws; but these survivals of an older practice are tending to disappear. The modern principle is that all laws are *territorial* in their operation: that they govern all persons within the territory, except foreign sovereigns and the diplomatic representatives of foreign countries; and that they do not operate outside of the territory. An apparent exception exists in that the courts of all countries, when called upon to deal with a case which has arisen in a foreign country or which is naturally subjected, on other grounds, to a foreign system of law, will regularly apply the foreign law. The exception is, however, only an apparent one; for the foreign law is applied only in so far as the written law or the judicial usage of each state authorizes its application. In other words, the rules of *international private law* are really rules of *law* only in so far as they are parts of each national, territorial system. See INTERNATIONAL PRIVATE LAW.

Retrospective Legislation.—As the domain of law is locally restricted, so again it is temporally restricted. A law begins to be applied only when it comes into existence, and ceases to be applied when it is abrogated. The only question that arises in determining the temporal domain of laws is whether a law is to be applied to all *decisions* rendered during its period of existence, even when the facts upon which the decision must be based have occurred before the enactment of the law. This question is regularly answered in the negative. It is recognized as a principle of justice that laws shall not operate retrospectively; that the legal character which has been impressed upon the acts of men or upon other facts by the law existing at the time, shall not be changed by subsequent legislation. This principle of the non-retroactivity of laws is affirmed in the U. S. by constitutional provisions, such as those which prohibit *ex post facto* laws (see EX POST FACTO) and those which restrain the States from impairing the obligation of contract. In countries where no such constitutional restrictions exist, the legislature is competent to pass retroactive laws; but it is a general principle of construction not to assume that the legislature has had such an intention unless it is indicated expressly or by necessary implication. In the field of private law, however, this whole doctrine of the non-retroactivity of laws is limited to cases where definite rights have been vested under an older law. Mere capacity to acquire rights and mere expectations (such as those of a presumptive heir) are not protected against legislative interference.

Revisions and Codes.—The ascertainment and the application of statutory laws are greatly facilitated by periodical revisions, in which antiquated and repealed provisions are eliminated and repetitions avoided, and in which some general order of arrangement by subjects is observed. This work was done for the imperial statutes of Rome by the *codices* of Theodosius and Justinian, and similar compilations have been made in almost every country. The U. S. and the majority of the single States publish *revised statutes* from time to time. Where this is not done, private compilations of a similar character are usually made; but these, of course, are not authoritative; they serve only as a means of discovering the various statutes still in force. Another method of attaining the same ends is to reduce all the rules which govern a certain field of legal relations (e. g., public education, public health, banking, insurance) to the form of a single *general act* or statute. When such a general act covers a very broad field, it is frequently termed a *code*. Thus, for example, we have, in many of our States, political codes, criminal codes, codes of civil and of criminal procedure, and, more rarely, civil codes. The latter term commonly indicates something more than a mere revision and orderly presentation of the statutory law; it involves the reduction of the judicial custom, the unwritten common law, to statutory form. Such codification in any commonwealth of the U. S. implies (1) the withdrawal from the courts of the power further to develop the common law by decisions, and (2) the future development of the law of the

codifying States on particularistic and probably conflicting lines. See CODE, COMMON LAW, CONSTITUTION, EX POST FACTO, INTERPRETATION, JURISPRUDENCE, LAW-MAKING, and LEGISLATURES. For literature, see especially JURISPRUDENCE.

MUNROE SMITH.

Law, EDMUND, D. D.: prelate and metaphysician; b. near Cartmel, Lancashire, England, in 1703; was educated at St. John's College, Cambridge, of which he was chosen fellow upon graduation in 1723; obtained the rectory of Graystock, Cumberland, in 1723; became Archdeacon of Carlisle in 1743; master of Peterhouse College, Cambridge, in 1754; librarian of the university, Professor of Casuistry, and Archdeacon of Lincoln soon afterward; prebendary of Durham in 1767, and Bishop of Carlisle in 1768. D. at Rose Castle, Carlisle, Aug. 14, 1787. Bishop Law was one of the most learned and liberal prelates and acute metaphysicians of his age. His works are translations from the Latin of Archbishop King's *Essay on the Origin of Evil* (1731), with copius notes; *Inquiry into the Ideas of Space and Time* (1735); *Considerations on the Theory of Religion* (1745; edited, with a *Life*, by Paley 1820); and *Reflections on the Life and Character of Christ* (1749); *Works* of John Locke (1777), with a biography of that philosopher. His sons were EDWARD, first LORD ELLENBOROUGH (*q. v.*). GEORGE HENRY (1761–1845), Bishop of Chester in 1812 and of Bath and Wells in 1824, and a third, Bishop of Elphin.

Revised by J. MARK BALDWIN.

Law, JOHN: financier and speculator; b. in Edinburgh, Scotland, Apr. 21, 1671; eldest son of a goldsmith and money-changer who accumulated a fortune and bought the large estate of Lauriston, which John inherited. At the age of twenty Law settled in London, and soon became prominent in financial circles, though addicted to gambling and dissipation. Having killed an antagonist in a duel (1693), he was condemned to death, but escaped from prison and took refuge in France, traveling thence into Italy and Holland, and was for some time connected with a banking-house in Amsterdam. Returning to Scotland in 1700 he published a pamphlet advocating a state bank, but as the project met with no favor at home, he presented it to the French Government, with the same result. He held that a paper currency based on land instead of the precious metals would supply a medium of exchange far better than that actually in use. "Wealth depends upon commerce," he wrote, "and commerce depends upon circulation." By his device of a land bank and paper currency an amount sufficient for all the needs of circulation could at any time be readily obtained. He did not, in his *Proposats for Supplying a Nation with Money* and other earlier writings, advocate mere fiat money, but maintained that the currency must be based on values. His plan, if adopted, however, would have led to a serious inflation. Another pamphlet was issued on the same subject in 1705. For several years Law led a wandering life in European capitals, gaining large sums at the gaming-table, until the death of Louis XIV. in 1715 opened a field for his grand scheme. The kingdom was burdened with an enormous debt, and the regent caught at a plan which promised unlimited gain to the state. A private general bank, with a capital of 6,000,000 livres, was chartered under letters patent of May 2, 1716, and was managed with such prudence as to gain the public confidence. Law's course seems at first to have been judicious and conservative. The bank supplied a currency at once safe and convenient, and in Apr., 1717, the Government decreed that Law's notes should be accepted in payment of imposts. Another feature was added to the scheme in Aug., 1717, by the formation of the celebrated Mississippi or West India Company, with a capital of 100,000,000 livres, a monopoly of trade with Canada, and sovereign rights over the Territory of Louisiana, which was to be colonized upon a vast scale. By royal edict of Dec. 4, 1718, the general bank was transformed into a royal bank, with Law as director and the king as security. Another edict of May, 1719, conferred a monopoly of East Indian and African trade upon the favored organization, which now absorbed the East India Company, took the name of Company of the Indies, augmented its capital, and undertook to pay the national debt, agreeing to lend the king 1,500,000,000 livres at 3 per cent. An unexampled fever of speculation now carried the shares to thirty or forty times their original value, and a vast amount in notes was issued. On Jan. 5, 1720, Law received the appointment of controller-general of the finances, and in March he united the royal bank to the Company of the Indies. It was in the conversion of paper demanded by this colossal operation that the utter bankruptcy of the company was first perceived. The Government, becoming alarmed, issued an edict deposing Law from the controllership, abolishing the bank, and depriving the company of its home monopolies and its connection with the state revenues. As a commercial corporation the company struggled for existence during several months, and disappeared in November. In December Law quitted France, carrying with him only a few hundred louis-d'or, and loaded with the public execration. A friend in France, the Marquis de Lassay, gave him for some years a pension of 20,000 livres. He gradually fell into obscurity, and died in poverty at Venice, Mar. 21, 1729. The complete works of John Law were translated for the first time into French in 1790. They were reprinted in 1842, and have since been inserted in the great collection of the writings of the principal economists and financiers of the eighteenth century, published by M. Guillaumin. See John P. Wood's *Memoirs of the Life of John Law* (1824); Mackay's *Memoirs of Extraordinary Popular Delusions* (1850); Thiers's *Histoire de Law* (1858); and Perkins's *France under the Regency* (1892). See MISSISSIPPI SCHEME.

Revised by C. K. ADAMS.

Law, RICHARD, LL. D.: jurist; b. at Milford, Conn., Mar. 17, 1733; son of Jonathan Law, colonial Governor of Connecticut from 1741 to 1750; graduated at Yale College in 1751; studied law, and practiced at New London, where he became chief judge; was delegate to Continental Congress 1777–78 and 1781–84; mayor of New London for more than twenty years; justice and chief justice of Supreme Court of State, and district judge by appointment of Washington. He aided Roger Sherman in revising the Connecticut code of statute law. D. at New London, Jan. 26, 1806.

Law, WILLIAM: controversialist; b. at King's Cliffe, Northamptonshire, England, in 1686; was admitted into Emmanuel College, Cambridge, 1705; became a fellow of that college 1711; graduated as M. A. 1712; took orders in the Church of England, and preached for a time in London, but on the accession of the house of Brunswick to the throne (1714) forfeited his fellowship and his prospects of advancement in the Church by refusing, as a Jacobite, to take the oaths of allegiance. He never again officiated in public as a clergyman. In 1717 the Bishop of Bangor, Rev. Dr. Benjamin Hoadly, having in a sermon before the king given rise to the famous Bangorian controversy by attacking the non-jurors, Law wrote in reply *Three Letters to Bishop Hoadly*, remarkable for their close reasoning and command of language, which placed him at once in the front rank of the defenders of authority both in Church and state. In 1724 he wrote one of the best of the numerous replies to Mandeville's *Fable of the Bees* (republished with introduction by Rev. F. D. Maurice, 1844); *The Absolute Unlawfulness of the Stage Entertainment Fully Demonstrated* (1726); and in 1728 published his masterpiece, the *Serious Call to a Devout and Holy Life*—a work to which Dr. Johnson attributed his conversion, which had great influence upon the brothers Wesley, and which elicited the warmest praise even from the pens of the historians Gibbon and Macaulay. Shortly before this time Law became tutor to Edward Gibbon, father of the historian, accompanied his pupil to Oxford, and was for several years a member of his family at Putney. Between the years 1733 and 1736 he became acquainted with the writings of the German mystic Jakob Böhme, and adopted in a measure his teachings, which influenced the treatises on the Sacrament (1737), *Christian Regeneration* (1739), and his numerous other tracts. In 1740 a wealthy widow, Mrs. Hutcheson, and Miss Hester Gibbon, sister of his pupil, resolved to spend their lives in a quasi-conventual manner, devoting their fortunes to charity, and engaged the services of Law as chaplain and almoner. After 1744 the three resided at King's Cliffe. Their indiscriminate giving caused the parish to swarm with beggars, and they were denounced from the pulpit, but in vain. Law prepared a series of works expounding the doctrines of Böhme; these were *The Way to Divine Knowledge* (1746), *The Spirit of Prayer*, and *The Spirit of Love* (1752). He also wrote some illustrative materials for a translation of the works of Böhme executed by the ladies above named, but published after his death under the name of Law (4 vols., 1764–81). He died at King's Cliffe, Apr. 9, 1761. In the following year his collected works were published in 9 vols. His *Life* was published by R. Tighe (1813), and a volume of *Notes and Materials* for

his biography was printed for the Theosophian Library (1856). In 1881 Canon J. H. Overton published a biographical sketch of his life, character, and opinions.

Revised by W. S. Perry.

Lawes, Henry: composer; b. about 1600 at Salisbury, England, where his father, Thomas Lawes, was vicar-choral in the cathedral. Educated as a classical musician under the instructions of John Cooper, he became about 1625 one of the gentlemen of the royal chapel to Charles I., and acquired celebrity as a composer of music for masques and songs. Milton's *Masque of Comus* was set to music and brought out under his personal direction at Ludlow Castle in 1634, and the great poet, probably a pupil of Lawes in music, bestowed upon him extraordinary eulogies in several of his poems. Waller, Herrick, and Phillips wrote of him in a similar strain, and were indebted to him for the popularization of many of their songs. The music of Lawes was of the Italian style, and was of very unequal merit. He was a royalist; remained in the service of the king as clerk of the cheque until 1649, and composed the anthem for the coronation of Charles II. He published in 1653 *Ayres and Dialogues, for One, Two, and Three Voices*, comprising 150 pieces. He died in London in Oct., 1662, and was buried in Westminster Abbey.—His elder brother, William Lawes, also a gentleman of the chapel, was associated with Henry in several of his musical undertakings, and composed the music for Sandys's version of the Psalms (1648) and for many songs of that period. He was killed at the siege of Chester, 1645.

Lawes, Sir John Bennett: chemist; b. at Rothamsted, Hertfordshire, England, Dec. 28, 1814; succeeded to the estate in 1822. He was educated at Eton and Oxford, and after leaving the university he spent some time in London studying chemistry in a practical way. On his coming of age and taking possession of his estate he began regular experiments in agricultural chemistry for practical agriculture, and in 1843 he engaged Dr. Gilbert as director of the Rothamsted farm undertaking in connection with him a systematic series of investigations in the field, the feeding-shed, and the laboratory, one result of which was the introduction of superphosphate of lime as a manure. Accounts of the results of the Rothamsted investigations are to be found in *Journals* of the Royal Agricultural Society of England, *Reports* of the British Association for the Advancement of Science, *Proceedings* and *Transactions* of the Royal Society of London, *Journal* of the Horticultural Society of London, and other publications. In 1882 Lawes was created a baronet. D. in Jan., 1892.

Law-making, Methods of: the practical methods employed in the enactment of laws. In treating the subject of law-making one needs to consider not only the nature of the legislative body concerned, its size, method of appointment, character of members, etc., but also the methods by which the work is done. Bad men are often so held in check by rules which they are compelled to follow that they can do little harm, while good men, for like reason, find themselves at times prevented from giving effect to their best plans. Again, the rules of parliamentary practice, important as they are, are often found in use to give results quite different from those intended when the rules were passed. Only from the study of the legislators at work can a just estimate be made of the excellence or weakness of any constitution.

Primitive Law-making.—The simplest form of legislation is of course that of the absolute ruler, who can impose his will upon his subjects. However, even in the rudest tribes, where the chief by virtue of his prowess is autocrat, the laws made by him must be far from arbitrary. As anthropological studies have shown, savages are so dominated by custom and superstition that little room remains for individual initiative; and if a chief with sufficient intelligence to devise laws much better than the old customs should attempt radically to change the ways of his tribe, he would lose his power.

Very early in the development of government we find by the side of the chief a body of councilors, either representative, as among the Germanic peoples, or otherwise, and this body, although the king may nominally make the laws, becomes really the legislature. When, as among the ancient Greeks and Germans, questions to be settled are discussed by the council, or by the chiefs, before the people, whose approval or disapproval is freely expressed, the popular opinion has great weight, and indeed it is often decisive. In the broadest political sense of the word, whatever the form of government, the sovereignty lies ultimately with the people, as the fact and success of revolutions show.

Modern Law-making.—Of chief importance, however, are the methods of making laws followed in the leading civilized states. While in many respects the methods of the U. S., Great Britain, France, Germany, and Switzerland are alike, in other respects they are so radically different that they may be said to be almost of different types. In all the states under consideration before bills can become law they must be passed by both houses of the legislature, and practically—though not formally in Switzerland and Germany—they must receive also the assent of the head of the government. The general details of business also, as regards keeping order in the houses, reading of bills, etc., though differing somewhat, need no special treatment, as they all tend to the same result. The organic differences are of much more importance.

The United States.—1. *The Executive in Legislation.*—To those unfamiliar with the U. S. system probably the most striking peculiarity is the relation existing between the executive and Congress. The President may make recommendations to Congress, but only in exceptional cases are they of great influence. He or his cabinet may prepare a bill on an important question, but it can not even be introduced into Congress without the friendly act of some Senator or Representative, and, when introduced, can not be advocated on the floor by any one officially connected with the executive. An influential private citizen can do as much as can the President in this regard, though the President's personal influence is often great, and he sometimes doubtless influences votes by the promise of office. On the other hand, in none of the other countries mentioned has the executive head so great a direct influence in defeating legislation that he deems unwise. In France the President may force the reconsideration of a measure; in Great Britain, indirectly through his majority in the House of Commons, the Prime Minister can smother one; in Germany the Imperial Chancellor, through his Prussian colleagues in the Bundesrath, could defeat any undesirable one; but in all the cases the individuals directly control only their own votes. Inasmuch, however, as a bill can be passed over the President's veto only by a two-thirds vote in both houses, he has a negative voting power equal to that of one-sixth of the members of both houses, to say nothing of the effect of a veto upon the opinions of members. When one thinks of the very important measures that Presidents have stopped by their vetoes that in any of the other countries would certainly have become laws, if the legislators had thought as did the U. S. Congress, the tremendous anti-legislative force of the veto appears. The fact, too (owing in some States to constitutional limitation of time of the sessions of the legislature, and in all of them to the committee system for all classes of bills), that much of the legislation in the U. S. is ill-digested and crude in form, as well as, at times, injurious in content, compels the executives to make more use of the veto power than would otherwise be the case.

2. *Committee Legislation.*—The legislation in Great Britain and France, and practically also in Germany, is mainly controlled and directed by the executive that acts in the houses as the leading committee to prepare and to manage all important measures. In the U. S. substantially every bill goes into the hands of a small permanent committee, which amends it at will, recommends its passage or its defeat, or smothers it without action. Though the houses must take final action on all bills, they are in great measure dependent upon the committees for advice: and thus the committees practically make nearly all the laws. As each committee is independent, there is naturally little harmony in the laws, no general scheme, and no definite responsibility. Even the two committees that provide for the revenues and for their expenditure are composed of different men, and do their work separately, though they work from the same estimates, and each doubtless with more or less reference to what the other is doing. In other leading countries the finance question, so far as it concerns revenues and expenditures, is treated as a unit and handled by one committee. The independence of the committees in the U. S., and the natural desire of each to advance its own work, lead often to the delay of important measures, while those of trifling consequence are pushed forward by some skillful tactician. This clashing of interests often gives undue importance to questions of order. Rules of order should serve to facilitate business in the main, but according to Spofford's estimate nearly one-third of the time of Congress and nearly one-third of

the space of *The Congressional Record* are taken up with questions of order. The size of the committees, the great power given to them, and the lack of time which prevents careful consideration of their work by the whole house, with the consequent lack of responsibility, afford many opportunities for corrupt lobbying, while the fact that bills affecting private interests go through the same channel and are subject to the same rules as public bills renders the temptation to corruption very great. (See LOBBY.) This evil has been practically stopped in Great Britain by changing the method of treatment of private bills, as will be explained later. In Great Britain the public is generally admitted to meetings of committees on private bills in the House of Commons, though not in the House of Lords; in France only those asked to come before the committee are admitted; in the U. S. the matter is in the hands of the committee, but usually any one is admitted who has any special interest in the subject under consideration.

3. *The Speaker* of the House of Representatives of Congress, and the presiding officer in the State Legislatures as well, occupies a position entirely different from the man holding a similar office in Europe. There the office is practically a non-partisan one, and the duties are strictly non-partisan. In the U. S. the office is distinctively partisan, as the most important duties are of a political nature. The Speaker appoints all the standing committees of the house, and thus practically determines the legislation of the Congress. In making these appointments he is entirely free, but he usually follows to a considerable extent certain customs. Men who have been long in Congress are more likely to be placed upon the important committees; former members of committees are generally retained. His most important competitors for the position of Speaker are given chairmanships of important committees. They are, of course, prominent men of long experience. Men whose previous studies have especially fitted them for certain work are put on committees where their training will be of advantage. Still, the Speaker is expected to form the committees so that his party will always control them, and so to form the leading ones that his personal views and those of his wing of the majority party will prevail. He thus to a great extent takes the place of the prime minister in Europe, so far as legislation is concerned. In the chair, while he is supposed to administer the rules impartially, it is generally expected that in case of doubt he will favor his own party, and this he can often do under the rules. Being himself a member of the committee on rules, he sometimes sees to it that they are shaped so as to enable his party to carry out its aims readily. All things considered, he probably wields more power over the country than any other officer, except the President.

There are certain advantages in the U. S. system even from the standpoint of law-making, though the advantages are much greater from a different point of view. In a parliamentary government with a responsible ministry the individual members who are not in the cabinet have almost nothing to do but to vote, and, if they show ability in that line, to serve on private bill committees. With the great public measures they have practically nothing to do, and they have almost no hope of putting into effect any good ideas of their own. Their hope is in getting the ear of the ministry, or in fighting it vigorously. In the system in vogue in the U. S., especially in the State Legislatures, the able member can make his influence felt more directly and sooner. His bill has, technically, the same chance as any other bill, and he is in a good position to press it forward in committee or elsewhere. The committee system gives, to be sure, an advantage to the chairmen of committees, as they represent the committee on the floor, and in Congress practically determine often who shall speak on the pending bill; but on the whole the private member has much greater force than under a parliamentary system, where all the important measures are prepared by the government.

GREAT BRITAIN.—1. *The executive*, i. e. Prime Minister and cabinet, are selected from the legislature, and hold office only so long as they can control a majority in the House of Commons. If defeated on an important bill the cabinet resigns in a body, or it may, if it thinks that the house does not really represent the feeling of the people, dissolve the House of Commons and direct a new election. If the new house also is opposed to the cabinet politically, the latter has no choice but to resign and to leave the government in the hands of the new leaders of the majority party. The cabinet in Great Britain is thus, as executive, mainly a committee to carry out the will of the people. In law-making, however, it is also, and even more emphatically, a committee of the House of Commons, whose duty it is to prepare in detail all important bills, and to present and advocate them in both houses until they are passed. The majority of the House of Commons having practically—though the appointment is made formally by the Queen—appointed the Prime Minister and his colleagues, expect them to take the lead in all important matters of legislation, and are in practice bound to follow this leadership, unless they wish to bring the opposition party into power.

2. *Parliamentary Counsel.*—In order to insure harmony in the provisions of all important bills, and care and accuracy in their forms, a lawyer was appointed as early as 1837 to aid the Home Secretary in preparing bills for Parliament. In 1842 his work was extended to other departments, and in 1869 the office of parliamentary counsel was created, with sufficient aid to make its work effective. The counsel is especially connected with the Treasury Department. Other departments make use of his services in drafting bills; but the counsel is bound to report to the Prime Minister and to the Chancellor of the Exchequer all bills affecting expenditures, and those that are likely to create trouble of any kind in the House of Commons. Ministers give directions to the counsel, usually in general terms, for the preparation of bills, which are then put into form in his office. So, too, while government bills are under discussion in committee, the parliamentary counsel or assistant counsel often attends, in order to give advice and assistance to the minister in charge of the bill, and to draft amendments that he may think it wise to adopt. All government bills, after being put into form, are circulated to all the members of the cabinet before being introduced, even if they are not the subject of special discussion at a cabinet meeting. This consultation of all members of the cabinet is of course made practically necessary on account of their collective responsibility.

3. *Committees.*—The cabinet is the special permanent committee that originates all the important measures, and these measures are discussed in detail by the house in committee of the whole. The pressure of business, however, has led to the appointment of two permanent grand committees, of from sixty to eighty members each, to act generally instead of the committee of the whole, their work being submitted directly to the house. One of these was instituted in 1882 to consider the Bankruptcy Bill, the other to consider Stephen's Code Bill. The first did its work well; the second was not successful; and such committees were dropped until 1888, when they were again instituted. One considers questions relating to law, courts of justice, and legal procedure; the other considers those concerning trade, shipping, and manufactures. The members of these grand committees are appointed by a committee of selection, consisting of eight members chosen by the house early in the session. The cabinet may in good part direct this choice. The chairman of the committee of selection is the chairman of the committee on standing orders with reference to private bills, a committee which is also chosen by the house. In practice these grand committees are intended to represent fairly the political complexion of the whole house, in whose stead they act, and the members are picked out usually by the whips of the respective parties. Besides the permanent committees on public bills, the bills introduced by private members are often referred to select committees for examination and report before they are discussed in committee of the whole house, if they get that far at all. Such a select committee is usually named by the member making the motion for the reference of the bill, and when its work on the one bill is finished the committee dissolves; meanwhile other bills covering the same subject may be referred to it for a joint consideration and report.

It should be noted, however, that a private member has little chance of getting a bill passed. In the first place, such is the press of business that he has to ballot for place to obtain permission to bring in a bill; then the government, if opposed to his measure, or if hurried with its own bills, can and is likely to take the time set for its discussion; it runs the usual risks in committee; in short, the government is expected to direct all business of consequence, and private members as a rule only bring in bills for the sake of securing discussion and consequent public notice for them, or, with the approval of the government, for the sake of forwarding some measure that the government favors, but does not care to stand sponsor for.

4. *Private Bills.*—In perhaps no other respect is the British system of law-making to be so highly commended as in

its dealing with bills affecting private or local interests. In nearly all civilized countries private and local bills follow the same course as do those of general public interest. In nearly all states, however, the department of the government whose interests may be affected by the bill gives it careful consideration, and the recommendations of a department have great weight with the legislatures. In the U. S. the separation of the executive from the legislative department, and the treatment of private bills by small committees just as public bills are treated have at times given rise to corruption. This has also happened in France; but though bribery was not uncommon formerly in Great Britain, at present it is practically unknown. Every private or local matter is now brought in by petition (a survival of the old system of law-making by petition) of the parties interested, though later a member takes charge of the bill. Parliament usually meets in the early days of February, and the notice of such petition must have been widely advertised in the papers in October and November, no publication being made later than Nov. 27. On or before Dec. 15, if any lands are to be taken, as by a railway or tramway, or if other particular interests are affected, notice must be served on all persons concerned. In case of bills that provide for making aqueducts, docks, drainage, railways, streets, and like improvements, plans, books of reference, drawings, etc., must be deposited on or before Nov. 30 in the offices of certain justices of the peace, of the Board of Trade, of the sheriff, and in other public offices, for public inspection and use. On or before Dec. 21 a copy of the bill or petition, with a declaration signed by the agent, the title of the bill, and full description of its subject-matter, must be deposited at the private bill office, with extra copies for the use of members and others interested. Similar deposits must be made at the office of the Treasury and at the General Post-Office, and in special cases at the other departments interested. "All estimates and declarations, and lists of owners, lessees, and occupiers, which are required by the standing orders of the house, shall be deposited in the private bill office on or before Dec. 31." Special forms are provided for the statement, in detail, of estimates of the cost and specifications regarding the structure of railways and similar works. In short, every effort is made to insure the fullest publicity possible and the most exact information.

The house has, as officers, two examiners of private bills, skilled lawyers, whose duty it is to see that the orders as to notices, publication, etc., are duly observed. On Jan. 18, after at least seven full days' notice for each bill or petition, the examiners begin their work. Opponents of the bills or petitions may come before them and oppose on the ground of non-compliance with these standing orders. If they have not been fully complied with, a special committee decides whether or not they may be dispensed with in the case under consideration. The evidence given before the examiners is of legal form under oath, or by affidavit.

The regular chairman of the committee of the whole house for the discussion of the questions of supply and of ways and means has special charge of private bills. After the questions regarding the standing orders have been settled by the examiners as above, all private bills are thoroughly examined by this chairman of the committee of ways and means and the counsel of the Speaker. These men are experts, and are at liberty to make suggestions to the committee or to the house regarding the bill. They must report to the house any provision that affects the government. Three or more special referees, appointed by the Speaker, not necessarily members of the house, excepting the chairman, form a court to consider the question of the *locus standi* of petitioners against any private bill. They decide whether such petitioners shall be heard or not.

A private bill, before final action in the committee of the whole and in the house, after having passed the preliminary stages given, is considered carefully on its merits before a small committee, consisting usually of "a chairman and three members and a referee, or a chairman and three members not locally or otherwise interested therein." This special committee is appointed by the committee of selection mentioned above, and each member is required before sitting to sign the following declaration: "I do hereby declare that my constituents have no local interest, and that I have no personal interest, in such bill; and that I will never vote on any question which may arise without having duly heard and attended to the evidence relating thereto." No member of such committee can absent himself except in case of sickness or by order of the house, and the committee can not proceed without special order of the house if more than one member be absent. Before this committee now come the agents of the promoters and opponents of the bill with all their evidence, and the matter is fully considered in a semi-judicial manner. If any departments of the government wish to be heard or to make suggestions, they are heard. Every vote in the committee is decided by a majority, the vote of each member being taken separately, made a matter of record, and handed in to the house with the report of the committee. The committee has power to suggest amendments with or without the consent of the parties concerned, and to make such recommendation to the house as it sees fit in order to guide its action.

Promoters and opponents are taxed heavy fees by the house, so that such bills are not brought in unless the matter is important; and, if a bill is opposed, or if much evidence is required, or if much property is concerned, the cost increases very rapidly, and may amount to enormous sums.

The system has promoted wise, careful, honest legislation, while it has effectually stifled bribery and jobbery. Bills are passed on their merits only, and in the form best adapted to accomplish their intended purpose. The careful sifting of the bills by trained experts at different stages of their progress, the careful attention to assure complete publicity and full notice to all parties interested, the small size and the composition of the special committee of men not interested—which, with the full responsibility of each member for every vote, gives to the members of the committee much the function and feeling of judges in courts—all these are features that might well be copied in other countries, especially in the U. S.

The House of Lords often differs in its customs and rules from the House of Commons. It is very useful as a house of revision; but it can hardly resist the House of Commons when the sentiment of the people goes with the latter, and its methods need no special treatment here.

The chief advantages of the British system as regards public bills, as well as the disadvantages, are readily seen. The responsibility for laws is definitely fixed; the cabinet can not shift its burden if it makes a mistake either in legislation or in its executive work. Again, it secures the precedence of the most important measures and a general unity of legislation both in matter and form. The importance to the party of every discussion holds public attention. An adverse vote may easily mean the downfall of the government. In consequence each party has a recognized official, the whip, who sees to keeping members informed of pending duties and opportunities, and who is the recognized agent of the party leaders, not merely in guiding votes in the house, but also in managing elections and in directing party affairs generally. The chief disadvantages of the system are probably (1) the undue opportunity given to the ministry at the expense of private members. An able new man naturally prefers to belong to the opposition at first. (2) When so much depends upon the holding of a firm majority in the house on every important measure, the temptation to yield to the desire of factions in the house and in the country is almost overwhelming at times. That form of government also, to be successful and stable, necessitates in great measure the sinking of private judgment, and the welding of the voters and members in the main into two great parties. Where this is not done, as often in France and Italy, the lack of stability in the government is a great fault. On the other hand, where less depends upon an adverse vote, compromise becomes a necessary condition of passing the most important measures, and this insures in numbers of instances the dominance of the moderates of all parties rather than that of the extremists.

France.—The form of government, so far as it concerns law-making, is essentially the same in France as in Great Britain. Only one or two distinctions need be pointed out. The most common criticism upon the French Government is the instability of the various ministries. They change much oftener than in Great Britain, a fact that is due not to the difference in the principles of government, but rather to the multiplicity of parties and factions. A majority is made up of a combination of factions united often for merely a temporary purpose, not of a single strong party, as is generally the case in England. Often a cabinet can not be said to have a general policy. When it has passed the one or two measures for which it was created it falls, and a new cabinet, often composed largely of the same men, is formed to carry through the next measure that the Chamber of Deputies wishes to deal with.

Committees and Bureaus.—The form of organization of the French chambers and their plan of selecting their committees were in use in France before the Revolution of 1789 (in the States General), and have been adopted with slight modifications in Germany, Italy, Belgium, and Japan. As compared with the usages of the U. S. and Great Britain, the striking feature is the element of chance in the selection of the members of committees. At the beginning of each session, and every month thereafter, the houses are divided as equally as possible by lot into bureaus, of which the Senate has nine and the Chamber of Deputies eleven. From these bureaus are chosen by ballot the special committees which consider in detail the bills presented to the houses. Besides the special committees that exist until they have disposed of the subject given into their charge, there are four committees named for a month each—those on parliamentary initiative, on petitions, on leave of absence, and on departmental and municipal affairs. The usual course of a bill is as follows: It goes first to the committee on parliamentary initiative. This committee considers the bill as a whole, and decides whether it will recommend that it be at once rejected without consideration by the chamber, or whether the chamber shall take it up at once as a matter of urgency, or—the usual course—send it to the bureaus for reference in due time to a special committee. The committee on parliamentary initiative is to make its report on each bill within ten days. Practically it is indulgent, and always passes the bill, which is then printed and distributed to the various bureaus. Here, after discussion, according to the theory, though in practice the discussion is at times omitted and is often perfunctory, the bureaus elect by ballot, each from its own number, a delegate, or in important cases two, and on the budget and, if the house so instructs (a rare case), on other bills of first importance three delegates. Often only a few members of a bureau are present, and the delegates are chosen without discussion. These delegates of the bureaus form a special committee to consider the bill in detail, to make amendments, gather information for the use of the house, etc., as is customary in all legislative bodies. At the close of its work the committee selects, also by ballot, a reporter, who drafts a report and submits it to the committee for its approval, and who afterward makes the report to the chamber and represents the committee before the chamber. Thereafter the procedure is the same, practically, as in other bodies of like character.

The bureaus and committees organize themselves by electing from their own number by ballot each a president and a secretary. In important committees they may elect vice-presidents and as many secretaries as seem desirable.

The advantages of this system in securing, if the bureaus will it, thorough discussion, in securing the best men for each important committee, and in checking partisanship in the appointment of committees, are readily seen; but in practice there are many faults of greater or less magnitude. Party feeling is often strong in France, and no party wishes to make another prominent. The bureaus being formed by lot, it will happen at times that the best-informed man on some special bill will belong to a bureau the majority of whose members are of the opposite party. In that case he may not be placed upon the committee. Again, the three or four best men for the committee may belong to one bureau. In that case only one can be elected on an ordinary committee. The German Reichstag (Imperial Diet, House of Representatives) and the Japanese House of Deputies avoid this difficulty by permitting each bureau to elect any member of the house for a committee. If a member is chosen by more than one bureau he decides for which one he will act, and the others make a new choice. Of course, the ministry and party leaders have often much influence in the selection of the important committees. As has been intimated, the bureaus sometimes defeat, in part, the purpose for which they were created, by selecting members of committees without preliminary discussion. The committees, too, are at times sharply criticised for their slowness in work, as they sometimes hold bills for months, even years, without report. They have no right technically to smother a bill, and the house may call for a report.

Germany.—The one matter of prime importance in the law-making of the German empire is the overwhelming influence of the executive as personated by the Imperial Chancellor representing the Emperor. This appears in part directly but especially indirectly through the part that Prussia plays in the Bundesrath (Federal Council). It would be hardly too much to say that all the legislation of prime consequence from the foundation of the empire, at any rate until the resignation of Prince Bismarck, was inspired and carried through by the Chancellor. The peculiar feature in Germany is that the Chancellor is not responsible to the legislature, except under general law, and in no sense could be said to represent the majority party, as does the prime minister in a parliamentary government.

In Prussia the King can always control a large majority in the upper house, because the members are either members of the aristocracy or are his appointees, and he could make a majority by new appointments if necessary. For different reasons he, as Emperor, can generally control a majority in the Bundesrath. The German empire is not in fact a confederation of states of equal importance, but it is really a confederation under the hegemony of Prussia. From the fact that Prussia has control of the army in the main, that it was Prussia's prowess that led to the formation of the empire, from the prestige gained by its later history, from the consciousness that she could if need be dominate by force of arms, Prussia can practically always control a majority of votes in the Bundesrath. By the terms of the constitution, Prussia's negative alone is enough to prevent any change in the constitution, but her vote is not enough to carry through unaided any new project. Each state has an equal right of initiative, but Prussia's position is such that all measures of great importance are expected to originate with her. The Chancellor as president of the Bundesrath, and as head of Prussia's delegation, really controls in this regard, first, Prussia, and then through Prussia the whole Bundesrath. So long as he has the confidence of the King of Prussia, he practically casts Prussia's seventeen votes, for the members of each state must vote in unison. In practice the Chancellor has even defied the Bundesrath opposed to his will. In 1880 Bismarck refused to send to the Reichstag a bill passed by the Bundesrath, because an amendment had been added contrary to his will. The Bundesrath protested; he resigned; the emperor declined to accept his resignation; the Bundesrath yielded and withdrew its amendment.

The part that the Chancellor takes in forming and carrying the budget shows fully his power. The budget is prepared at first by the heads of the various departments, who submit to the Chancellor a detailed estimate of needed expenditures and receipts from the various sources. These chiefs of departments are appointees of the Chancellor, and hold office practically at his pleasure. From their reports he draws all needed details, co-ordinates and unifies the whole, and presents it to the Bundesrath. This body examines it carefully, may criticise it in detail, make valuable suggestions, etc., but finally passes it in the form that the Chancellor decides upon. It then goes to the Reichstag, and here the Chancellor may have more trouble, for here he has no direct control. He may, however, himself go before the Reichstag to defend it; he may send any of the ministers or members of the Bundesrath, who are heard in open session or in the committees. The Reichstag is limited in its opposition in another way, as are most legislatures. It is recognized that it can not indirectly abrogate any law by refusing to vote the supplies necessary to carry it out. In this way all regular expenditures are usually made safe by coming under some general law. The Reichstag is practically limited to the rejection of some new plan of raising revenue, or to preventing the creation of some new object of expenditure. For example, in 1881 it rejected the proposal for a monopoly of tobacco, and in 1886 likewise that for a monopoly of alcohol. Even, however, in these regards the Chancellor can make his power felt in the Reichstag. His opportunities for favorable compromise are many. No bill can become law without the consent of the Bundesrath, so that the Chancellor can threaten to defeat any measure that the Reichstag may wish to become law, unless it consents to pass his own bills. Or he may promise his aid to different factions for different purposes in order to get them to unite on his measure. Bismarck, as Chancellor, never spoke as a party man, but dealt with parties as he would to further the policy of himself and the Emperor. Again, the Chancellor speaks with the authority of a man who represents the person of the Emperor, who has formally in his hands the control of the entire executive department of the government, and who has also a tremendous social and official influence. All this added to a strong personality, such as Bismarck possessed, made him almost irresistible even in the Reichstag, although at times he could not carry through a much-desired measure. As a matter of fact, however, all the great reform measures of the empire

have come from the executive, and the legislative body really waits for the initiation of the executive in such matters.

Committees in the Reichstag are appointed, in form, much as in France, though the practice is very different, and the general course of proceeding is about the same as in other legislative bodies. The whole house at the beginning of the session is divided by lot into seven sections for the whole session, instead of for a month as in France. The business of the sections, besides the verification of the credentials of the members, is to appoint the members of the committees. Nominally this choice is made by election; practically the sections do not meet at all. The leaders of the different parties form an extra-legal committee, called, after the university phrase, the senior convent. The members of the senior convent apportion the membership of committees among the parties in proportion to their relative strength in the house. They name the members of any committee. This list of members is handed to the proper official, who enters their names as if they had been really appointed by the sections. The selection is not made necessarily for a section from the section itself, as in France, but may fall upon any member of the Reichstag. In case of a double election, which under present practice will not happen, the member decides, according to the rules, for which section he will act; the other makes a new choice. There are six standing committees:—on the order of business, petitions, commerce and industry, finances and tariffs, justice, the budget—and special committees are appointed as needed. This is all in practice, however, really settled and directed by the above-mentioned senior convent, with which the speaker regularly consults, and which, though it has no legal standing, is practically and wisely recognized as the directing force in all matters concerning the legislative business.

Switzerland.—So far as the passage of the laws through the legislature of either the confederation or of one of the cantons is concerned, little need be said. The bills need to pass both houses of the legislature of the confederation. The ministry (Bundesrath) may prepare and submit bills, and discuss them in the houses, though their tenure of office does not depend upon their success in carrying their measures. The fact that they are elected by the houses in joint session, however, practically makes it certain that they will be politically in harmony with the houses.

1. *The Referendum* is one of the two or three peculiarities of law-making in Switzerland that need special attention. The referendum doubtless originated in the custom of requiring representatives to get instructions from the home government before deciding upon important questions. The smaller cantons elected by popular vote their representatives to the federal assembly, and naturally settled all questions submitted to them in the same way. At present the usage varies in different cantons. In some, any law passed by the legislature must be submitted to the people for ratification, if a certain number of voters (the number depending upon the population of the canton) demand it; otherwise the law stands (the "facultative referendum"). Attempts to check this power of the people have been made by securing the provision that if the law is urgent it need not be submitted. That check has been weakened again by requiring a two-thirds vote of the legislature to declare urgency. The tendency in Switzerland is clearly toward the direct voice of the people in law-making. In Zurich, which has perhaps gone further in this direction than any other large canton, with the possible exception of Berne, the people vote twice a year on all the acts that have been passed in the meantime by the cantonal council. The council can put no law into force till the people have decided upon it; but in case of urgency the council can summon the people sooner to a special vote. The people vote only yes or no on each law submitted, but the council may ask them to decide separately on special points. The laws must be distributed at least thirty days before the voting, so that the people may discuss them. The absolute majority of those voting decides.

It is the duty of the council to consider and put into form all bills that are to be submitted to the people, and they have the power to decide finally on many matters of minor importance, though many of these matters are largely of an administrative nature, and are never of the nature of new legislation.

2. The *initiative* of the people in law-making is another step that Switzerland has taken in the direction of a real democracy. In Zurich, for example, every voter has the right to propose the passage or the repeal or the amendment of any law or of any decree, except the few unimportant ones that are exclusively in the hands of the cantonal council. The proposition may be put forward in the form of a complete bill or of a mere summary of the subject-matter of a bill which the cantonal council is to put into final form. If one-third of the council vote in favor of the proposition put forward by an individual or by a communal council, the bill must be submitted to the people. If twenty-five members of the council favor it, the proposer of the law has the right to expound and defend his bill in person before the council. So also if 5,000 voters declare in favor of a measure, the council must see that it is put into proper form and submitted to the people. If the council wishes to do so, it may prepare another measure on the same subject as the one "initiated" by the people and present it as an alternative. The people then decide between the two or reject them both. Such propositions coming from the people and properly supported must be put into form and submitted not later than at the second regular ballot of the people after its introduction.

3. *Proportional Representation.*—The cantons of Ticino, Neuchâtel, and Geneva have adopted a system of proportional representation by which each party is given a representation in the legislature in proportion to its voting strength. (See Representation for details.) In this way the need for the referendum is much lessened, while the advantage of having the laws thoroughly discussed by a small body is secured. The system will doubtless soon be adopted in other cantons.

4. The *federal government* has also gone far in the direction of legislation by the people directly. According to article 89 of the constitution, "the federal laws are submitted for their adoption or rejection by the people, if the demand for it is made by 30,000 active citizens or by eight cantons." The same holds true of any federal decree of a general nature which is not urgent in its character.

On July 29, 1891, a new chapter regarding the revision of the constitution went into force. This recognizes the principle of popular initiative. If one of the two houses wishes a total revision of the constitution, or if 50,000 voters demand it, the question must be submitted to the people. If a majority favors it, there must be a new election of the two houses, and they work out the revision. There may be a partial revision also through popular initiative. "The popular initiative consists in a demand presented by 50,000 Swiss voters for the adoption of a new article or the abrogation or modification of specified articles of the constitution that is now in force." The demand may be in the form of a general proposition, or the new article may be elaborated in detail. In the first case, if the federal legislature approves, it will put the request into the form of an amendment and submit it to the people; if the legislature does not approve, the general question is submitted to the people; and if they approve, the federal legislature must draft the amendment in accordance with the popular will. If the amendment is first presented in complete form, the legislature may propose an alternative form if it wishes, so as to let the people choose between the two. A majority of the people voting and a majority of the cantons are required to amend the constitution. The popular vote of a canton is held to express the will of that canton.

In the U. S. as well as in Switzerland there is a tendency toward popular methods of legislation. Distrust of the legislature appears in nearly every new constitution in the lessening the frequency of its meetings, in the shortening of its sessions, and in the many provisions in the constitutions themselves that are of the nature of ordinary laws. In brief, the apparent result of the Swiss experience with this method of law-making is as follows:

1. It is found that the people as a rule are conservative, and are averse to any rash experiments in legislation. Out of thirty-nine propositions to amend the constitution of the confederation twenty-four have been rejected, only fifteen accepted. This may at times delay wise legislation, but it at any rate insures popular support for the laws that are passed. Not long since a law providing for State ownership and management of important railways was rejected by the people by an immense majority (289,406 against, 130,729 for), though it had passed both houses by a large majority. In a matter of that kind, involving very large expenditure, it is certainly well to wait until the people approve before undertaking such a scheme, even if the measure be wise.

2. No scheme can stand against the popular veto if there is good reason for belief that there is jobbery in it. This fact is likely to discourage corrupt lobbying, and to advance the

intelligence of the people by forcing those who favor any important measure to supply valuable information for general circulation.

3. When the people's voice is so readily heard, there is less need for frequent elections, and the skill of the legislators may be increased by longer terms.

4. The popular initiative in connection with the referendum favors also many kinds of popular reform, especially those kinds that tend to lessen the power of the politicians as a class. (See Representation.) The people may be said to be always on the side of honesty and economy, though it may be difficult to show them the best method of reaching these ends at times.

5. There is danger of popular prejudice becoming crystallized into law before the public can be sufficiently informed or made tolerant, though experience shows that this danger is less than might have been anticipated. Since the amendment of 1891 to the Swiss federal constitution an anti-Semitic feeling has manifested itself in the guise of an amendment to prevent cruelty to animals. The federal council sent to the chambers in Sept., 1892, a popular demand supported by 69,000 genuine signatures, for a law on the subject of the Israelitish method of slaughtering animals. There can be little doubt that popular prejudice rather than reason was behind this demand, but after ample opportunity for discussion the amendment was passed.

6. There can be no doubt that under a true theory of representative government, where the representative is elected for his worth and is expected to vote according to his own judgment instead of according to popular desire, better laws would be passed by a legislature than by the people acting directly; but, as a matter of fact, most representatives try to please their constituencies by their votes. This being the case, it is likely that the people, feeling their responsibility more if they have to vote directly on the laws, will take more pains to inform themselves on political questions, and that consequently the laws passed by popular initiative, or by popular vote on the initiative of a legislature, will be as good and as wise as those ordinarily passed by a legislature. They will probably be more free from suspicion of fraud, and they will certainly have the public support in execution.

7. The educative effect on the people of a direct voice in law-making, both in the way of veto and of the popular initiative, is not likely to be overestimated.

8. Switzerland, by the adoption of the system of proportional representation, is securing the advantages of both the representative system and that of the referendum.

The above short sketch of the peculiar characteristics of several of the leading civilized nations as regards law-making seems to show that though all have their weaknesses that need to be strengthened, and though their methods have much to do with the character of the laws passed, yet that under all the differences in method there are strong resemblances, and that all can get some good results. It is further true that there is clearly a strong drift toward a more extreme democracy, even in Germany. Unless, however, signs of the times deceive we may learn that the tendency is not greatly to be feared, but rather that as popular government is slowly realized it seems itself to be working out in its forms of manifestation protection against the dangers which it has seemed at times to threaten.

Authorities.—McKee, *Manual of Congressional Practice*; Bryce, *The American Commonwealth*; Wilson, *The State, Congressional Government*; Goodnow, *Comparative Administrative Law*; Burgess, *Political Science and Comparative Constitutional Law*; *Rules and Practice of the House of Representatives*; Marquardsen, *Handbuch des öffentlichen Rechts der Gegenwart*; Von Rönne, *Das Staatsrecht der Preussischen Monarchie*; Laband, *Handbuch des deutschen Staatsrecht*; Meyer, *Lehrbuch des deutschen Staatsrechts*; Loening, *Lehrbuch des deutschen Verwaltungsrechts*; *Geschäfts-Ordnung für den Deutschen Reichstag*; *Sammlung enthaltend die Bundesverfassung und die Kantonsverfassungen der Schweiz*; *Geschäfts. reglementarische Bestimmungen für die Eidgenössischen Räthe (der Schweiz)*; Lalor, *Cyclopædia of Political Science*, articles on various countries and on subjects connected with this article; Bagehot, *The English Constitution*; Anson, *The Law and Custom of the Constitution*; Dicey, *The Law of the Constitution*; May, *Parliamentary Practice*; Todd, *On Parliamentary Government in England*; Porritt, *The Englishman at Home*; *Standing Orders of the Lords and Commons relative to Private Bills*, for session of 1893; *Rules, Orders, and Forms of Procedure relating to Public Business for the Lords and Commons*; Poudra and Pierre, *Traité Pratique de Droit Parlementaire*; Dupriez, *Les Ministres dans les Principaux Pays d'Europe et d'Amérique*; Pierre, *Organisation des Pouvoirs publics*; *Règlements du Sénat et de la Chambre des Députés* (France). In addition to the above-mentioned works all the well-known treatises on constitutional law or parliamentary law contain much that is useful. The actual methods of work and the significance of the rules as found in practice can often be learned only from members of legislatures or from those thoroughly conversant with the methods of pushing laws through.

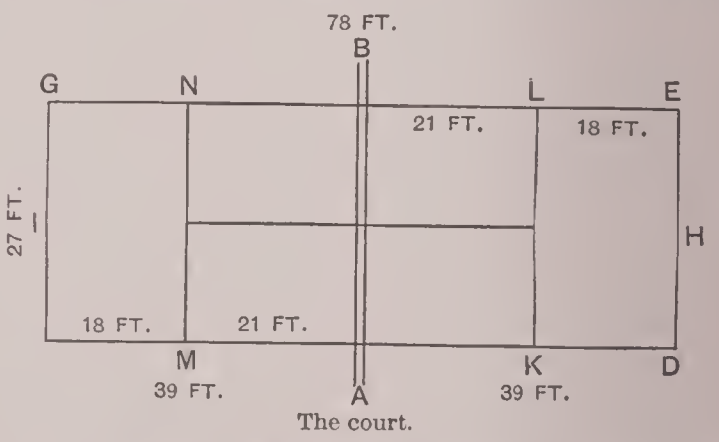
Jeremiah W. Jenks.

Lawn [M. Eng. *laund*, an open clear place, from the Celtic, cf. Ir. *land*, *lann*, Welsh *llan*, Fr. *lande*, Ital. *landa*, moor]: a name which originally meant an open space between woods, but is now mostly restricted to a space of ground covered with grass for ornamental purposes. In order to produce a thick-turfed, dark-green, velvety lawn, the soil, especially if light, should be well provided with manure, and worked so deeply as to allow the plant to extend its roots below the stratum generally reached by a surface-drought. The seed most popular in the U. S. is blue-grass or June-grass (*Poa pratensis*), although various good mixtures are sold by seedsmen. Some like to sow a little white clover-seed for the sake of the clover-flowers. Timothy or herd's-grass seed (*Phleum pratense*) may be sown with the June-grass in small amount to afford an early cover for the ground. The June-grass eventually overcomes the timothy. The June-grass should be applied at the rate of 2 or 3 bush. per acre. A few quarts of timothy will suffice for this area. It is not recommended to mix the grass-seed with that of some grain, which is often done. The idea is to produce shade for the young grass-plant, but the effect really is that it is starved. A third and indispensable condition is frequent mowing—once a week during the growing season, at least once every two weeks, and each spring a little top-dressing, especially on any poor spot.

Revised by L. H. Bailey.

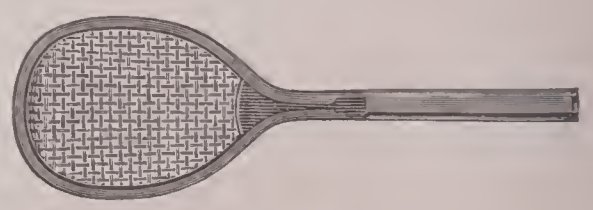
Lawn-tennis: a game of ball played by either two or four persons, in a space called a court. It is a modification of the old game of tennis, designed to allow a game resembling tennis to be played on any level piece of ground without any expensive arrangements.

The court is marked out by lines on any level, hard surface, grass being the most common, but gravel, asphalt, cement, wood, etc., are also used. The court is 78 feet long by 27 feet wide, for two players. For four the court is of the same length, but is 36 feet wide. It is divided by a net stretched across the middle (A B in the diagram), 3 ft. 6 in. high at the posts and 3 feet in the middle. The posts stand 3 feet outside the side-lines. The balls are of hollow rubber,



The court.

covered with smooth white cloth, cemented to the ball and then sewed. Each weighs 2 oz., and is about 2½ inches in diameter. The ball is struck with a racket, made of ash and strung with catgut.



The racket.

History.—The game is an adaptation of tennis for outdoor purposes. The parent game was played in France

and Italy as early as 1500. It existed in two forms, one played in the fosses of castles, and in any space bounded by walls, which formed part of the game, and by degrees buildings were erected especially for the game, which began to be called *la court paume*. The other form was called *la longue paume*, and played in the open ground. The name *paume* arose from the fact that the ball was struck by the palm of the hand. *La longue paume* must have to a certain extent resembled lawn-tennis, but it has been extinct for at least 150 years, and lawn-tennis is derived from *la court paume*, which has been corrupted into court-tennis.

The modern game of lawn-tennis was originated by Maj. Wingfield at a country-house in Wales in 1874. Many people claim to have invented the game, and did, no doubt, bat a ball of some kind back and forth over a cord or net; but Maj. Wingfield put the game into a condition where it could be played by every one. In 1875 the Marylebone Cricket Club, the ruling body on cricket in England, appointed a committee to frame laws for the game. A year later the All England Croquet Club, in combination with the M. C. C., revised the laws and held the championship meeting for singles on its grounds at Wimbledon. The All England Lawn-Tennis Club continued to rule the game until the formation of the Lawn-Tennis Association in 1887, which is now the governing body in Great Britain.

In the U. S. the game was first played at Nahant, Mass., by F. R. Sears and James Dwight in Aug., 1874. The laws in force were those used in Great Britain, until in 1881 a convention was called by the Young America Cricket Club of Philadelphia, the Staten Island Cricket Club of New York, and the Longwood Cricket Club of Boston. This convention formed the U. S. National Lawn-Tennis Association, which has from that time made the laws of the game in the U. S.

The singles championship was played first at Newport, R. I., in 1881, and has been held at that place every succeeding month of August. The winners are as follows: 1881–87, R. D. Sears; 1888–89, H. W. Slocum; 1890–92, O. S. Campbell; 1893, R. D. Wrenn.

The doubles championship was instituted in the same year as the singles, and has been held at various places—Newport, Orange, N. J., Chicago, etc.

Explanation of the Game.—The game is begun by the players tossing for choice of sides and "service," i. e. the right to make the first stroke of the game. The winner may take either the side or the service, but if he chooses the side his opponent has the right to serve or not as he may prefer. The player who is to serve throws the ball up into the air with one hand and strikes it with his racket, trying to make it fall in the front part of the court diagonally opposite to him. Should he fail to do so, a fault is called, and the player must try again. Should he fail a second time, two faults are called, and one point is scored for the striker-out. Should the server, however, succeed in hitting the ball into the proper court, his opponent must return it after the first bound. He can play the ball into any part of the server's court, and the server in his turn must return the ball, but he is no longer compelled to place it in any particular part of the court. It is only the "service" or first stroke that is restricted to this quadrangle. In like manner any stroke except the service may be played before it touches the ground, i. e. "volleyed," but the service must be allowed to strike the ground. To serve, the player must stand directly behind the base-line, first on the right of the control-line, and for the next stroke on the left, and so on alternately.

The server wins a stroke whenever the striker-out fails to return the ball into the server's court.

The striker-out wins a stroke when the server serves two consecutive faults, or fails to return the ball into the striker-out's court.

Either player loses a strike if the ball touches him or anything that he wears or carries except his racket, or if the ball touches his racket more than once.

When the first stroke is won the score is called "fifteen." If the second stroke is won by the same player, the score is "thirty," if the third "forty," and if the last game. In other words, the game is made up of four strokes, each called fifteen, except that for convenience forty is called instead of forty-five. In France, in the parent game of tennis, forty-five is still called.

Four strokes won by the same player make game, as stated, but there is one exception. Should each player have scored three strokes the score is called "deuce," and an additional stroke "vantage" is introduced. Thus to make game a player must make two consecutive strokes after the call of deuce. Should he make one stroke "vantage" and lose the next, the score returns to deuce. In like manner a "set" is the best of eleven games, i. e. the player who first wins six games wins the set; but should the score be five games all, a player must win two consecutive games to win the set, or the score returns to "games-all."

Matches are usually the best of three sets, but in all championships they should be the best of five advantage sets. It should be stated that by agreement advantage sets may be dispensed with, and the player who first scores six games takes the set.

Umpires.—In all matches it is necessary to have umpires to decide if the ball falls in the court or outside of the lines, to keep the score, etc. This can be done by one or two persons, but it is very much better, if possible, to have an umpire for every line, who shall give a decision on that line only, and to have a special umpire to keep the score, etc. It is his duty to see if the ball touches a player, if it is played before it has touched the ground twice, etc.

Odds.—As all players are by no means equal, it is often necessary to give odds. This may be done in several ways. The smallest odds are a "bisque," i. e. the player who receives a bisque can add one point to his score once in a set at any time he sees fit.

The next odds are half-fifteen, which is one stroke given at the beginning of the second, fourth, and every following alternate game of a set. Fifteen is one stroke in each game. Half-thirty is one stroke the first game, two the second, and so alternately. Thirty is two strokes each game. Half-forty is two strokes the first game, and three the second, etc. Forty is three strokes in each game. Sometimes the difference between two players is so great that odds like forty are needed to make a game; but when such odds are given there is practically no game left to play, as one stroke may win a game. In such cases "owed odds" are used—that is, the better player must make one or more strokes before he can score. The table is exactly like that of given odds, except that in the case of half-odds, as half-fifteen, half-thirty, etc., the larger odds are given in the odd-numbered games of the set, while with given odds the same is the even-numbered games.

With a view of promoting exactness in handicapping, a system called the quarter system has been devised. In it fifteen is divided into quarters. One quarter of fifteen is one stroke given in the second, sixth, tenth, etc., games of a set. Two quarters is one stroke given at the beginning of the second and every subsequent alternate game of a set. Three quarters is one stroke in the second, third, and fourth games, and in the last three of every subsequent four games of a set. Fifteen is one stroke in each game. The rest of the system is carried out in the same way. It is accurate but complicated. A still newer but far more complicated method is to divide fifteen into sixths. One other system of scoring should be mentioned, called the "hundred-up" game. It simply consists in playing till one player reaches 100. The service is changed after four or six strokes. This is a dull game and can not be recommended.

JAMES DWIGHT.

Law of Nations: See INTERNATIONAL LAW.

Lawrence: city (founded in 1854); capital of Douglas co., Kan. (for location of county, see map of Kansas, ref. 5–J); on both sides of the Kansas river, and on the Atch., Top. and S. Fé, the Kan. City, Wyo. and N. W., and the Union Pac. railways; 38 miles W. of Kansas City. It is the seat of the State University and of Haskell Institute, which, next to that at Carlisle, Pa., is the largest Indian training-school in the U. S. Excellent water-power is obtained from the river by means of a dam, and the city has become noted for its manufactories, which include large barb-wire, canning, and shirt factories, flour-mills, and a straw-lumber plant. There are 20 churches, 3 national banks with combined capital of $350,000, 2 State banks with capital of $60,000, public library, and 3 daily, 8 weekly, 2 monthly, and 2 quarterly periodicals. The city was founded during the Free-soil and pro-slavery struggle for the admission of Kansas into the Union; was the headquarters of John Brown and other noted Free-soil leaders; was burned by Quantrell and his guerrillas on Aug. 21, 1863; and has made rapid progress since its rebuilding. Pop. (1880) 8,510; (1890) 9,997; (1900) 10,862. EDITOR OF "JOURNAL."

Lawrence: city (founded by the Lawrence family; incorporated as a town 1847, as a city 1853); one of the capitals of Essex co., Mass. (for location of county, see map of Massa-

chusetts, ref. 1–I); on both sides of the Merrimac river, and on the W. and S. Divisions of the Bost. and Me. Railroad; 26 miles N. W. of Boston. The city has unrivaled water-power for manufacturing, obtained from the river, which here has a descent of 26 feet in about half a mile. A granite dam, 900 feet long and 30 feet high (begun in 1845), was constructed across the rapids at a cost of $250,000, and a distributing canal, a mile long, 16 feet deep, 100 feet wide at the head, and 60 feet wide at the mouth, costing with locks $200,000, was completed in time for the inauguration of the manufacturing industries of the town by water-power, on Feb. 24, 1848. Subsequently a second canal was built on the opposite side of the river. The city has become widely known for its manufacture of cotton and woolen goods. The census returns of 1890 showed that 521 manufacturing establishments (representing 69 industries) reported. These had a combined capital of $29,108,756; employed 15,825 persons; paid $6,513,454 for wages and $14,731,652 for materials; and had products valued at $25,933,354. There were 21 textile manufactories, which reported $24,383,100 capital; employed 12,193 persons; paid $4,547,678 for wages and $10,447,655 for materials; and had products valued at $17,932,388. The next largest industry was the manufacture of foundry and machine-shop products, which had 25 establishments, employed $1,253,203 capital and 776 persons; paid $454,948 for wages and $481,567 for materials; and had products valued at $1,221,913. The most important textile manufactories are the Atlantic cotton-mills, capital $1,000,000, looms 2,109, operatives 1,200; Pacific mills, capital $2,500,000, looms 6,900, printing-machines 25, operatives 4,800; Washington mills, capital $3,015,000, looms 1,400, operatives 2,100; Arlington mills, capital $2,000,000, operatives 3,000; Everett mills, capital $800,000, looms 1,014, operatives 1,050; and the Pemberton mills, capital $450,000, looms 870, operatives 850. There are also three large paper-mills. The city has an area of 7 sq. miles; net debt $1,258,571, and assessed property valuation $39,000,000; 5 daily and 8 weekly newspapers; 5 national banks with combined capital of $925,000, and 3 savings-banks; public library with 35,000 volumes; and 3 public parks. There are 26 churches, 63 graded public schools, and numerous institutions of private and public benevolence. Pop. (1880) 39,151; (1890) 44,654; (1895) 52,-164; (1900) 62,559. EDITOR OF "AMERICAN."

Lawrence, SAINT: See LAURENTIUS, SAINT.

Lawrence, ABBOTT, LL. D.: philanthropist; b. at Groton, Mass., Dec. 16, 1792; son of Samuel Lawrence (1754–1827), an officer during the Revolutionary war; studied in the academy at Groton, and became a successful dry-goods merchant in Boston. He was an early advocate of the protective tariff, and one of the foremost men in building up American manufactures. He engaged largely in manufacturing, and was one of the principal founders of the city of Lawrence, Mass. He was a member of Congress 1835–37 and 1839–41; was in 1842 a commissioner to settle the Aroostook boundary question; U. S. minister to Great Britain 1849–52. In the presidential canvasses of 1840, 1844, and 1848 he took an active part, but declined the seat in the cabinet which President Taylor offered him. He founded the Lawrence Scientific School of Harvard University, to which he gave $100,-000, established scholarships and prizes in public schools, and was a liberal benefactor of the Groton Academy, now known by his name. He was liberal in all philanthropic and charitable causes. D. at Boston, Aug. 18, 1855.

Lawrence, GEORGE NEWBOLD: ornithologist; b. in New York city, Oct. 20, 1806; was actively engaged in business in New York from 1826 to 1862, devoting his leisure time to ornithology. He made a special study of the avifauna of tropical and sub-tropical America, and described over 300 new species. Beside more than 100 shorter papers, he was, with Prof. Spencer F. Baird and John Cassin, editor of *The Birds of North America*, published first in 1858 as vol. ix. of the Pacific Railway Reports, reissued separately, with additions and plates, in 1860. F. A. LUCAS.

Lawrence, Sir GEORGE ST. PATRICK: soldier; b. at Trincomalee, Ceylon, in 1805; was educated at Foyle College, Londonderry, and Addiscombe College, Surrey; became a cornet in the Bengal Light Cavalry in 1821, and was appointed political agent at Cabul in 1839, at Peshawar in 1848, at Mewar, Rajputana, in 1850, and agent to the governor-general for the Rajputana states in 1850. In 1867 he retired on full pay and with the rank of lieutentant-general. The stirring events of his life—he was present at the murder of Sir William Macnaghten and in the Kata Pass with Sir Charles Napier—he recorded in his *Reminiscences of Forty-three Years' Service in India*, edited by W. Edwards in 1874. D. Nov., 1884.

Lawrence, Sir HENRY MONTGOMERY: statesman and soldier; b. at Matura, Ceylon, June 28, 1806; studied at the Military College at Addiscombe; went to India in 1821 as a cadet in the Bengal Artillery; took part in the Burmese war of 1828, in the first Afghan war of 1838, and in the Sikh wars of 1845 and 1848; was resident at Lahore from 1846 to 1849; then chief of the board of administration in the Punjaub, agent of the governor-general in Rajputana (1852), and in 1857 commissioner in Oudh. He conducted the memorable defense of the British residency at Lucknow against the mutineers, until on July 2 he was mortally wounded, and died at Lucknow, July 4, 1857. He founded the Lawrence military asylums at Sanawan on the road to Simla, at Murree in the Punjaub, at Mt. Abu in the Rajputana, and on the Madras Nilgiri hills, and to these institutions devoted a considerable portion of his large income. He was also the author of the *Adventures of an Officer in the Service of Ranjit Singh* (1845), and of a series of articles in *The Calcutta Review* which attracted much attention on their first appearance and afterward were collected and reprinted in London.

Lawrence, JAMES: naval officer; b. at Burlington, N. J., Oct. 1, 1781; entered the U. S. navy as a midshipman in 1798; became lieutenant in 1802; took part in the war with Tripoli (1804–05); was appointed in 1810 to the command of the Hornet (18), with the rank of master-commandant; cruised in Com. Bainbridge's squadron on the South American coast at the close of 1812, and on Feb. 24, 1813, captured, near the mouth of the Demerara river, the British sloop of war Peacock after an engagement of fifteen minutes. Returning to New York with his prisoners, Lawrence received from Congress a gold medal, and was promoted to be captain and commander of the frigate Chesapeake. On June 1, 1813, he was mortally wounded in an engagement between that vessel and the British frigate Shannon in Boston harbor. The Chesapeake was taken by assault and carried into Halifax, where Lawrence died July 5. His exclamation on being carried below, "Don't give up the ship!" became a household word in the U. S.

Lawrence, JOHN LAIRD MAIR, D. C. L., Baron: Viceroy of India; b. at Richmond, Yorkshire, England, Mar. 24, 1811; was educated at Haileybury College, where he became proficient in Oriental languages and laws; went to India in 1829 as a cadet in the Bengal civil service: filled various subordinate administrative and judicial posts, and in 1846, after the first Sikh war, was called to the responsible office of chief commissioner of the Punjaub, becoming lieutenant-governor in 1849. In this post, which he retained many years, Lawrence displayed rare talent in the government of a naturally turbulent race, and with such perfect success that the Punjaub, far from joining the mutiny of 1857, as was anticipated, was able to send forces of Sikhs and Punjaubis to the relief of Delhi. His co-operation with Canning, Havelock, Outram, and Clyde for the suppression of the mutiny was of inestimable value, and gave him popular fame as "the saviour of India." He succeeded in disarming the Hindustani force (38,000 men) before they could join the mutineers, he raised the Punjaubi force, which remained loyal, from 12,000 to 59,000 men, and he induced the non-combatant forces to subscribe to a 6-per-cent. loan, which measures finally broke the backbone of the mutiny. Having returned to England in 1858 the last special court of directors of the East India Company, on the eve of its abolition, conferred a pension of £2,000 upon Lawrence, who also received a baronetcy and was sworn of the privy council. He was Viceroy of India from 1863 to 1868—the first civilian not a peer who had filled that position since the time of Warren Hastings—and was created a baron in 1869. His cautious policy with respect to Afghanistan, which by his friends was characterized as a "masterly inactivity," was strongly censured by another party. Nevertheless the opposite policy led, nine years later, to the second Afghan war, and was denounced with as unsparing bitterness. D. June 27, 1879. See the *Life* by Bosworth Smith (1883).

Lawrence, Sir THOMAS: painter; b. in Bristol, England, Apr. 13, 1769. His father was a tavern-keeper. When a mere child he made sketches in chalk; at ten he used the crayons with skill; at seventeen he painted in oil; he was but thirteen when he received a silver palette and five guineas

from the Society of Arts for a copy of *The Transfiguration*; at twenty he settled in London as a portrait-painter; at the age of twenty-two he was made a supplementary associate of the Royal Academy, through the special intervention of George III., and painted portraits of the king and queen; in 1794 he was elected an Academician; in 1815 he was knighted; in 1820 he became president of the Academy. Reynolds befriended him with counsel and influence, and so diligent was he that during his first year in London he exhibited at Somerset House seven portraits of women. His attempts at historical painting, such as the *Satan Summoning his Legions*, the subject taken from Milton, did not justify his abandonment of the department in which he excelled. The most distinguished men and women of the time sat to him; his prices were high, rising in 1810 to 100 guineas for heads and 400 for full-lengths—more than thrice his earlier charges. In 1814 the prince regent commissioned Lawrence to paint the sovereigns, generals, and statesmen who were in league against Napoleon. The famous Waterloo Gallery at Windsor is the result. In Vienna he painted the Emperor of Austria; in London he painted Blücher and Platoff; in Rome he painted Pius VII. and Cardinal Gonsalvi. Honors were showered on him at home and abroad; foreign academies elected him to membership; he was made a chevalier of the Legion of Honor. The special cause of his success was probably the skillful and not too gross flattery of his sitters in their portraits; every one found himself looking his best in what seemed yet a faithful likeness. D. in London, Jan. 7, 1830. See *Memoirs and Correspondence*, by D. E. Williams (3 vols., London, 1831).

Revised by Russell Sturgis.

Lawrence, William Beach, LL. D.: jurist; b. in New York city, Oct. 23, 1800; graduated at Columbia College in 1818; studied law, and in 1821 went to Europe; admitted to the New York bar on his return in 1823; secretary of legation in London 1826–27; *chargé d'affaires ad interim* 1827–28; then resided for some time in Paris, and returned to the U. S. in 1832. He became eminent in his profession, and was influential in promoting the Erie Railway enterprise; was vice-president of the New York Historical Society 1836–45. In 1850 he removed to Rhode Island, where he became Lieutenant-Governor and acting Governor in 1851, and member of the constitutional convention in 1853. He was a member of the Social Science Congress which met at Bristol, England, in Oct., 1869, and lecturer on International Law (1872–73) at the law school of Columbian College at Washington, D. C., in which city he gained distinction as an advocate in cases of international claims, especially those arising from the Treaty of Washington of 1871. Besides writing many articles for the magazines, and publishing shorter papers and brochures on various subjects, he translated from the French of Barbé Marbois a *History of Louisiana* (1830), and wrote a *History of the Negotiations in Reference to the Eastern and Northeastern Boundaries of the United States* (1841); *The Law of Charitable Uses* (1845); *Visitation and Search* (1858); a *Commentary on the Elements of International Law* (in French, 3 vols., Leipzig, 1868–73); *Disabilities of American Women Married Abroad* (1871); and *Administration of Equity Jurisprudence* (Boston, 1874). He edited (in French) Wheaton's *Elements of International Law*, with a memoir of the author and copious notes (1855). D. Mar. 26, 1881.

Revised by F. Sturges Allen.

Lawrenceburg: city; capital of Dearborn co., Ind. (for location of county, see map of Indiana, ref. 8–G); on the Ohio river, and the Cleve., Cin., Chi. and St. L., and the Ohio and Miss. railways; 25 miles W. of Cincinnati. It has manufactories of beer, whisky, barrels, carriages, furniture, coffins, flour, pumps, and pianos, and two weekly newspapers. Pop. (1880) 4,668; (1890) 4,284; (1900) 4,326. Editor of "Press."

Lawrenceburg: town; capital of Anderson co., Ky. (for location of county, see map of Kentucky, ref. 3–H); on the Louisville S. Railroad; 10 miles S. of Frankfort. It has 6 churches, graded schools, 2 banks, flour-mill, barrel-factory, and weekly newspaper, and is principally engaged in tobacco-growing and whisky-distilling. Pop. (1880) 638; (1890) 1,382; (1900) 1,253. Editor of "Anderson News."

Lawrence University: an institution of learning, connected with the Methodist Episcopal Church; situated at Appleton, Wis. It was founded in 1847 and opened in 1849. The Hon. Amos A. Lawrence, of Boston, Mass., gave $10,000 for its establishment, which was increased to $20,000 by a like sum raised by the Methodist denomination. The charter provides for full university work. The courses of instruction in the college are three—the ancient classical, scientific, and modern classical. Preparatory and English courses are also provided, with departments in music, painting, and commercial training. The university has a library of 17,000 volumes. The productive endowment is about $212,000. The value of the property is $225,000. There are four buildings—University Hall, Ormsby Hall (a ladies' boarding-hall), Underwood Observatory, and the president's house. The observatory is thoroughly equipped with the finest instruments for astronomical work. The number of students is 423; of the faculty, 23. Samuel Plantz, Ph. B., D. D., who is president, was elected to the position in 1894. C. W. Gallagher.

Law Reports: the published statements of opinions given by courts in deciding cases brought before them for adjudication, containing statements of the reasons which influenced the court in the decision of the cases, together with a brief account of the pleadings and facts, sufficient to make the decision intelligible, and generally an outline of the argument of counsel. Here it may be noted that the *report* is distinct from the *record*, which latter is a collection or formal statement of all the papers essential to the progress of the cause, such as the writ or summons calling the defendant into court, the pleadings, order for trial, verdict, and judgment, and may also contain a statement of the grounds upon which the judgment is based. In continental Europe the superior tribunals are required not only to put their judgments, but the reasons and grounds thereof, in writing, and to enter the same as a part of the record.

In Great Britain the opinions of the superior courts may be given orally or in writing, but the statement of reasons for the judgment forms no necessary part of the record. Prior to the year 1865 the reports were published as private enterprises only, with the exception of the year-books, which are the earliest of English reports extending in an unbroken series from the beginning of the reign of Edward II. to the latter end of the reign of Henry VIII., with broken cases reaching back as far as the reign of Henry III. They were taken by the prothonotaries or chief scribes of the court at the expense of the crown, and were published annually. They are composed in Norman-French, with many abbreviations difficult to be deciphered. A few only of them have been translated and published in England with the original and the translation in parallel columns. When the year-books ceased to be made, the matter of reporting was left open to all, and lawyers undertook the business of reporting for their own use, or for publication as a business enterprise. Under this system some good reports were obtained, while others were incomplete and full of errors. Since 1865 reporting has been regulated by the action of the bar, and the reports are well systematized, and are of a high degree of excellence. In the U. S. it is the universal custom for appellate courts to give written opinions, and the reporters are, in general, appointed by some public authority, and in some States statutes and rules of court prescribe what decisions shall be reported.

The vast multitude of books through which the laws and jurisprudence of the U. S. and Great Britain are scattered is mainly due to the multiplication of the law reports, which are made necessary by the authoritativeness of adjudged cases. It has been stated that in 1881 the judicial reports of England numbered 2,944 volumes, and those of the U. S. about 3,000. The number is now much larger, and the number of volumes of reports added yearly is constantly increasing, owing both to the increase in the number of cases decided and the larger proportion reported. For example, there were twenty-three volumes for the court of appeals of New York alone from 1886 to 1890 inclusive. Various projects for codes and authoritative digests have been presented, but these meet as yet with but little favor from the profession. The spirit of development of English jurisprudence is to adopt case-law instead of the work of jurists, and this course of development can not well be arrested. Digests, however, are of the highest value when well prepared, as a means of consulting the reports, and are constantly in the hands of the profession.

Owing to the fact that these reports contain thousands of useless and even conflicting cases, and that multitudes of cases have been questioned, limited, "distinguished," or overruled, the ascertaining of the existing law upon a point not provided for by an adequate and self-interpreting statute becomes an increasingly arduous task, and the remedying of

this mischief and of the other evils arising from the multitude of the repor s is an important problem which has as yet received no solution.

Law reports are especially necessary and valuable in Great Britain and the U. S. because of the fact that it is a well-settled rule in both countries that if a case has been deliberately adjudicated by a court of high authority and having appellate jurisdiction, the principle determined is binding as a precedent upon inferior courts when another case arises involving the same facts; and it will in general be followed in the court itself which rendered the decision unless strong reasons can be given to the contrary. The law in this way consists in the main of a collection of principles evolved from the decisions of actual controversies disposed of by the courts, rather than theoretical propositions laid down by jurists and philosophers. It is, however, true, notwithstanding these doctrines, that many cases have been overruled and discarded as not containing a correct view of the law. In continental Europe law reports are of less importance because, while prior decisions are valuable as aids, they are not authoritative as precedents. See JURISPRUDENCE.

The value or authoritativeness of reported cases depends upon so many circumstances that much skill is frequently necessary to determine it correctly. A few of the leading rules may be stated.

Rule I.—Decisions of the court of last resort are to be treated as technically *authoritative* and binding on the inferior courts.

Rule II.—Decisions of inferior courts may be referred to as evidence of the law, and will be binding, if they are appellate courts, upon those of a lower grade, from which an appeal may be taken to them.

Rule III.—Decisions of courts of one State of the U. S. are not binding as "authority" upon the courts of another State. The same principle prevails as to the decisions of the U. S. courts. Thus a State court is not bound to follow the decisions of the Supreme Court of the U. S., except as to matters involving the construction of the U. S. Constitution and the laws and treaties made under it. A similar rule prevails as to decisions in the English courts, except so far as they were made before the time fixed upon in any State for the adoption of the English common law as the basis of its jurisprudence. The decisions rendered in England before that date have the aspect of authority, while those since given are to be regarded as arguments.

Rule IV.—A special rule prevails in the U. S. courts as to the weight to be attached to decisions in State courts upon matters having in them a local element, such as the construction of a State constitution or statute, or the exposition of the local law of real estate. In the first of these cases the U. S. courts follow the interpretation of the State constitution adopted by its own courts, if that has taken place. Having once followed the view of the highest State court, Federal tribunals will not be bound to change though the State courts may adopt a new interpretation. In commercial matters this special rule does not prevail, and the Federal court may consider a question on its merits, independently of the action of any State tribunal. The whole rule gives way when it leads to any conflict with the U. S. Constitution.

Rule V.—Distinctions must be taken as to the value of cases in the reports, depending upon the grade and standing of the court, the thoroughness of the discussion, and the ability of the reporter. (1) The reports of the opinions of inferior courts may in special instances have an exceptional worth, owing to the pre-eminent ability of the presiding judge, as in the case of some of the English *nisi prius* reports. In all courts respect is paid to the decisions of particular judges whose capacity is superior to that of their associates in the same court. It is proper to urge in argument that a commercial question was decided by Mansfield, or a point in the law of evidence by Ellenborough, or a constitutional question in the U. S. by Marshall, or a rule of equity law was established by Hardwicke or Eldon in England, or by Kent or Story in the U. S. (2) The ability of the reporter has much to do with the value of the reports. It is generally his office to prefix to the opinions of the judges a sufficiently full statement of the facts in the case, as well as a "head-note" containing an abstract of the points decided. An inaccuracy in the statement of the facts may make the opinion misleading. Error in the head-note or *syllabus*, arising from failure to grasp or properly state the conclusions of law given in the opinion, is especially likely to be found, and must be guarded against by verification. The early English reports, which consisted of notes taken without the aid of stenography from opinions delivered orally, are frequently obscure and unintelligible. Points actually decided as material to the issues of the case are indicated by the word "*Held*," those discussed and not so decided by "*It seems*," or "*Semble*."

For fuller information, see Kent's *Commentaries* (vol. i.); Dillon's *The Laws and Jurisprudence of England and America*; Wallace *On Reporters*; Marvin's *Legal Bibliography*; Bouvier's *Law Dictionary* (ed. 1862 and later). Lists of reporters can usually be found in catalogues of leading law-booksellers. Revised by F. STURGES ALLEN.

Law Schools: See SCHOOLS.

Lawson, JOHN DAVISON: See the Appendix.

Lawson, Sir WILFRID: temperance advocate; b. in Cumberland, England, Sept. 4, 1829; succeeded to the title and estate of Aspatria on the death of his father in 1867; became at an early age an enthusiastic advocate of the temperance movement; was elected to Parliament for Carlisle in 1859, and introduced in Mar., 1864, the measure known as the Permissive Bill, the main principle of which is the giving to two-thirds of the inhabitants of any parish or township an absolute veto upon all licenses for the sale of intoxicating liquors granted within their district. Defeated at the election of 1865, he was returned at the head of the poll in 1868 as a supporter of Gladstone, and again elected in Feb., 1874. He is the president of the United Kingdom Alliance for the Suppression of the Liquor Traffic, and its spokesman in the House of Commons, where he figured also as a frequent opponent of Disraeli upon other subjects, and where, on June 18, 1880, he succeeded in carrying his local option resolution by a majority of twenty-six. He was defeated at the parliamentary election of 1885, but was returned for the Cockermouth division of Cumberland as a Gladstonian Liberal the following year and again in 1892.

Lawton, HENRY W.: See the Appendix.

Lawton, WILLIAM CRANSTON, A. B.: classical teacher; b. at New Bedford, Mass., May 22, 1853; graduated at Harvard in 1873; studied at Berlin University; was a classical teacher in New Bedford and Boston, and was acting Professor of Greek, Boston University, 1890–91, and afterward in Adelphi College, Brooklyn, N. Y.; author of *Three Dramas of Euripides* (1889).

Lay, HENRY CHAMPLIN, D. D., LL. D.: bishop; b. at Richmond, Va., Dec. 6, 1823; graduated at the University of Virginia in 1842, and at the Theological Seminary of Virginia; ordained deacon July 10, 1846; was minister in Lynnhaven parish, Va., until June, 1847, when he removed to Church of Nativity, Huntsville, Ala.; ordained priest 1848; consecrated missionary bishop of the Southwest Oct. 23, 1859, and translated to diocese of Easton Apr. 1, 1869. During the civil war Bishop Lay was assigned to the charge of Arkansas, which was then made an episcopal see. To Bishop Lay the revision of the Calendar of Lessons in the present American Prayer-book is largely due; while his labors in the preparation of the Standard of 1892 were only interrupted by his death. He published several volumes, including *Studies in the Church* (New York, 1872) and *The Church and the Nation* (1885). D. at Easton, Md., Sept. 17, 1885. Revised by W. S. PERRY.

Lay'amon: poet; a priest at Arley Regis on the Severn, Worcestershire, England; wrote about 1200 the *Brut*, a rhyming chronicle of English history from the time of the fabulous Brutus of Troy to the death of King Cadwallader (689 A. D.). His work is an amplified translation of the *Brut d'Angleterre* of the Anglo-Norman poet Wace, the additions being derived chiefly from the writings of Bede and St. Augustine of Canterbury, while Wace's work is itself little more than a translation of Geoffrey of Monmouth's Latin *Historia Brittonum*. The value of Layamon's chronicle is mainly philological. It contains 32,250 lines, some alliterative, but more imitating the imperfect rhyme of its Anglo-Norman original. The best edition is that of Sir Frederic Madden, with a literal translation, notes, and a grammatical glossary, published by the English Society of Antiquaries (3 vols., 1847). Revised by H. A. BEERS.

Lay'ard, Sir AUSTEN HENRY, D. C. L.: traveler, explorer, and diplomatist; b. of English parents in Paris, France, Mar. 5, 1817; spent several years of his youth in Florence, Italy, and began the study of law in England. In

1839 he undertook a course of Eastern travel extending over several years, chiefly within the Turkish empire; learned Persian and Arabic; spent many months in 1842 in exploring the antiquities of Susa and Southwestern Persia: and passing through Mosul, became interested in the excavations then being made by the French consul, M. Botta, at Khorsabad, the supposed site of Nineveh. Returning to Mosul in 1845, Layard, aided financially by Sir Stratford Canning and others, began that series of wonderfully successful researches which has made the British Museum the richest Oriental museum in the world, and laid the foundation for the reconstruction of ancient Oriental history by means of the copious cuneiform inscriptions. Accounts of these discoveries were given by Layard in *Nineveh and its Remains* (1849). The British Government in 1849 appointed him *attaché* to its legation in Constantinople, and he undertook for the British Museum a second series of excavations in Assyria and Chaldea, which resulted in another work, *Discoveries among the Ruins of Nineveh and Babylon* (1853). He also published two volumes of engravings of the *Monuments of Nineveh* (1849–53), and a volume of inscriptions (1851). In 1887 he published his *Early Adventures in Persia, Babylonia, and Susiana.* In 1852 Layard was elected to Parliament for Aylesbury, and for a few weeks was Under Secretary of State for Foreign Affairs in Lord John Russell's administration. He was again on duty in the legation at Constantinople for a short time in 1853, and took an active part in the House of Commons in the debates on Eastern questions, advocating a vigorous policy against Russian aggression. He visited the Crimea in 1854, witnessed the battle of the Alma, and examined the condition of the army, concerning which he soon afterward gave testimony before a parliamentary committee, the appointment of which he was instrumental in procuring. In 1855 he became one of the leaders of the Administrative Reform Association; was chosen lord rector of Aberdeen University in 1855 and 1856; was defeated at the election of Mar., 1857; spent some months in India during the great rebellion of 1857–58; was elected to Parliament for Southwark in 1860, and appointed by Lord Palmerston in July, 1861, Under Secretary of State for Foreign Affairs, holding that post until the fall of the Russell ministry in July, 1866. In that year he became a trustee of the British Museum; was chief commissioner of works and privy councilor in Gladstone's administration (Dec., 1868) until in Nov., 1869, he accepted the post of ambassador at Madrid, where he long remained, having rendered important services, both to Great Britain and incidentally to the U. S., during the troubled period of his diplomatic life in Spain. In 1877 he was sent as ambassador to Constantinople, in 1878 received the order of the Bath, and in 1890 was elected a foreign member of the Institute of France. D. in London, July 5, 1894. Revised by C. K. Adams.

Lay'cock, Thomas, M. D.: physiologist; b. at Wetherby, Yorkshire, England, Aug. 10, 1812; was educated at London, Paris, and Göttingen, where he received degrees; was the first to formulate, in 1844, the theory of the reflex action of the brain; became Professor of the Practice of Physic and of Clinical Medicine at Edinburgh 1855; was physician to the Queen in Scotland 1869; wrote much upon sanitary science, physiology, mesmerism, insanity, etc. Author of *Mind and Brain, or the Correlations of Consciousness and Organization* (1860; 2d ed. 1869); *Methods of Medical Observation*, etc. D. Sept. 21, 1876.

Lay Days: See Demurrage and Shipping.

Layering, or **Laying**: the propagation of plants by bending down branches and covering the portion to be rooted with earth. The covered part takes root, and as soon as the roots are well developed the layer may be cut off and planted as a new tree. A notch cut in the branch where it is covered with earth favors the early development of the new roots. Layering may be done either in fall or spring in outdoor plants. Revised by L. H. Bailey.

Laynez', Diego: ecclesiastic; b. in Castile, Spain, in 1512; studied at Alcala and Paris; became the second of the early adherents of Ignatius Loyola (1533), and general of the Jesuits on the death of Loyola in 1556, and died at Rome, Jan. 19, 1565. He was a man of great natural gifts, and still greater attainments; played a conspicuous part in the debates of the Council of Trent and at the assembly of Poissy. His labor for the order was very successful, and his influence on the members was decisive. It is generally acknowledged that the peculiar spirit which characterized the Jesuits issued from Laynez. He published little, and his manuscripts are well-nigh illegible. Hartmann Grisar published selections from them (2 vols., Innsbruck, 1886).
Revised by S. M. Jackson.

Laz'arists: a body of Roman Catholic missionary priests, founded by St. Vincent de Paul in 1624. The name is derived from the College of St. Lazare at Paris, their original house given them in 1632, but their proper title is Priests of the Mission. They are engaged in foreign and especially in domestic missions, and in the teaching of theology. They are found in most civilized and in several barbarous countries, and have fourteen establishments in the U. S., including three colleges. Revised by J. J. Keane.

Lazarus, Emma: poet; b. in New York, July 22, 1849; published her first volume (*Poems and Translations*) in 1867. A second volume, entitled *Admetus, and other Poems*, was issued in 1871; this had warm praise, especially from English critics. In 1874 was published a prose-work entitled *Alide: an Episode of Goethe's Life*; in 1881 a volume of translations, *Poems and Ballads of Heine*; in 1882, *Songs of a Semite.* Besides these volumes, Miss Lazarus contributed papers of importance to *The Century* and to *The American Hebrew.* D. in New York, Nov. 19, 1887.

Lazarus, Moritz: philosopher; b. in Filehne, Posen, Germany, Sept. 15, 1824; educated at Brunswick and at Berlin University; was Professor of Psychology in Berne 1860–66, and became teacher in the Military College in Berlin in 1868. His principal works are *Das Leben der Seele in Monographien* (1856–58); *Ueber den Ursprung der Sitten* (1860); *Ueber die Ideen in der Geschichte* (1865); *Zur Lehre von der Sinnestäuschungen* (1867). J. Mark Baldwin.

Lazhech'nikov, Ivan Ivanovich: Russian writer of novels in the style of Walter Scott, once very popular; b. Sept. 14, 1794; d. May 4, 1869. He served in the campaign of 1813 against Napoleon, but otherwise led an uneventful life, part of the time in the service of the Government. Three of his books were widely read—*Poslednĭ Novik* (The Last Novice, 1833); *Ledĭanyĭ Dom* (The House of Ice, 1835); and *Basurman* (The Mussulman, 1838). None of his later literary efforts attracted or deserved much attention. Complete works, St. Petersburg, 1858 (8 vols.) A. C. C.

Lazulite, or **Azurite** [*lazulite* is deriv. of *lazuli*, short for Lapis Lazuli (*q. v.*)]: a mineral composed of phosphate of alumina, magnesia, and iron, and bearing some resemblance in color to lapis lazuli.

Lazzari, lăad-zaa'rĕĕ, Donato Bramante (generally called Lazzari, though the correctness of this is disputed): architect; b. in the duchy of Urbino in 1444. He is thought to have designed the beautiful east end and dome of S. Maria delle Grazie at Milan, and in the same city the residence of the canons adjoining the Church of S. Ambrogio, of which only a part was finished, and the Church of Abbiate Grasso, near Pavia. In 1499 he settled in Rome, where he built the beautiful palace of the Cancellaria and the Tempietto on the hill, near S. Pietro in Montorio. Then employed by Pope Alexander VI., he worked on the new buildings of the Vatican palace, such as the Belvedere court, and then undertook the great task of St. Peter's church, already begun by Alberti and Rossellino, but now undertaken on a larger and more perfect plan. He was in charge of this work from 1506 until his death. The church, as he designed it, was a Greek cross in plan, without the long nave added at a later time, and he had designed a dome like that afterward added by Michelangelo. A few wall-paintings of his still exist, and he is thought to have been the author of several engravings of architectural subjects. D. at Rome in 1514. Russell Sturgis.

Lazzaro'ni [Ital. *lazzaro*, a leper]: formerly the popular name for the lower classes of Naples; so called from the Hospital of St. Lazarus, their customary place of refuge. The lazzaroni of Naples numbered at the close of the eighteenth century nearly 40,000 persons, who had no fixed employment or home, but were by turns porters, boatmen, or peddlers, besides their constant recourse to begging. From the Middle Ages they derived the obligation to wear a peculiar dress of the simplest description, were treated by the government as a separate class, electing annually a chief called *capo lazzaro*, and often took part in political revolutions. They upheld Masaniello in 1647, and fought bravely during the siege of Naples by the French in 1799. During the republican agitations of the nineteenth century they generally sided with the Bourbon monarchy. They have lost their former character as a distinct class, and the term

as now used applies to the proletarian element in the population, including many law-abiding and industrious citizens.

Lea, Henry Charles, LL. D.: historical writer; son of Isaac Lea, naturalist; b. in Philadelphia, Pa., Sept. 19, 1825; was educated at home; entered the publishing-house founded by his grandfather, Mathew Carey, which still exists as Lea Brothers & Co., in 1843, and retired from business in 1880. He wrote between 1840–60 many papers on chemistry and conchology. He has become distinguished by his historical writings, the most important of which are *Superstition and Force* (Philadelphia, 1866; 4th ed. 1893); *Historical Sketch of Sacerdotal Celibacy* (1867; 2d ed. 1886); *Studies in Church History* (1867; 2d ed. 1883); *History of the Inquisition of the Middle Ages* (3 vols., 1888); *Chapters from the Religious History of Spain—Censorship of the Press, Mystics and Illuminati, The Endemoniadas of Queretaro, El Santo Nino de la Guardia, Brianda de Bardaxi* (1890); *Formulary of the Papal Penitentiary in the Thirteenth Century* (1893). He has published also numerous pamphlets on political and social questions, and has in preparation (1894) *A History of Sacramental Confession and Indulgences in the Latin Church*. Revised by C. H. Thurber.

Lea, Isaac, LL. D.: naturalist; b. of Quaker stock at Wilmington, Del., Mar. 4, 1792; was engaged in business in his early youth, and devoted his spare time to the study of natural history, especially geology, making collections of fossils, minerals, and shells in the vicinity of Philadelphia. In 1815 he was elected a member of the Philadelphia Academy of Natural Sciences, and began to contribute papers to its *Journal*. From 1821 to 1851 he was a partner with his father-in-law, Mathew Carey, in what was then the principal publishing-house in the U. S., and in 1827 began a series of memoirs upon fresh-water and land mollusks, which were continued for nearly fifty years, and form the materials for a great work upon American *Unionidæ*, on which he was for a long time engaged. In 1828 he was elected a member of the American Philosophical Society, was chosen president of the Academy in 1858, and was connected with the chief societies of natural history throughout the world. His collection of *Unionidæ*, the richest in existence, and his collection of gems are deposited in the National Museum at Washington. His memoirs, read chiefly before the Philadelphia societies, number more than 150. Among the more important are *Synopsis of the Family of Naiads* (1852; 4th ed., enlarged, 1870) and *Observations on the Genus Unio* (13 vols., 1827–73). D. in Philadelphia, Pa., Dec. 7, 1886. Revised by G. K. Gilbert.

Lead, lĕd [M. Eng. *leed* < O. Eng. *lēad*, lead: M. H. Germ. *lōt* > Mod. Germ. *loth*, a plummet, a lead. Germ. *blei*; Fr. *plomb*; Lat. *plum'bum*]: after iron, the most abundant and widely distributed of the metals. It is bluish gray in color, soft and ductile, but without elasticity. Its specific gravity is 11·35. It fuses at 612° F., and when raised to a white heat in the open air it volatilizes, burning with a blue flame and leaving an oxide known as litharge. Its uses in the arts are varied, such as for roofing, for lining sinks, cisterns, etc., for shot and balls for firearms, and for the manufacture of pipe. This latter is formed by mechanical pressure, the softness of the lead permitting of its being forced out in tubes of indefinite length without welding. From the facility with which lead pipes are manufactured and afterward bent, cut, and united, they are almost universally employed as conduits for the distribution of water through buildings in cities; and this employment of lead pipes has created the plumber's trade, which takes its name from *plumbum*, lead. Type-metal is formed of an alloy of lead and antimony, and the alloys which go by the name of pewter or solder are composed of lead and tin.

Lead has apparently been in use among civilized nations from the dawn of the historic period. Among barbaric races it seems to have been but little used, its softness making it of little value to the savage man, whose only use for metals was for the manufacture of offensive and defensive weapons, and for tools, purposes served much better by bronze and iron. Lead is found in all the geological formations except the igneous rocks, and deposits of it are known to occur on every considerable portion of the earth's surface. In China lead mines have been worked from remote ages, the metal being there chiefly employed for the production of sheet lead used to line the chests in which tea is stored and transported. Among the nations of Western Europe lead was apparently first brought into general use by the Romans, who derived a large part of their supply from Spain, where the remains of their smelting-works are still to be seen. Lead occurs as a component element in many minerals, but the lead of commerce is almost exclusively obtained from the sulphide or galena. This consists of lead 86·55, and sulphur 13·45. Near the outcrops of lead-deposits this ore is sometimes extensively decomposed by oxidation, and the carbonate (cerusite), the phosphate (pyromorphite), and the sulphate (anglesite) are formed in such quantities as to have an economic value. The other ores of lead which deserve to be mentioned are *bournonite*, antimonial lead ore; *mimetite*, the arsenate; *crocoite*, the chromate; *wulfenite*, the molybdate; *minium*, the oxide, etc., vanadates, tungstates, etc., which have interest only to the mineralogist. Nearly or quite all galena contains some silver, and often so much that it is called argentiferous galena, and is one of the most important ores of Silver (*q. v.*). Lead occurs in three distinct classes of deposits, viz., what are known as gash veins, chambers, and fissure veins. Of these the first class is confined to the sedimentary rocks, and consists of fissures or crevices filled or lined with galena. These are generally vertical, though sometimes horizontal, when the ore which they contain is said to form floors. Gash veins are restricted to a single stratum of limestone, and apparently have been produced from cracks and joints enlarged by the solvent power of atmospheric water, which has flowed through them and filled or lined them with galena deposited from a solution issuing from the adjacent rock. Chambers are caves and galleries formed by solution in limestone and filled, partially or completely, with ore deposited from a mineral solution flowing from a remote and deep-seated source. In fissure veins lead occurs, associated with copper, silver, zinc, antimony, and other minerals.

Throughout the Allegheny belt and the metamorphic region of New England galena occurs in numerous localities, but all the workings have long since been abandoned. For many years the most noted lead-producing districts of the U. S. were those of the upper Mississippi and the States of Missouri and Kansas. Of these, the first covers the contiguous angles of Wisconsin, Iowa, and Illinois, the larger part of the district lying within the first-mentioned State. Lead is here found in gash veins, contained in the Galena limestone, a portion of the Lower Silurian system, and the equivalent in part of the Trenton group of New York.

The production of lead in the Galena, Mo., district was in 1825 664,530 lb. From this date it rapidly increased, and in 1845 it was 54,494,856 lb. Since then it has gradually, though somewhat irregularly, declined, until in the census year 1890 it had fallen to only 2,000,000 lb. The lead mines of Eastern Missouri are like in all essential particulars to those of Wisconsin, except that the formation which contains them is older—the equivalent of the Calciferous sand-rock of New York—and the fissures which contain the lead are somewhat more continuous, giving more system and certainty to mining operations. Among the Missouri lead mines the Mine La Motte was first worked, 150 years ago, and is still producing regularly a moderate quantity every year. The St. Joe, Doe Run, and Desloge mines in St. François County are large producers, having made in 1890, with the Mine La Motte, 21,456 tons of lead. In these mines the ore is found in a system of inosculating veins, forming a network of which the limits have not yet been reached. The mines of Southwestern Missouri and Kansas, about Granby, Joplin, etc., are worked in the Carboniferous limestone. The lead ore is won as an incidental product of zinc-ore mining, a part of it being converted into sublimed lead, a white color, by the Lewis and Bartlett process. All of the lead ore mined in Wisconsin, Missouri, and Kansas is non-argentiferous or soft lead.

Lead is abundant in the silver districts of Colorado, Idaho, Montana, and Utah, many of the silver ores there having the character of argentiferous galena, and their mode of treatment being determined by the lead they contain. The working of such ores has completely changed the conditions and prospects of the lead industry of the U. S., and has made this the greatest lead-producing country of the world. Denver, Pueblo, and Leadville, Col., Helena and Great Falls, Mont., and Salt Lake City, Utah, are important centers of lead-smelting. The once-important ores of Eureka chiefly occur in chambers in limestone of Cambrian age, and were originally deposited as sulphides of lead and iron, now changed to carbonates and oxides. At Leadville the ores are in irregular sheets, mainly along the plane of contact between Carboniferous limestone and an overlying porphyry; they are ferruginous soft and

hard carbonates derived from sulphides and bodies of the latter ore, undecomposed. In Utah the lead ores smelted at Salt Lake are brought from many mines—viz., the great lead and iron veins of Bingham, the chamber mines of Alta. In Idaho the principal district is the Cœur d'Alene, producing large bodies of concentrating ores, while in Montana the Neihart and the Barker are the latest producing camps. On the Pacific coast the Monte Cristo, Wash., district is coming into prominence, and large bodies of argentiferous galena have been developed in the past few years in the Kootenai region on the Canadian side of the border. A good deal of Mexican ore is smelted in the U. S., the principal source being the Sierra Mojada.

The production of lead rose to some importance early in the industrial history of the U. S. It reached 10,000 tons in 1832, rose to 20,500 short tons in 1841, and reached a maximum of 30,000 tons in 1845. It declined again very rapidly, fluctuating between 14,000 and 18,000 tons until 1871. Then the opening of the Rocky Mountain districts, Nevada, Utah, and Colorado, in rapid succession carried the product to 52,080 tons in 1874, to 117,085 tons in 1881, and to 143,957 tons in 1883. Since 1886 the production has been as follows, in short tons:

YEAR.	Non-argentiferous.	Desilverized lead (U. S.).	From foreign ores and base bullion.	Total product.
1886	20,800	114,829	5,000	135,629
1889	29,258	153,709	26,570	182,967
1892	31,678	181,584	39,957	213,262
1895	39,890	201,992	76,173	241,882
1897	43,553	247,483	83,671	291,036
1899	40,566	263,826	95,926	304,392

The report of the director of the U. S. Geological Survey for 1899 shows the lead contents of the ores mined in the Rocky Mountains to have been as follows:

	Short tons.		Net tons.
Arizona	3,377	New Mexico	4,856
California	487	South Dakota, Washington, Oregon, etc.	862
Colorado	70,308	Utah	29,987
Idaho	52,154		
Montana	10,227		
Nevada	3,388	Total	175,646

The total content of the ores mined in Missouri, Kansas, Wisconsin, Illinois, Iowa, and Virginia was in 1899 54,444 short tons.

In the Rocky Mountain region, and at points on the Pacific coast, the Missouri river, Chicago, Pittsburg, St. Louis, and the Atlantic coast, the argentiferous ores are smelted, and the base bullion produced is desilverized and refined. Considerable quantities of Mexican base bullion are also refined in bond at Newark, N. J. The following figures from the census report refer to certain groups of works exclusively employed in smelting:

GROUP.	Ore treated, net tons.	Base bullion produced, net tons.	Number of employees.	Total disbursements, exclusive of cost of ore.
Colorado	602,014	67,867	1,929	$4,196,405 10
Montana	71,403	16,335	457	860,014 90
Utah	66,797	12,908	354	690,813 79
Mexican border	79,168	13,733	565	843,239 79

Besides these quantities, large amounts of ore are smelted by refiners. The production of Europe is estimated as follows for 1899, in metric tons: Germany, 129,225; Spain, 180,000; Great Britain, 41,500; Austria, 10,000; Hungary, 2,000; Italy, 18,195; Belgium, 16,500; France, 11,200; Greece, 18,400; and other European countries, 4,500; a total of 431,520 metric tons. Australia produced about 70,000 tons. Mexico 85,000 tons, and Canada 10,932 tons.

For information on lead-smelting proper, the reader is referred to METALLURGY.

The salts and oxides of lead are quite numerous, and are somewhat extensively employed in manufactures and medicine. Of these, one of the best known is the protoxide called litharge, used as a drier with oils and varnishes and in the manufacture of glass. Red lead, or minium, is a compound of the protoxide with the peroxide. It is very generally employed as a pigment, either in oil-paints or in the coloring of wall-papers, sealing-wax, etc. It is also employed, like litharge, in the manufacture of glass. Perhaps the most important preparation of lead is that of the carbonate of the protoxide. This is commonly known as WHITE LEAD (*q. v.*). Some of the salts of lead are highly poisonous, and, since the quantity of lead used by every civilized community is great, grave accidents are not uncommon from this cause. The carbonate, the oxide, and the acetate of lead are the most active poisons. They are introduced into the system both by the lungs and the digestive organs. With those who work much in the preparations of lead, as painters, plumbers, and those employed in glazing cards, earthenware, etc., cases of lead-poisoning are constantly met with. One of the most striking symptoms of the disease is what is called lead-colic, or *colica pictonum*. It also produces local or general paralysis or other symptoms, which are always grave and difficult of cure. The use of lead pipe must be regarded as the source of many cases of lead-poisoning. The danger may be avoided by lining lead pipe with tin. It is but little more expensive, and is certainly far safer, than that made from pure lead. See LEAD-POISONING.

Revised by CHARLES KIRCHHOFF.

COMPOUNDS OF LEAD.—The most important of these are *white lead*, *litharge*, *minium*, or *red lead*, the *nitrate*, *chromate*, and *acetate*. *Litharge* is the oxide of the formula PbO. Another commercial variety of this oxide is called *massicot*. The latter is obtained by heating molten lead at a moderate temperature in the air. The product of this action is then ground and levigated. Litharge is formed when the oxidation of the lead takes place at a temperature high enough to melt the oxide, as in the process of cupellation. Some of the litharge, that which cools quickly from fusion, is sent to market in scaly or flaky form; but the more compact, lumpy portions are ground between horizontal stones in a stream of water. After separating from the water it is dried at a low heat in a reverberatory furnace, packed, and sold as *levigated litharge*. Litharge is used in the manufacture of flint glass (see GLASS), as a glaze for earthenware, for the preparation of lead acetate, lead nitrate, lead plaster, and for drying oils. *Red lead*, *minium*, is an oxide of the formula Pb_3O_4. It is formed by continued heating of molten lead in contact with the air, the action of the oxygen being carried beyond the stage of the formation of litharge. It is a red powder, the shade of which varies somewhat, owing probably to the greater or less purity of the lead used in its manufacture. It is used as a pigment in the manufacture of flint glass (see GLASS), as a cement in making steam-joints, and in the manufacture of secondary batteries. *White lead*, *ceruse*, is a basic carbonate of lead of varying composition, according to the method of preparation. The *Dutch method* of manufacture consists in exposing sheets of lead wound in spirals to the action of acetic acid, air, and carbon dioxide, from decaying organic matter. The spirals of sheet lead are placed in earthenware vessels, on the bottom of which, but not in contact with the lead, is the dilute acetic acid. The vessels thus arranged are placed in beds of horse manure. In consequence of the natural decomposition of the manure, carbon dioxide is slowly given off, and enough heat is generated to start the action of the acetic acid upon the lead. The chemical changes involved are mainly the formation of a basic acetate of lead, and the subsequent decomposition of this by carbon dioxide, a basic carbonate being found. The *French method* of manufacturing white lead consists first in digesting litharge with pyroligneous acid, which results in the formation of a solution of basic lead acetate. Through this carbon dioxide is passed and the white lead precipitated. The *English method* is like the Dutch method, except that, instead of horse manure, spent tan in a state of fermentation is used for the generation of the carbon dioxide, and pyroligneous acid is used instead of vinegar. White lead is a heavy white powder, which appears to be a mixture in varying proportions of the basic carbonate of the formula $Pb(OH)_2.2PbCO_3$ and the normal carbonate $PbCO_3$. It is extensively used as a pigment. An objection to white-lead paint is that it turns dark under the influence of hydrogen sulphide and other sulphur compounds. Further, the manufacture of white lead necessitates special precautions to prevent the poisoning of the workmen. *Nitrate of Lead.*—This is used as a material for the preparation of the carbonate and chromates, and is therefore, in crystallized form, a regular article of commerce. *Acetate of Lead*, *Sugar of Lead.*—This familiar article has well-known uses in medicine. It is manufactured by dissolving litharge in wood-vinegar or other cheap form of acetic acid. It crystallizes very beautifully; but on exposure to the air acetic acid is lost, with formation of a basic acetate. Hence sugar of lead has an odor of acetic acid, and the transparent

crystals gradually fall down to a white powder, to dissolve which in water requires an addition of acetic acid to replace that which has been lost. It is from this circumstance that the *nitrate*, which undergoes no such spontaneous change, but remains clean and uniform, is largely supplanting the acetate in commerce. *Chromates of Lead: Chrome-yellow and Chrome-red.*—These are two brilliant and valuable pigments, chrome-yellow being especially so. The latter occurs naturally as an elegant crystallized mineral called *crocoite*, of which one locality is at Congonhas-do-Campo in Brazil. It was in crocoite that Vauquelin first discovered the metal *chromium* in 1794. *Chrome-yellow* is, however, prepared artificially by precipitating a solution of the nitrate of lead with chromate of potash. The brilliant yellow precipitate that falls, after thorough washing and drying at a low heat, is ready for grinding with oil for pigmentary purposes. If the heat in drying much exceeds that of boiling water, the color is liable to injury from reducing action of traces of organic matter always present. In calico-printing chrome-yellow is formed on the tissue itself by successive application of the above specified compounds of lead and chrome in appropriate ways. This color, however, does not attach itself so well to silken and woolen fabrics. Chrome-yellow as a pigment is liable to be much adulterated with cheaper substances. As most of these are insoluble in nitric acid, they may generally be detected by heating a little of the color with diluted nitric acid, which should dissolve it wholly to a clear yellow liquid. *Chrome-red* is a chromate containing twice as much lead as the yellow chromate:

Chrome-yellow is..... PbO,CrO_3.
Chrome-red "..... $2(PbO),CrO_3$.

The red pigment is produced from the yellow by several different methods—either by boiling with lime or an alkaline solution, which takes out half the acid; or by digesting with levigated litharge; or by boiling it with neutral yellow chromate of potash, which forms bichromate of potash with half its acid; or by fusing it with saltpeter. Its color is very fine, considered equal in tint to vermilion, but, like all lead colors, it becomes dingy in the air in time, through the action of sulphur, forming black lead-sulphide. *Chrome-green* should strictly be the green oxide of chromium, but most of what passes under that name commercially is a mixture of chromate of lead with some blue pigment—prussian blue or ultramarine. A dilute acid will quickly distinguish such mixtures from true chrome-green, which is not affected by acids.

Alloys of Lead.—*With Arsenic.*—This is white, brittle, crystalline, and very fusible. It is of practical importance in connection with the manufacture of *lead shot*, which are formed of a true alloy of lead with arsenic, containing about 2 per cent. of the latter, which is held by the manufacturers to be absolutely essential to success in the manufacture. *With Antimony.*—Type-metal is the chief of these. The alloys of these two metals are harder and more fusible than either metal, while endowed with peculiar qualities adapting them for making fine and sharp castings. Common type-metal contains 17 per cent. of antimony, the remainder being lead, sometimes with a little zinc. Common stereotype metal varies from these proportions within small limits, sometimes a little tin being added. (For other alloys containing antimony and lead see Antimony; for alloys containing tin and lead see Fusible Metals.) *With Silver, Gold, Platinum, etc.*—Lead has a great affinity for the noble metals. In the process of assaying, when litharge is reduced to metallic lead in admixture with an ore of gold or silver for subsequent cupellation, the lead takes up every trace of the precious metals, the success of assaying as an art being dependent on the completeness of this combination.

Revised by Ira Remsen.

Medicinal Uses of Lead.—In this relation the local and constitutional effects of lead compounds have to be considered. *Locally, soluble* salts of lead are astringent. Weak solutions of lead-salts are positively soothing. Taken internally in large dose, however, these salts are powerful irritant poisons. Solutions of lead-salts are used in medicine as local applications in catarrhs of mucous membranes and in many inflammations of the skin, especially where attended by much heat and pain. They should not, however, be used in inflammations of the eye, except by physicians' prescription, as if there be any ulceration of the cornea an indelible white opacity will be produced at the spot by chemical decomposition of the lead-salt. The preparations used as lotions are solutions of lead acetate, nitrate, and subacetate. Two official solutions of the latter are directed by the U. S. Pharmacopœia, the stronger being commonly called Goulard's extract, and the latter lead-water. From the former are also prepared a cerate (Goulard's cerate) and a liniment. Internally, lead acetate is alone used, its employment being as an astringent in diarrhœas and in bleeding from the stomach. *Insoluble* lead compounds, like the carbonate, are simply soothing to moist surfaces, but as, if applied in quantity, they may be rendered soluble, and thus irritant, or become absorbed, and thus induce lead-poisoning, other insoluble powders, like zinc-oxide or salts of bismuth, are safer. The *constitutional* effects of lead are wholly poisonous, and are brought on by a slow and steady impregnation of the system with the metal. See the article Lead-poisoning.

Revised by H. A. Hare.

Lead City: city; Lawrence co., S. D. (for location of county, see map of South Dakota, ref. 6-A); on the Black Hills and Ft. Pierre and Deadwood Cent. railways; adjoining Deadwood, the county-seat. It has a daily newspaper and is engaged in mining. Pop. (1880) 1,437; (1890) 2,581; (1900) 6,210.

Leading Note: See Note.

Leading Question: in the law of evidence, a question put to a witness which is so framed as to suggest or indicate the answer desired. It is a general rule in regard to the taking of testimony that leading questions are not allowable in the direct examination of a witness—that is, in the examination by the party producing him; but the whole subject is peculiarly within the discretion of the judge, and his decision is subject to appeal only in a plain case of abuse. The reason for the rule is that a witness is considered as probably biased in favor of the party for whom he appears, and is likely to be influenced by his bias to shape his answers according to the testimony which he sees is desired, either by varying from the truth or by giving only those matters which are favorable.

Leading questions are permitted, however, in the direct examination: (*a*) When the witness appears to be hostile to the party producing him or unwilling to give evidence; (*b*) where an omission in testimony is evidently caused by a want of recollection, which a suggestion may assist: as when a particular specification of a matter of inquiry is necessary in order that a witness's attention may be directed to it; (*c*) when the subjects of inquiry are not material, but are merely introductory to the principal points in controversy.

Upon cross-examination, or examination by the opposing party, leading questions may be used without restriction in order to expose the inaccuracies in the witness's direct testimony, as he appears in opposition to the counsel then examining him. See the article Evidence; also Greenleaf *On Evidence*, vol. i., and Best *On Evidence*.

Revised by F. Sturges Allen.

Lead Plaster: See Fats.

Lead-poisoning: a diseased condition resulting from the presence of a considerable amount of lead in the system. This condition is induced in various ways: (1) By the use of lead pipe for the conduction of drinking-water. Happily, a large proportion of the waters used for drinking and cooking cause an insoluble deposit upon the lead pipes, and hence have not the power to take up lead in this manner; but a great number of cases of lead-poisoning are induced in this way. (2) By the use of lead pipes in racking off wines, cider, and beer; by the use of lead-lined chambers in soda-water apparatus and the like. The use of leaden siphons for drawing cider and vinegar from the cask is a common practice among farmers and dealers in the U. S., and a senseless, even criminal, practice it undoubtedly is. (3) By the use of lead-paints; hence the name painter's colic applied to one symptom of lead-poisoning. (4) Various unusual ways of introduction are recorded. Thus cosmetics, hair-dyes, and similar materials have sometimes caused lead-poisoning.

The symptoms of lead-poisoning are varied. The most common form is lead or painter's colic, in which the pain, constipation, and blue line on the gums are characteristic. In another and well-known class paralysis occurs, and is most apt to affect the extensor muscles of the wrist, causing wrist-drop. Various forms of rheumatoid or gouty symptoms occasionally occur and may be very deceptive. In all cases of chronic lead-poisoning there is progressive anæmia and loss of color. As rare manifestations various mental disturbances, such as convulsion, delirium, coma, and the like, or tremors and similar nervous troubles, may occur.

Treatment.—Opium is the chief remedy in ordinary lead-poisoning. It relieves the pain, and at times the obstinate constipation, of this disease. Cathartics are very useful, except when there is much tenderness of the bowels. Then their use should be deferred for a time. Iodide of potassium is prescribed in chronic cases, and is believed to assist in the elimination of the metal. Sulphuric acid and the sulphates are given with a view to precipitating lead in the intestines and rendering it insoluble. Revised by WILLIAM PEPPER.

Leadville: city (settled 1859); capital of Lake co., Col. (for location of county, see map of Colorado, ref. 3-C); on the Col., Midland, the Denver and Rio Gr., and the Union Pacific railways; 114 miles S. W. of Denver. It is on the north side of California Gulch, which was one of the first containing free gold discovered in the State, and on the Mosquito range of the Elk Mountains, 10,200 feet above sea-level. From $12,000,000 to $15,000,000 in placer gold was taken from California Gulch in 1860–64, when the claims became unprofitable to work and the site was almost deserted till 1877, when the presence of carbonate silver ore was accidentally discovered on Iron Hill. The news spread rapidly and soon mining operations were in progress on Carbonate, Fryer, Evans, Long, and Derry Hills. From 1879 till 1900 the various mines yielded precious metals to the value of $278,000,000, principally silver, and one-third of the lead consumed in the U. S. The Government's seignorage on the coinage of Leadville's silver from 1879–92 was $14,000,000; its postal revenue over $500,000; land-office receipts $750,000; and internal revenue taxes over $700,000. More than $50,000,000 were paid for labor in mines and smelters, and $7,500,000 for timber used in the mines. The city has 9 churches, 11 public-school buildings, 2 hospitals, 2 national banks with combined capital of $200,000, a U. S. fish-hatchery with capacity of 15,000,000 trout annually, 4 large smelters, 15 mills, and 3 daily and 2 weekly newspapers. Pop. (1890) 10,384; (1900) 12,455.

Leaf [O. Eng. *lēaf*: O. H. Germ. *loub* (> Mod. Germ. *laub*): Goth. *laufs*, leaf]: one of the parts of the plant body, especially in the higher plants. The leaf always stands in a definite relation to the stem, the former being supported by the latter. The stem and its leaves constitute the shoot, which is morphologically equivalent to the thallome (thallus) of lower plants. The leaf is essentially an expansion of chlorophyll-bearing tissue, its framework, epidermis, stomates, etc., being accessory structures. In the simpler cases there is but one layer of cells, as in some seaweeds and many mosses; but in most cases there are at least several layers, the outermost being especially modified, as an epidermis. With the increase in size of the leaf (in aërial plants), there is an increased development of supporting tissues, forming more or less branched systems of ribs and veins (fibrovascular bundles). These grow with the leaf, consequently the pattern which they present is dependent upon the mode of growth of the leaf. Where the leaf-growth is lengthwise only, as in many grasses and sedges, the veins run parallel from base to apex, but where the growth is in all directions, as in the cabbage, grape, etc., the veins are crooked and irregular. The leaf outline also is dependent upon its mode of growth; where the growth is uniform the margin is entire, but where some sections grow more than others, the outline presents certain irregularities (serrations, dentations, lobing, etc.), all of which have been very accurately defined by descriptive botanists. These details, together with those relating to very many leaf-shapes which have likewise received much attention in descriptive botany, may well be omitted here. *Phyllotaxy*, or the particular arrangement of the leaves upon the stem, has received much attention, even to the working out of mathematical formulas, but here again we find that the law is a very simple one: that in the bud "new lateral members have their origin above the center of the widest gaps between the insertions of the nearest older members of the same kind at the circumference of the growing point." (*Hofmeister.*)

The chlorophyll-bearing cells of the leaf are commonly arranged so that in one or more layers (palisade layers) they stand with their longer axes perpendicular to and touching the upper epidermis (Fig. 1, A). The remaining cells are loosely and irregularly arranged, with many large intercellular spaces. In leaves whose two surfaces are equally exposed to the sunlight, there are palisade cells on both sides, as in the compass-plant (*Silphium laciniatum*) of the prairies of the U. S. (Fig. 1, B), the cottonwood, etc.

The epidermis of one or both surfaces contains many breathing pores (stomates) which are formed by the division and splitting of an original epidermis cell (Fig. 2). Each

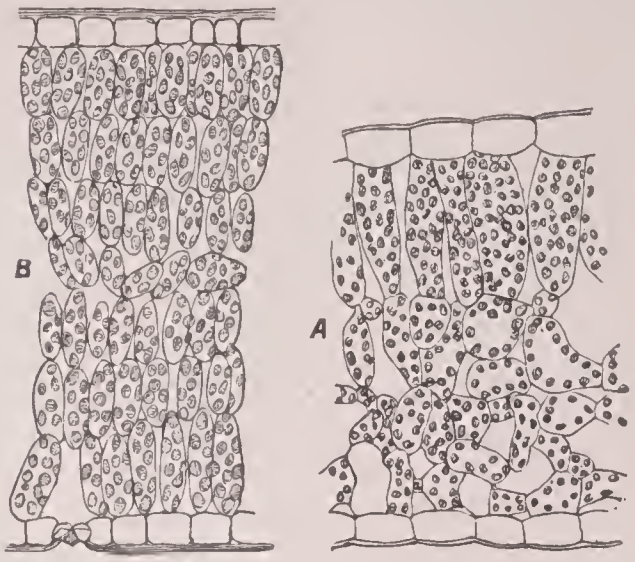


FIG. 1.—A, section of wild-cucumber leaf; B, compass-plant leaf.

pore thus lies between two cells, the guard-cells, which retain their activity, and by contracting and expanding increase and decrease the size of the opening. Leaves with a marked difference between their palisade and loose parenchyma have few if any pores in the upper epidermis; but when this difference is less internally, the pores are more nearly equal in number; thus in the compass-plant there are in the upper surface 82 per sq. mm. (52,700 per sq. inch), and in the lower 87 per sq. mm. (57,300 per sq. inch), while in the apple there are none above, and 246 per sq. mm. (158,670 per sq. inch) below.

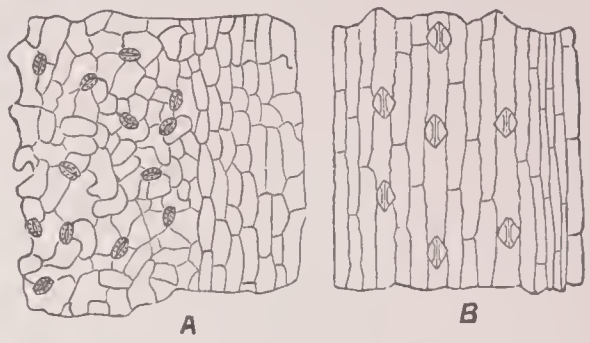


FIG. 2.—A, epidermis and stomates of beet; B, of oats.

The function of the stomates is the ingress and egress of gases, and more particularly the ingress of carbon dioxide and oxygen. It has long been known that moisture escapes through them when open, and by many it has been supposed that this was also one of their functions; but a better view is that the escape of moisture is accidental, and not functional. The whole leaf structure is designed to secure as much aëration as possible with the least loss of moisture; but in spite of epidermis, and the opening and closing stomates, some moisture escapes. See HISTOLOGY, VEGETABLE; BOTANY, and PHYSIOLOGY, VEGETABLE. CHARLES E. BESSEY.

Leaf-cutter Bees: solitary bees belonging to several species of the genus *Megachile*; deriving their popular name from their habit of constructing, or sometimes merely lining, their cells with bits of leaves cut out by their scissor-like jaws. *M. centuncularis*, the most common species in the U. S., is found also in Europe. It cuts out pieces of rose-leaf for its cells, which are of a very neat and curious structure. The cell it stuffs with pollen, in which it deposits an egg.

Leaf-insect, or **Walking-leaf**: a name applied to the orthopterous insects of the genus *Phyllium*, family *Phasmidæ*, from the fact that their wings resemble leaves in shape, color, and venation. A few species occur in the U. S., but they are mostly natives of the tropics. F. A. L.

Leaf-rollers: small, lepidopterous insects, belonging to the important family *Tortricidæ*; characterized by short beak-like palpi. They are mostly nocturnal, and take their name from the fact that many species make a rude tent by rolling up the leaves of trees, often fastening them with silken threads. The number of genera and species is great, and as a rule the insects are great destroyers of useful vegetation. The genus *Tortrix* is the typical one.

Leaf-spot: a disease of plants which produces discolored spots upon the leaves, caused by many different species of minute fungi. One of the most familiar is the strawberry leaf-spot, which is produced by *Ramularia tulasnei*, one of the so-called imperfect fungi. (See FUNGI.) The spots are whitish or yellowish, bordered by red or purple. A microscopical examination of these spots shows myriads of short, protruding fungus-threads, upon which are borne cylindrical, one-septated spores. Later in the season black, egg-shaped sclerotia may be formed; these remain over winter, and originate the disease the next season. It is quite probable that *Sphærella fragariæ* is the asciger-ous stage of this *Ramularia*. If so, the ascospores also serve to propagate the species the next season. Plum and cherry trees are attacked by a leaf-spot fungus (*Septoria cerasina*), producing dark-purple spots, which soon turn brown upon the death of the tissue. "Sometimes this dead tissue drops out from the leaf, leaving a clean-cut round hole, giving the leaf the appearance of having been perforated by shot-holes" (*Scribner*); hence this malady is sometimes called the shot-hole disease. The parasite is one of the imperfect fungi, producing its spores in the cavities of minute black fruits, which develop in the dead tissue of the spots. Its whole round of life is not known, but it is supposed that its further development takes place upon the fallen leaves.

Strawberry leaf-spot.

Beet leaf-spot, which often attacks garden and sugar beets, producing pale-yellowish or whitish spots of dead tissue, is produced by *Cercospora beticola*, another of the imperfect fungi. It is also known as beet-rust.

Remedies.—Since the leaf-spot fungi are internal parasites, little is to be hoped from the use of fungicides, although an application of ammonical carbonate of copper is sometimes recommended. Gathering and burning the leaves has proved the most effective. The strawberry-leaves should be mown off, and the field lightly covered with straw, and then burned over. Consult, further, William Trelease's *Spot-disease of Strawberry-leaves*, in report of the Wisconsin agricultural experiment station (1884), and F. L. Scribner's *Fungus Diseases of the Grape and other Plants* (1890). CHARLES E. BESSEY.

Leake, Sir JOHN: admiral; b. at Rotherhithe, England, in 1656; distinguished himself in the naval service during the war of the Spanish succession by taking Newfoundland from the French (1702), for which he was made vice-admiral and knighted; relieved Gibraltar in Oct., 1704, and Mar., 1705, forcing the French and Spaniards to abandon the siege; took part in the reduction of Barcelona the same year; captured Carthagena and Majorca in 1706; became commander-in-chief of the fleet in 1707; took Sardinia and Minorca in 1708; became rear-admiral of Great Britain and lord of the admiralty in 1709; represented Rochester in Parliament for some years. D. at Greenwich, Aug. 21, 1720.

Leake, WILLIAM MARTIN: topographer and archæologist; b. in London, England, Jan. 14, 1777; educated at the Royal Military Academy at Woolwich; obtained a commission in the artillery in 1794; served in the West Indies; sent in 1799 to Constantinople to instruct the Turks in the use of artillery; appointed in 1800 to advise the Turks in resisting the French, and proceeded through Asia Minor and Syria to Egypt; and in 1801 was engaged with William Hamilton in making a general survey of Upper Egypt. In 1804 he was appointed to survey the coasts and fortresses of European Turkey, and made a careful exploration of Greece. For many years he was frequently employed upon government commissions in the East, and gave the result of his researches in the learned and still valuable works *Researches in Greece* (1814); *Topography of Athens* (1821); *Journal of a Tour in Asia Minor* (1824); *Travels in the Morea* (1830); *Travels in Northern Greece* (1835); *Peloponnesiaca* (1846); *Numismata Hellenica* (1854); *Disputed Questions of Ancient Geography* (1857), and *Historical Outline of the Greek Revolution* (1826): and other minor political works. Filling important posts in the geographical and antiquarian societies of London, he was a leading authority upon Eastern questions. D. at Brighton, Jan. 6, 1860. See J. H. Marsden, *Brief Memoir of the Life and Writings of W. M. Leake* (London, 1864); E. Curtius, *Altherthum u. Gegenwart*, ii., 305–323.

Revised by ALFRED GUDEMAN.

Leaming, lem'ing, JEREMIAH, D. D.: clergyman and author; b. at Middletown, Conn., in 1719; graduated at Yale in 1745; was ordained to the Episcopal ministry in 1748; was pastor for eight years at Newport, R. I., twenty-one years at Norwalk, and eight years at Stratford. During the Revolutionary war he was imprisoned as a Tory, and contracted a disease of the hip which rendered him a cripple. On account of infirmity he declined in 1783 to permit his name to be used as a candidate for the bishopric of Connecticut at the time Dr. Samuel Seabury was chosen to the episcopate. He wrote a *Defense of the Episcopal Government of the Church* (1766); a *Second Defense* (1770); *Evidences of the Truth of Christianity* (1785); and *Dissertations on Various Subjects* (1789). D. at New Haven, Conn., Sept. 15, 1804. Revised by W. S. PERRY.

Leamington, lem'ing-tŭn, or **Leamington Priors**: town of England; 2 miles from Warwick, on the Leam; celebrated for its mineral springs, saline, sulphurous, and chalybeate, which attract a large number of fashionable guests during the season from October to May (see map of England, ref. 10–H). It is wholly of modern growth, and is one of the handsomest places in England. Pop. (1891) 26,930.

Lean'der: See HERO.

Leander, RICHARD: pseudonym for RICHARD VON VOLKMANN (*q. v.*).

Leaning Towers: towers which overhang their base on one side, the deviation from the vertical having been caused by settlement of the foundation, explosion, or the like, as there is no evidence of any such effect being produced deliberately. The celebrated tower at Caerphilly Castle, in Wales, is said by the guide-books to overhang 9 feet in a total height of 80 feet, an extraordinary angle; but it is half ruined, and is merely an instance of a piece of solid masonry nearly overthrown and stayed on the verge of falling. The tower at Saragossa, in Spain, built about 1500 in a modified Moorish style, of brick, and octagonal in plan, is a very interesting piece of architecture, and in excellent condition. Its overhang is stated as 10 feet, but its height is about 280 feet, so that the slope, though noticeable, is not excessive. As it now stands, however, the visible inclination is all in the middle two-thirds of its height, as the lofty basement, either as originally or by restoration, stands seemingly vertical, and the belfry at the top is also vertical or nearly so. There are two surprising towers at Bologna, leaning toward one another across a very narrow space, so that they seem almost to touch, the Torre Asinelli, about 300 feet high, and overhanging 4 feet, and the Torre Garisenda, not more than 160 feet high, but 10 feet out of plumb. These towers are plain, square brick structures, without architectural character, and their inclination is therefore the more noticeable. At Este, in Venetia, is a Romanesque bell-tower, overhanging about 12 feet. In Venice, the slender tower of the Church of San Giorgio dei Grechi slopes visibly outward over its narrow canal. In Pisa, the Church of San Niccolò has a slight but perceptible inclination. The bell-tower of San Benedetto, at Ferrara, and the clock-tower of the ancient palace of the Venetian governor at Padua, slope, and a tower at Neviansk, in Siberia, is mentioned as having a decided inclination; but the most famous and most noteworthy of all is the bell-tower of the Cathedral of Pisa, a Romanesque tower of very unusual design, having six stories of open arcades forming balconies above a basement decorated with a similar arcade in only slight relief, and a belfry story of much smaller diameter, without any roof whatever. The center of this tower is a smooth, uniform shaft like the bore of a cannon. The staircases are placed and the bells are hung in the thicknesses of the walls themselves. The height of this strange tower is about 175 feet, and it overhangs its base 13 feet. RUSSELL STURGIS.

Leap-year: See CALENDAR.

Lease: See LANDLORD AND TENANT.

Lease and Release: See BARGAIN AND SALE.

Leather [M. Eng. *lether* < O. Eng. *leðer*: Icel. *leðr*: O. H. Germ. *ledar* > Mod. Germ. *leder*]: a material which is the result of the half-chemical, half-mechanical combination of the albuminous hide fiber and a substance which preserves

the hide or skin, thereby making it useful in the arts and manufactures. Leather has played a very important part in human history. Probably the first recorded instance of its use is in the passage in the Old Testament (Gen. xxi. 14) in which Abraham is described as giving Hagar a leathern water-bottle. This bottle must have been of a firm tannage, as a mineral-tanned or smoke-tanned leather would not hold water, so that it is a reasonable inference that it was tanned with bark. Specimens of leather have been discovered in China in company with a number of relics which give absolute proof of an age of at least 3,000 years, and the analysis of these specimens proves them to be of an alum tannage. When Columbus arrived in the New World he found the copper-colored natives in possession of skins tanned with buffalo dung, oil, and clay. This treatment is practically the same as an alum tannage. The Indian also smoked skins for the purpose of making them proof against vermin. Sir Edwin Arnold when in India discovered a pair of slippers in a sarcophagus containing nothing else but a small heap of dust. In the British Museum there are among the Egyptian relics tanned crocodile backs which were used as armor. In the U. S., the oldest leather of which there is any record is that which has been found in the huts of the rock-dwellers of Arizona, in the shape of sandal-thongs. The Romans also left articles of leather tanned with oil, alum, and bark. Skins constituted the first clothing of man, and have been more or less perfectly prepared from the earliest times. Babylonian leather was long celebrated, and during the first century of the Christian era the Russians and Hungarians were most skillful tanners. The method in general use in those early periods, as a rule, was not a bark tannage, but a sort of tanning with oil, clay, sour milk, smoke, and dung. At a later period astringents, such as nutgalls and leaves, began to be used. These methods were pursued in a rather uncertain way until about 1790, when the first great change was made in the leather industry, viz., the use of lime to loosen the hair-roots, making it feasible to remove the hair with ease, and to plump the flesh and the hide-fiber, thereby admitting of the removal of the superfluous flesh, leaving nothing but the leather hide or coriin.

Hide Structure.

It is a remarkable fact that, as scientists divide or class living animals according to their nature, in the same way we can class the same animals according to hide-fiber structure. The alligator, snake, and lizard are classed among reptiles on account of their subsisting by similar means and bearing a general resemblance. They are even more alike in their fiber structure, so much so that it is almost impossible to distinguish any difference under the microscope. Again, cowhide, horsehide, calfskin, deerskin, etc., may be classed together, their fiber being of a looser nature than that of reptiles. In all hide structure we have the same growth and trend as in that of the bark of trees. The lower flesh structure always consists of loose bundles of fiber interwoven. As these bundles enter the cutis or coriin, they become more compact, the weaving becoming of a closer nature, and as they near the grain, or papillar, the bundles disappear, and the single fibers are woven into a mass that becomes more solid until it reaches the compactness of the horny grain which withstands the wear the leather is subjected to. Just as the bark of trees is worked off and replaced by younger layers from the wood, so is the grain of the living animal continually replaced by fiber from the lower portion of the hide.

The Conversion of Hide into Leather.

This may be divided into three classes: (1), the conversion of hide into leather by the use of astringents of different kinds, such as bark, etc. (2), the conversion of the hide, or, rather, the preservation of the hide-fiber by the use of some mineral—alum, chrome, etc.—a process called tawing. (3), by the use of oil. The last two ways are by no means actual tanning processes; they are simply availed of as a quick method of making hides and skins (usually skins) useful by preserving them against decomposition. The heavier grades of leather made of hides are divided into two classes, sole and upper. We then of course have the skins, which are always used for the upper parts of the shoe and slippers, for fancy decorative purposes, book-binding, pocket-books, etc. The preparation of these classes of hides for the actual process of tanning is as follows:

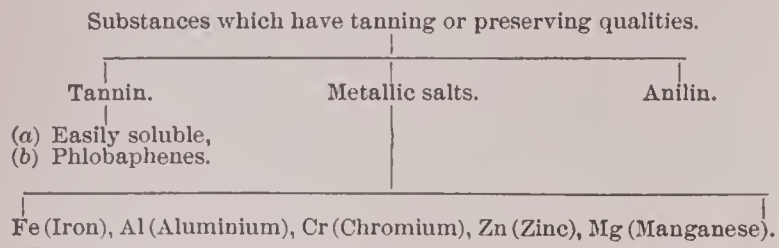
Hides are bought by weight, and in two different conditions, dry and green-salted, the latter term meaning the hide freshly skinned from the animal, and then salted down to prevent decomposition. These hides in the tannery are soaked in water, the dry hides always being soaked for a greater length of time than the green, so as to get the hide-fiber as near the natural state as possible. This period, which is called soaking, varies from four to eight or ten days. There are two kinds of sole-leather made—first, that which is known as sweated, and, second, that which is limed. In sweated leather the hair has been removed by the hanging of the hide in a very moist and warm atmosphere in a closed compartment, thereby loosening the roots, the hair then being easily pushed off with a knife, or by machinery. The former process is a little cheaper than the latter, and produces greater weight of leather. Sweated leather is not considered quite equal to that which is limed. The latter is placed in a lime after the superfluous flesh, fat, and blood on the flesh side have been removed with a knife. This lime is made by slaking quicklime or calcium oxide in water, making a milk-of-lime or calcium hydrate. The hides are raised and plunged every day or two for four to six days. After the hide is taken from the lime, the hair can be removed easily with a knife or by a machine. After unhairing, as this process is called, the flesh is green-shaved, i. e. the flesh is removed with a shaving-knife; then the hide is well washed in water to remove the lime.

Bating.—Dungs all contain quantities of pepsin and pancreatin, which are formed in the system of the animal or bird, and as there is generally an over-production, they pass away with the excrements. Pepsin transforms albumen to peptones, which are partially soluble and insoluble in water. The hide or skin, being an albuminous substance, undergoes an actual digesting process, which may be prolonged or shortened, intensified or weakened, at the tanner's will. The method in general use for regulating and governing bate action is that of raising or lowering the temperature of the bate. The higher the temperature the more rapidly do pepsin and pancreatin solve and transform albumen. A factor which has a material effect in bate action and results is the bacteria ravages, and, in longer bating, the decaying action. The temperature of bates in general use is from 95° to 100° F., and as this is the most favorable for the propagation of bacteria, which increase with enormous rapidity, it will be seen that they have a marked power. If it were possible to kill or disable these bacteria, a great source of danger would be removed from the bate, and it could be controlled according to a fixed scale, both of quantity of dung and temperature necessary.

The Process of Tanning.

The purpose of the art is to convert the green, albuminous hide into an article which will not decay, which is tough in fiber, and which is useful for all purposes for which leather is adapted. Taking the structure of the hide with its numerous bundles of fiber, each bundle divided into smaller fibers, we have an immense network, which, in its perfection, can only be observed with the aid of a microscope. Every fiber has its regular course, every bundle the same, and the product is one of the most perfect creations of which art is capable. When the hide is removed from the animal it is soft and flabby. Each fiber moves against another fiber with a small amount of friction, it being lubricated with animal matter which passes through the fibers by means of the infinitesimally small canals separating the bundles of fiber. It is the object of the tanner in his beam-house work to remove the interfibrous substance or fillar, thereby giving, when the hide is taken from the beam-house, a simple network which is perfectly clean, the interfibrous substance having been removed, first, through the soaks, the water taking out the lymph substance, blood, etc.; second, by the lime solving the interfibrous substance; and, third, by the bate which digests the hide to such an extent that, as before stated, when the hide is ready for the tanner it is a complete clean network of fiber, just as a piece of textile of clean fiber would be. When the hide is put into tan liquor, tannin begins its work in the form of a molecule. The molecule of tannin enters the grain, attacks the first fiber of the first bundle, and with the aid of a number of other molecules partly changes the albuminous fiber to chemically pure leather, or surrounds it in such a way that the air does not attack it nor in any way reach it, binding it by the power called absorption, this being the dividing-line between a chemical combination and a mechanical combination. The action is the same on the flesh side, the molecules also attacking the first fiber; the first fiber being tanned, the at-

traction for the second fiber draws the molecule away. In order that the tanning process may proceed and the molecules go from the first fiber to the second, it is necessary that the molecules should be resolved in water. Passing forward from the first fiber to the second, they surround the latter, their place being taken by other molecules from the tanning liquor. From the second they go to the third, from the third to the fourth, until they all meet. A method beyond striking through, and one which tanners use for gaining weight, is that of not alone surrounding each fiber with tannin molecules, but also filling up every cavity and every space between the bundles of molecules, this surplus not being necessary for the preservation of the hide, but simply to make a more solid and weightier piece of leather. Of the different tannins which the tanner finds in his barks—galls, leaves, extracts, etc.—we may make a scale, one extremity being used to indicate the affinity that chemically pure tannin has for hide-fiber, the other extremity to represent the small affinity of the article which has the least tanning properties that we know of:



When the barks, leaves, extracts, or galls are leached they extract both tannin and coloring material, or phlobaphenes, as they are called. These phlobaphenes, or coloring materials, are insoluble in cold water, and will not go further than the first fiber, whereas the pure tannin goes on. This theory is completely substantiated by the fact that the coloring materials always conglomerate in the grain and make discolored spots, and also fill up the grain of the hide to such an extent that it breaks easily. The skins absorb the coloring materials, and they become brittle in the grain and discolored. The tannin molecules (which were solved by the aid of heat in the extractors), being in solution, attacked the first fiber, and the tanning process, being conducted in cold water, lacks the power to resolve the molecules, originally solved in hot water, and consequently they do not lodge firmly in the grain. Therefore the use of extracts poured on leaches and solved and resolved in cold water gives much better results in color and much quicker tannage. All barks, galls, etc., contain a certain amount of coloring material; these materials have an affinity for hide-fiber, but not to such an extent as pure tannin. The chief distinction, however, between the two is that one is easily soluble and the other is only soluble with the aid of heat.

Looking at the diagram again, and taking up metallic salts, at one extremity we have iron, at the other end manganese. So great is the affinity between hide-fiber and iron salts that a piece of limed hide lying on a rusty wheelbarrow will immediately absorb the iron and show a brown spot. Iron is, however, not used to any great extent. Alum has the next greatest affinity, chrome the next, zinc the next, and manganese the last. These metallic salts must also be used in a soluble way, all the salts in general use being respectively sulphate of iron, or copperas, sulphate of alum, bichromate of potash, sulphate of zinc, and permanganate of potash.

The method whereby hide-fiber is preserved, or tawed, by metallic salts and by anilin is that the molecules, having no chemical combination, do not affect the fiber at all, but simply surround the fiber in such a close way that it becomes impervious to the air and weather. Some have added oil, or oil surrounding the metallic molecules, so that they become insoluble. Other manufacturers—and this is by far the better method—have tawed the leather with a soluble salt, and then precipitated the salt upon the hide-fiber by means of a chemical process. In the alum-tannage a great many manufacturers give skins a bath of bicarbonate of soda or carbonate of soda, thereby changing the sulphate of alum to aluminium-hydrate, which is insoluble in water, and which is therefore not at all affected by weather. In the chrome process, tanners using bichromate of potash rely upon hyposulphate of acid or sulphurous acid, which have a great affinity for oxygen, to reduce the salts to a chrome-oxide, which is insoluble in water. This all goes to show that there is practically no chemical combination between the metallic molecules and the hide-fiber, and that it is simply a surrounding of them, it being necessary to change them to an insoluble substance before the process of tawing is completed. Anilin has a very small affinity for hide-fiber, and is not in practical use at all.

Leather is preserved with the aid of oil. The skins are soaked in oil and laid in piles until they heat. By this heating the oil is changed to a substance known as degras, through the partial fermentation and partial oxidation of the oil. In the development of degras a peculiar substance known as degras former is created in exact proportion as the time of heating is continued. The oftener the skins are repiled and allowed to heat, the greater becomes the per-percentage of degras former created. This degras former has a peculiar property of preserving hide-fiber in a more substantial way than metallic salts, and is almost as strong as tannin. Aiding this degras former are the small molecules of oil surrounding the fiber, and the result is the chamois of commerce, an extraordinarily flexible kind of leather, on account of the lubricating power of the oil molecules, and a leather perfectly indifferent to water.

In the tannage of goatskin by what is known as the Dongola process, which is of modern origin, there is combined the solidity of tannin, the toughness of metallic salts, and the flexibility of the oil and degras former.

Electrical Tanning.

This process has received considerable attention within a few years. It is still an open question whether it possesses sufficient merit to assure it of permanence. As yet no one has claimed to be able to tan with the aid of electricity only. The electrical current has been used to hasten the ordinary process of tanning. The passing of an electrical current through water decomposes the latter, and consequently releases oxygen. The presence of oxygen in a tan liquor or any coloring-bath has a tendency to intensify the colors and again to precipitate, thereby making the coloring matters insoluble. Upon this may be based the slight increase in the speed in tanning leather by the use of electricity. The tannin molecules left are of the most easily soluble kind, and consequently the tanning process proceeds quicker. As the poles used in passing the current through the water differ, so does the color of the leather vary. Zinc poles give one result, tin another, platinum another, silver another, etc. The electrical current, however, does not affect the hide-fiber in any way. Experiments are still being conducted on a large scale in Europe and South America.

Tanning Materials in General Use.

The tanning materials vary greatly; they are divided into two great classes, viz., physiological and pathological. The first consists of those which are of perfectly natural or of animal growth; for instance, bark, sumach, etc.; whereas the second class contains those which are the result of abnormal growth, caused by diseases, stings of insects, etc. An example of the latter class is the gall. Materials of both of these classes are used to a great extent in Europe, while only those of the first division are in general use in the U. S.

The Physiological Tannins.

Oak Bark.—This material is and will be for some time to come the main tanning material in use throughout the world. The advantages of oak tannage are recognized in all countries. The kinds of bark in use in the U. S. are chestnut oak, white oak, black oak (or quercitron), red and rock oak, and a few other sorts which are not of great importance. In Europe, however, the species vary to a greater extent. *Spiegel Rinde* (mirror bark) is well distributed throughout Europe, and is peeled when the tree has attained a growth of from twelve to twenty-four years, its peculiarity being that it is very highly polished by nature and reflects objects, from whence comes its name. *Reitel Rinde* is obtained from the same tree as the spiegel rinde, but after the tree has attained a growth of twenty to twenty-five years. Old oak is obtained from the aged tree, but is not as valuable as the younger bark. Bosnia has fine oak-trees, the bark containing 10 to 11 per cent. of tannin; Bohemia produces the grape oak; Southern France and Northern Africa the Kirmess oak. The bark is used in two grades, root and trunk. Tyrol has the evergreen oak, yielding from 12 to 13 per cent. tannin; Sardinia produces a cork oak which yields 13 to 14 per cent.; white oak is found throughout Europe, yielding 10 per cent.

Hemlock and Pine Bark.—Besides oak-bark tannage, hemlock tannage is used in the U. S.; a corresponding tan-

nage is that of pine bark in Europe. Hemlock-trees are well distributed throughout the U. S. The bark is cheaper than oak, imparts a reddish color, and makes as strong and durable leather as any material used. Europe has a number of species of pine. The countries that consume the greatest amount of bark are Austria, Germany, Russia, and Italy. The tannin contained varies from 7 to 12 per cent., as is also the case with hemlock. The use of both these barks is to a great extent confined to the handlers—that is, their first stages of tanning all leather before the laying away. Pine bark gives poorer weight results—that is, given an equal amount of green hide, a less amount of leather in weight will be obtained by using pine bark than by using oak, and a larger weight by using hemlock than oak.

Birch bark is mainly used in Russia, Norway, and Sweden for upper-leather and sole-leather, but seldom alone. The bark is usually peeled from the full-grown tree, and contains 6 to 10 per cent. tannin.

Willow bark is also used in the above-mentioned countries and in Germany. This material contains 6 to 9 per cent. tannin.

Mimosa bark is obtained from the acacia of Australia and a similar sort of vegetation in Brazil. It is a favorite in England, and the varieties are as follows: Gold wattle, silver wattle (black wood, light wood), black wattle, green wattle. The gold wattle is a native of Victoria; its cultivation was tried as an experiment in Algeria, and met with some success. The trees are always grown from seeds, which are laid in warm water for a few hours before sowing. The acacia may be peeled at eight years' growth, and at that age carries seeds. The Tasmania bark is very good, and that from Adelaide likewise good. Sydney does not produce so good an article, but Queensland produces a better. The bark is marketed in the stick, ground, or chopped. Madagascar and the Reunion islands also produce a mimosa bark. The mimosa barks give a reddish-colored leather and plump well, containing a high percentage of tannin, averaging from 10 to 35.

Gambier is used in very large proportion in the U. S. It is an excellent tanning material; it comes from Singapore, where the natives derive it from the leaves of a large bush. The method of producing and packing is as follows: The leaves are boiled in a tub or large pot until they become a thick, pasty substance, the stems having been previously removed from the leaves. This is allowed to cool, when it becomes hard and mastic. It is then formed into blocks of about 220 lb., enveloped with a straw matting, and again wrapped in bagging. It is a general favorite on account of its good color results, its quick quality of tanning, and the softness of the leather. It is adulterated by admixture of camels' and elephants' dung during the boiling-down process.

Sumac is also used in large quantities, and gives the lightest color of any tanning material. There are two kinds of sumac, Sicilian and American, the former generally considered of better quality and bringing a higher price. The leaves of the sumac-bush are ground to a powder between mill-stones, and then packed in bags of about 200 lb. and shipped. The tanning material contained varies from 15 to 25 per cent. The American brand contains very nearly the same amount of tanning material, but is darker in color and does not give the beautiful color results that are obtained by the Sicilian.

Cutch is also used in the U. S.; the article is somewhat similar to gambier, but comes from India instead of Indo-China. Its use is limited.

Fruit tanning materials may be found in great variety. The best known is valonia, one of the materials most generally used in Europe. All countries consume it. Valonia was first used in England about the beginning of the nineteenth century; a few years later Germany began using it, and still later Austria. It is the fruit of the oak-tree, and is obtainable in Asia Minor and adjacent islands; in form it resembles the fruit of an American oak, but in size nearly trebles it.

Pathological Tannins, or those of Abnormal Growth.

Galls, at one time used quite extensively, are not now consumed to any great extent. They are found upon the leaves of the oak, sumac, and other trees. (See Galls.) The different varieties include Aleppo, found upon the same tree as the valonia, and containing 60 to 75 per cent. tannin; Istrian, 32 per cent. tannin; Persian, 28 to 29 per cent. tannin; Chinese (the result of the sting of a louse) giving 80 to 82 per cent. tannin, and making a very light colored leather. Dyers also use this material for coloring.

Knoppern belong to the family of galls, and are a most important factor of commerce in Austria. The knopper is generally found on the acorn or leaf of the oak-tree, especially the steel oak of Hungary. The tannin contained varies from 27 to 33 per cent. Their main use is in combination with valonia. Valonia gives better weight results than knoppern and is replacing them more and more every year. The combination of knopper, valonia, and myrobolans is also quite popular, and gives good results.

Bark and wood extracts are becoming general favorites throughout Europe and the U. S., partly because of their weight-giving qualities and partly because the transportation costs little. They are used to strengthen weak bark liquors. *Oak extracts* are obtained both from wood and bark, and are used extensively. Slavonia furnishes the greater part of the supply. *Chestnut-oak-wood extract* is manufactured in quantities, and easily finds purchasers. *Pine-bark extract* is also consumed in goodly amounts. *Quebracho-wood Extract.*—The wood is shipped from Brazil to Hamburg and other ports, and the tannin extracted there. Hamburg furnishes quantities of this extract. *Hemlock extract* is used in Russia, and is so popular that imitations of it in color are made. The hemlock that is consumed is imported from North America. As most leather is sold by weight in Europe, the leather manufacturers aim to obtain as good weight results as possible, and often, to gain this point, adulteration is resorted to. Both upper and sole leather are commonly adulterated. Sole-leather is nine times out of ten given false weight by forcing entirely foreign substances into the leather, such as glucose, barium chloride, magnesium chloride, resins, etc. Glucose and resin are also used for weighting upper-leather. Leather is also weighted with extracts by over-tanning. Leather-buyers have become wary, and do not purchase large quantities before an analysis is made of a fair sample.

Weight Results.

Sole-leather tanned with these materials gives for every 100 lb. green hide the following quantities of finished leather:

Oak bark	48 to 54 lb.
" extract	55 to 56 "
Pine bark	44 to 46 "
" extract	48 to 50 "
Willow	45 to 46 "
Birch-bark and oak extract	49 to 51 "
Quebracho wood and extract	48 to 49 "
Valonia	52 to 56 "
Knoppern	51 to 53 "
Myrobolans	50 "
Knoppern, myrobolans, and valonia	52 to 53 "
Hemlock	55 "

Specification of Tanning Materials Used in Different Countries.

United States.

Oak bark.
Hemlock bark.
Sumac.
Gambier.
Cutch.
Oak-bark extract.
Oak-wood extract.
Hemlock-bark extract.

France.

Oak bark (kirmess).
Sumac.
Chestnut-wood extract.
Quebracho-wood extract.
Some gambier.

Italy.

Oak bark.
Pine.
Sumac.
Valonia.

Norway and Sweden.

Birch bark.
Willow bark.
Oak bark.

Great Britain.

Oak bark.
Divi-divi.
Myrobolans.
Valonia.
Mimosa.
Extracts { Oak bark and wood / hemlock.
Gambier.
Cutch.

Germany and Austria.

Oak bark.
Pine bark.
Willow bark.
Valonia.
Knoppern.
Myrobolans.
Exts. { Oak bark and wood. / Pine bark and wood.

Russia.

Birch bark.
Willow bark.
Oak bark.
Pine bark.
Hemlock extract.

THE FINISHING OF LEATHER.

The methods vary greatly. For shoe-leather the stretch is taken out of the skins, which are then stuffed with greases of different kinds and colored, usually black. The black color is obtained by the use of logwood as a first coat and an iron salt, usually acetate of iron, as a precipitant.

Wax calf is used for shoes only, and is finished on the flesh side in contradistinction to other kinds of leather, which are, with a few exceptions, finished on the hair side. *Glove grain* consists of calf or kip skins (the latter meaning skins of calves over one year old) finished on the grain and usually ironed. *Oil grain* is made of cowhide leather. The hide is split in half after tanning, and is blackened, pebbled by machine, oiled, and given a luster on the face.

Wax Splits.—The parts of leather which have been removed from the original tanned hide or skin by the splitting-machine, in order to level them, are finished in the same finish as wax calf for inferior shoes.

Glazed kid, as the name implies, is made from goatskins. The skins are usually tanned in a combination of alum salt and gambier. Large quantities are tanned by bichromate of potash and hyposulphide of soda, sulphurous acid, etc.—a process of recent origin. The skins are then treated in fat-liquor, which is a kind of saponified oil soluble in water. The skins are revolved in a drum or tumbling-wheel with the fat-liquor until the latter is absorbed. The skins are then colored black. They are then softened by the staking-machine, and a hard face is imparted to them by the use of albuminous substances which are applied to the grain with a sponge, and they are allowed to dry. They are now glazed, and usually another coat is applied on the face and polished again by machine.

Kangaroo leather is also used for shoes. *Horsehide leather* is very tough and durable. *Harness leather* is made from steer and cow hides, which are tanned in bark and stuffed with hot tallow after blacking. *Calf kid* consists of calfskins tanned in alum, colored black and finished without luster.

Russia leather is an article that formerly was in use for the choicest kinds of leather fabrics, pocket-books, satchels, and the like. Bookbinders preferred it for the binding of their most costly volumes. The leather had a peculiar odor. Small quantities of it were imported into the U. S., and more could have been sold if it had been imported. In 1873 the U. S. minister to Russia, Marshall Jewell, himself a tanner, discovered the process by which it was made, and the result was that "Russia" leather became a commodity of extensive manufacture and sale in the U. S., and it is of quite as good quality as the imported. The process of manufacture is to take the leather which is to be Russianized, steep it in a solution of 50 lb. each of oak and hemlock bark and sumac, 1 lb. of willow bark, and 900 gal. of water; heat by steam and immerse the sides till struck through, and while the material is still damp to smear on the outer side a solution of oil of birch bark dissolved in a little alcohol and ether. This imparts the odor and the pliability.

Alligators' leather is made from the skins of alligators, and is used for satchels, bags, and shoe-leather; also from the skins of lizards, snakes, and seals. *Walrus-hides* are tanned, and the leather used for polishing knives and tools. It takes two years to tan a walrus-hide. *Sheepskins* are used for all purposes, and are manufactured in all tannages. The wool is always removed, and the skins are limed and painted with sulphide of sodium and lime mixed.

Patent, Japanned, or Enameled Leather.—Almost all kinds of hides or skins are, or have been, japanned. The general consumption, however, is confined to cowhide, horsehide, and calf. The usual procedure is to fill the surface, either flesh or grain side of the leather, with a daub called sweetmeats, consisting mainly of boiled linseed oil and a filling substance, and then, after a smooth surface has been obtained, to give the hides or skins a covering of varnish or japan, and then bake until the varnish is hardened. Fancy colors are also made. WALTER J. SALOMON.

Leather-board: an article much used in the manufacture of boots and shoes. It is made of old Manilla rope, hemp rope, jute or linen canvas, and leather scraps, to which are added certain chemicals and a cement which makes it more impervious to water than leather. The rope or canvas and leather scraps are first ground to a pulp, the same as in the manufacture of paper. The pulp is then run off by a wet-cylinder machine and cut into sheets, usually $2\frac{1}{2}$ by 3 feet; these sheets are then dried either in the sun about ten hours or by steam two hours, and are run through calendering-machines to smooth them, and are afterward pressed by still heavier machines to give an even surface and still greater solidity. It is also pressed into different forms convenient for use, among which are counters or stiffenings for boots and shoes, which by a patent process are made perfectly water-proof. These forms, being pressed by machines into a perfect fit for the various sizes, are considered superior to leather, as they hold their form better. The larger the percentage of Manilla rope or jute and linen waste, the better will be the quality of the board. This will be apparent when it is considered that Manilla retains its fiber, while leather does not. Although much used in the manufacture of boots and shoes it is not confined to this industry alone, but is used considerably in the manufacture of toys, chair-bottoms, etc. It was first manufactured in the U. S. in Exeter, N. H. Large quantities are manufactured, especially in New England, and are exported, principally from Boston, to Great Britain, Germany, France, and elsewhere. There are also a few small factories in Canada.

Leather-carp: See CARP.

Leather-turtle: a name given to the trunk turtle (*Dermochelys coriacea*), on account of the leathery appearance of the carapace; also applied to the fresh-water turtles of the family *Trionychidæ*, which have a flattened carapace with a wide, flexible, cartilaginous margin. F. A. L.

Leather-wood, **Moose-wood**, or **Wic'opy**: a shrub (*Dirca palustris*) of the family *Thymelaceæ*, abundant in the northern parts of North America. Its tough bark was used by the Indians for thongs or cordage. The bark has irritant cathartic properties, and its decoction in small doses is recommended for the cure of sick headache. Its wood is very white, soft, and brittle.

Leathes, le*ethz*, STANLEY, D. D.: divine and author; b. at Ellesborough, Buckinghamshire, England, Mar. 21, 1830; was educated at Jesus College, Cambridge; ordained in 1858; served as curate in several churches in London; became in 1863 Professor of Hebrew in King's College, London, and prebendary of St. Paul's Cathedral in 1876. He was Boyle lecturer from 1868 to 1870, Hulsean lecturer at Cambridge in 1873, and Bampton lecturer at Oxford in 1874; was a member of the British Old Testament company in the Anglo-American Bible revision committee, and was one of the delegates to the Evangelical Alliance in the session of 1873 in New York. His Boyle Lectures were published as follows: *The Witness of the Old Testament to Christ* (1868); *The Witness of St. Paul to Christ* (1869); *The Witness of St. John to Christ* (1870). He has also published *The Structure of the Old Testament* (1873); *The Gospel its Own Witness* (Hulsean Lectures, 1874); *The Religion of the Christ: its Historic and Literary Development Considered as an Evidence of its Origin* (Bampton Lectures, 1874; 2d. ed. 1876); *The Grounds of Christian Hope* (1877); *The Christian Creed: its Theory and Practice* (1877); *Old Testament Prophecy: its Witness as a Record of Divine Foreknowledge* (Warburton Lectures, 1880); *Studies in Genesis* (1880); *The Foundations of Morality, being Discourses on the Ten Commandments* (1882); *Characteristics of Christianity* (1883); *Christ and the Bible* (1885); *The Law in the Prophets* (1891).
Revised by W. S. PERRY.

Leavenworth, lev'*en*-wŭrth: city; capital of Leavenworth co., Kan. (for location of county, see map of Kansas, ref. 5–J); on the Missouri river, and the Atch., Top. and S. Fé., the Chi., Gt. West., the Chic., Rock Is. and Pac., the Kan. City, St. Jo. and Council B., the Kan. City, Wyo. and N. W., the Mo. Pac., and the Union Pac. railways; 312 miles N. W. of St. Louis. Excepting its water-front, the city is surrounded by bluffs 300 feet high. It is built on sloping ground, has excellent natural drainage, is lighted by gas and electricity, and has large manufacturing and commercial interests. The river is here spanned by an iron railway bridge that cost $1,000,000 and a steel one (opened Jan. 2, 1894) that cost $670,000. Manufacturing is promoted by several coal mines in the city and vicinity. There are 27 churches, 9 public-school buildings, several private academies and seminaries, 2 orphan asylums, 3 national banks with combined capital of $600,000, a State bank with capital of $30,000, and 3 daily, 5 weekly, and 1 monthly periodicals. The assessed property valuation in 1892 was $5,488,450, and the total debt in 1893 was $714,753. Fort Leavenworth, a U. S. military reservation, on which is a regular military post, a military prison, and a widely known military school, is 2 miles N. of the city,

and the State penitentiary is 4 miles S. The manufactures include carpets, furniture, carriages and wagons, boots and shoes, boilers, engines, mining machinery, iron bridges, cigars, and jewelry. Pop. (1880) 16,546; (1890) 19,768; (1900) 20,735. EDITOR OF "TIMES."

Leaves: See LEAF.

Leavitt, lev'it, ERASMUS DARWIN: mechanical engineer; b. at Lowell, Mass., Oct. 27, 1836; was educated in the public schools of Lowell, and supplemented his studies there and later by extensive study and reading in the mathematical and physical sciences, especially as applied in engineering. During 1859–61 he was the chief draughtsman for Thurston, Gardner & Co., steam-engine builders at Providence, R. I., and designed some of the most efficient and advanced types of steam-engine of that time, embodying in them the Green valve-gear, a now well-known form of expansion-gear, and many novel and economical devices of his own. In some cases he adopted a pressure for stationary engines and boilers exceeding 100 lb. per square inch, then an important advance upon contemporary practice, and designed special forms of boiler for such pressures. In the summer of 1861 he entered the U. S. navy engineer corps, and served throughout the civil war, and until 1867, when he resigned to again take up the practice of his profession. He was an instructor at the U. S. Naval Academy during the latter part of his service in the navy, in the department of steam engineering. Resuming his practice in civil life, he made a specialty of mining machinery and steam pumping-engines. He built the engines supplying the cities of Lawrence and Lynn with water, and the engines of the Boston sewerage station. In 1874 he became the consulting engineer of the Calumet and Hecla Copper Mining Company the most extensive mining company in the world. Since 1878 he has completed all the designs and plans for their enormous steam and other machinery outfits. He is a member of many scientific and technical associations. R. H. THURSTON.

Leb'anon [from Heb. *Lebhānōn*, liter., white (mountain). Cf. Syr. *Lebhnān*: Arab. *Jebel* (mountain) *Lubnān*, and Gr. *Λιβανός*]: a celebrated range of mountains in Syria, extending about 110 miles along the seacoast from the Nahr-el-Kibir (Eleutherus) river on the N. to the Nahr-el-Litany (Leontes) on the S.; i. e. from the great pass opening into the valley of Hamah (Hamath), lat. 34° 40′, to the vicinity of Tyre, in lat. 33° 20′, and separated by the elevated valley of El-Bukaa (Cœle-Syria), 10 to 20 miles wide, from the parallel range of ANTI-LIBANUS (*q. v.*), similarly extending from near Homs (Emesa) on the N. to the peak of Jebel-esh-Sheikh (Hermon), a few miles S. of Damascus. In the center of the valley of El-Bukaa are the majestic ruins of BAALBEC (*q. v.*), the ancient Heliopolis, near which rise the Aasy (Orontes) and Litany rivers. Lebanon was at the earliest recorded period the chief geographical feature and eastern limit of PHŒNICIA (*q. v.*); it was alternately subject to Assyria and Egypt, whose monarchs often employed the celebrated cedars to supply timber for their edifices, and was included within the boundaries of the Hebrew land of promise (Num. xxxiv.; Deut. xi. 24; Josh. i. 4), though it never came into their possession unless in a very limited sense for a brief period, and may properly be considered as the northern boundary of the Holy Land. The books, prophetic, poetic, and historical, of the Old Testament abound in references to Lebanon, which supplied the timber for Solomon's magnificent temple and palaces; and the term usually, though not uniformly, includes both ranges. Lebanon proper was called by the early Arabian geographers Jebel-Libnan, and by later writers Jebel-el-Ghurby, the west mountain, in distinction from Anti-Lebanon, called Jebel-esh-Shurky, the east mountain. Between the mountains and the sea the plain of Phœnicia is of varying breadth, but never more than 10 or 15 miles, while spurs are several times thrown off which jut precipitously into the sea. The base of the range has an average breadth of 20 miles; the peak of Jebel Timarun attains a height of 10,533 feet, that of Dahar-el-Kudib 10,051, and Sunnin 8,500 feet. The elevation decreases toward the S., and falls rapidly from the twin-peaks of Tomat-Niha (6,500 feet) to the wild, abrupt ravine of the Litany, whose banks sometimes rise perpendicularly 1,000 feet. The mass of Lebanon is a hard, partially crystallized Jurassic limestone, surmounted in many places by a grayish-white cretaceous deposit, whence the name, more usually derived from the snows which cover the main ridge from December to March. The southern section exhibits traces of violent volcanic action, and earthquakes are still frequent, that of 1837 having buried thousands of persons in Safed beneath the ruins of their homes. The inhabitants are chiefly Maronites, a Christian sect in the N., and Druses, professing a corrupted Mohammedanism in the S. These races are rivals, and have for centuries been at feud; a terrible massacre of Christians in 1860 resulted in European intervention. The district is subject to a Maronite governor, depending upon the pashalic of Damascus. There are more than thirty ruins of ancient temples within this region, which has still a considerable population. Capital, Nahr-ed-Dammur, formerly called Deir-el-Kamr. Revised by C. K. ADAMS.

Lebanon: city; St. Clair co., Ill. (for location of county, see map of Illinois, ref. 9–D); on the Ohio and Miss. Railway; 24 miles E. of St. Louis. It is in an agricultural and coal-mining region, and is a summer resort for citizens of St. Louis. It is the seat of McKendree College (Methodist Episcopal, chartered 1834), which in 1890 had 10 instructors, 186 students, $10,000 invested in scientific apparatus and $60,000 in grounds and buildings, and $24,000 in productive funds. Pop. (1880) 1,924; (1890) 1,636; (1900) 1,812.

Lebanon: city; capital of Boone co., Ind. (for location of county, see map of Indiana, ref. 6–D); on the Chi. and S. E., and the Cleve., Cin., Chi. and St. L. railways; 26 miles N. W. of Indianapolis. It is in the natural-gas region, and has grain elevators, sawmills, barrel and stave factories and other industries, and a daily and two weekly newspapers. Pop. (1880) 2,625; (1890) 3,682; (1900) 4,465.

Lebanon: city; capital of Marion co., Ky. (for location of county, see map of Kentucky, ref. 4–G); on the Louisv. and Nashv. Railroad; 67 miles S. E. of Louisville. It is in an agricultural and horse-breeding region, and has ice and furniture factories, several whisky-distilleries, and weekly and monthly periodicals. Pop. (1890) 2,816; (1900) 3,043.

Lebanon: town; capital of Laclede co., Mo. (for location of county, see map of Missouri, ref. 6–G); on the St. L. and San Fran. Railway; 185 miles S. W. of St. Louis. It is in an agricultural and magnetic-spring region; is a popular health resort; and has manufactories, large trade with the surrounding country, a seminary, and three weekly newspapers. Pop. (1880) 1,419; (1890) 2,218; (1900) 2,125.

Lebanon: town (incorporated in 1761); Grafton co., N. H. (for location of county, see map of New Hampshire, ref. 6–E); on the Connecticut river, and the Boston and Maine Railroad; 65 miles N. W. of Concord. Water-power for manufacturing is afforded by the Mascoma river, which falls 400 feet in 9 miles. The town has a public library, circulating library, and weekly newspaper, and manufactures flannels, cloakings, shirts, overalls, underwear, machinery, scythes, watch-keys, and wood-pulp. Pop. (1890) 3,763; (1900) 4,965. EDITOR OF "GRANITE STATE FREE PRESS."

Lebanon: village; capital of Warren co., O. (for location of county, see map of Ohio, ref. 6–C); on the Cin., Leb. and N. Railway; 30 miles N. E. of Cincinnati. It contains the National Normal University, a widely known private institution, an opium-cure sanitarium, a county infirmary, an orphans' home, and a community of Shakers. It is in an agricultural and stock-raising region, and the Poland-China variety of hogs was originally bred in this locality. Pop. (1890) 3,050; (1900) 2,867. EDITOR OF "WESTERN STAR."

Lebanon: city (Moravian and Mennonite churches erected 1740, town laid out 1750, incorporated 1821); capital of Lebanon co., Pa. (for location of county, see map of Pennsylvania, ref. 5–H); on Swatara creek and Union Canal, and the Phila. and Reading and the Cornwall and Leb. railways; 25 miles E. of Harrisburg, 86 miles N. W. of Philadelphia. It is in an agricultural, limestone, brownstone, anthracite coal, and brick-clay region, 5 miles N. of the great Cornwall iron hills, and is principally engaged in iron-manufacturing. There are 6 iron-furnaces, 5 rolling-mills, 3 machine-shops, 2 stove-works, and boiler, nut and bolt, and chain works; electric street-railway, gas and electric lights, public library, hospital, widows' home, 25 churches, and public-school property valued at over $250,000; and 3 national banks with combined capital of $350,000, 2 State banks with capital of $150,000, an assessed property valuation of over $8,000,000, and 3 daily, a monthly, and 8 weekly periodicals. Pop. (1880) 8,778; (1890) 14,664; (1900) 17,628.

Lebanon: town; capital of Wilson co., Tenn. (for location of county, see map of Tennessee, ref. 6–F); on the Nash., Chat. and St. L., and the Nash. and Knox. railways; 30 miles E. of Nashville. It is in a rich wheat and corn region; has large hog and mule breeding interests; and

manufactures flour, flour barrels, woolen goods, and other articles. It is the seat of Cumberland University (Cumberland Presbyterian, chartered 1842), which in 1900 had preparatory, theological, academic, and law departments, 18 instructors, 232 students, 16,000 volumes in its library, about 100,000 invested in grounds and buildings, and $95,000 in aggregate endowments. Pop. (1880) 2,296; (1890) 1,883; (1900) 1,956.

Lebanon Springs: See NEW LEBANON.

Lebanon Valley College: an institution under the auspices of the United Brethren; located at Annville, Lebanon co., Pa.; on the Philadelphia and Reading Railroad, 21 miles E. of Harrisburg. It was organized in 1866 and chartered by the State Legislature in 1867. There are two courses of study leading to degrees—the classical, to the degree bachelor of arts, and the scientific, to the degree bachelor of science. The institution has also departments of music and the fine arts. Young women are admitted to the privileges of the college on equal terms with young men, and are allowed to pursue the same courses of study. Its presidents have been Rev. T. R. Vickroy, Ph. D., L. H. Hammond, A. M., Rev. D. D. De Long, D. D., E. Benjamin Bierman, A. M., and Rev. H. V. Roop, A. M., Ph. D.

Le Bas, *le-baa'*, PHILIPPE: antiquarian and philologist; b. in Paris, June 18, 1794; served first in the navy, then in the army, later in the office of the prefect of the Seine, and was appointed by Queen Hortense tutor to Prince Louis Napoleon in 1820. In 1827 he returned to Paris; was appointed Professor in Greek at the Lyceum in 1829; and made a scientific journey in Greece and Asia Minor in 1842 at the expense of the Government. His principal writings are *Explication des Inscriptions grecques et latines recueillies en Grèce* (1835) and *Voyage archéologique en Grèce et en Asie Mineure* (1847). D. in Paris in 1861.

Lebeau', JEAN LOUIS JOSEPH: statesman; b. Jan. 2, 1794, at Huy, in the province of Liège, Belgium; studied law, practiced as an advocate with great success; and founded in 1824 the *Journal Politique de Liège*, which contributed to that alliance between the clerical and liberal parties which made it possible for the Belgian provinces to dissolve the union with the Netherlands. He became a member of the committee of safety of Liège in 1830, and was sent to Brussels to appeal to the Prince of Orange for the separation of Belgium from Holland. The revolution broke out soon afterward. As member of the congress of 1830 and Minister of Foreign Affairs 1831 he opposed the annexation to France and the election of the Duke of Nemours as king. He advocated the election of Leopold, and served under him as Minister of Justice to 1834; was called once more in 1840 to the ministry of Foreign Affairs, but retired before the violent opposition of the clerical party. D. Mar. 19, 1865. He wrote *Observations sur le Pouvoir Royal dans les États Constitutionnels* (1830). See *Les Fondateurs de la Monarchie Belge*, by Juste, 1865.

Revised by F. M. COLBY.

Leber, *lā'ber*, THEODOR, M. D.: ophthalmologist; b. in Carlsruhe, Germany, Feb. 29, 1840; was educated at the University of Heidelberg; was Professor of Ophthalmology, University of Göttingen, 1871–90; since then has been Professor of Ophthalmology in the University of Heidelberg. He is author of *Die Entstehung der Entzündung*, etc. (4th ed. 1891); several articles in Graefe's *Handbuch*, and a large number of professional essays; has been co-editor of Graefe's *Archiv für Ophthalmologie* since 1871. C. H. T.

Le Bœuf, *le-büf'*, EDMOND: marshal; b. in Paris, Dec. 6, 1809; received his military education in the École Polytechnique; entered the artillery in 1822, and distinguished himself as officer in the staff during the expedition against Constantine. He served in Algeria 1837–40; returned then to France; became second commander of the École Polytechnique in 1848, and went in 1854 to Crimea as colonel and chief of the staff of the artillery. Here he distinguished himself greatly, both in the battle of Alma and at the artillery attack on Sebastopol, which he partly led; in Nov., 1854, he was made a brigadier-general. After the close of the Crimean campaign he was sent to Kinburn as commander-in-chief, and remained there until 1856. He then received the command of the artillery of the guard; was made a general of division in 1857, and took an important and brilliant part in the Italian war of 1859. In 1869 he was commander of the Sixth Corps, stationed at Toulouse. Unfortunately for him Niel died Aug. 14, 1869, and he was called upon to succeed him as Minister of War, for, although an excellent officer, he was unable to master an administration of such dimensions. On Mar. 24, 1870, he was created a marshal, and four months afterward the war with Germany began. He received the eminent position of chief of the staff of the emperor—that is, of actual commander of the army, as the emperor, even bodily, was unable to command in person; but this task was too heavy for the marshal. The dispositions of the French army at the end of July, 1870, and the first strategical measures against the invading German army, showed the greatest lack of preparation and a fatal weakness in the command. When Bazaine was made commander-in-chief (Aug. 12, 1870) Le Bœuf received command of the Third Corps. In this position he took part in the battles of Vionville and Gravelotte (Aug. 16 and 18), and fought at Noisseville (Aug. 31 and Sept. 1) with furious stubbornness. At the surrender of Metz he became a prisoner of war. Before the commission on the capitulation he testified against Bazaine. D. June 7, 1888.

Lebret, GEORGES: See the Appendix.

Lebrun, *le-brün'*, CHARLES: painter; b. in Paris in 1619. He displayed early so decided a talent for art that the Chancellor Séguier took him under his protection and placed him with Vouet, and then sent him to Rome, where he remained six years. At Lyons, on his return, he met Poussin, with whom he later acquired his style. In 1648 he was recalled to France, where his work was much appreciated. His *Martyrdom of St. Andrew* and that of *St. Stephen* in Notre Dame led to his being admitted to the Academy that year, and other great works of decoration were intrusted to him. His popularity soon exceeded that of Lesueur, then so much in vogue, that Cardinal Mazarin commissioned him to make a design for a painting representing the defeat of Maxentius, and was so well pleased with the result that he presented him to Louis XIV. From this moment Lebrun became omnipotent in all art matters, and carried out in a satisfactory manner all the gigantic schemes of the great king and his prime minister Colbert. Lebrun painted the battles of Alexander, engraved by G. Audran, in a series which included the *Family of Darius*, considered his masterpiece. He decorated the Palace of Fontainebleau, the great gallery of Versailles, the chapel and pavilion of Aurora in Colbert's palace of Sceaux. He was chancellor and director of the Royal Academy of Painting and Sculpture in Paris, and president of the Academy of St. Luke in Rome. Through his influence the French Academy was established in Rome in 1666. At the death of Colbert, Louvois, his successor, removed Lebrun from his all-important position, giving it to his rival Mignard. Grief and disappointment at this treatment caused his death. The Louvre possesses many works of this artist, who has shown himself both by his paintings and his treatises on physiognomy, character, and the passions to have been one of the most cultured painters of France. D. in Paris, 1690. W. J. STILLMAN.

Lebrun, CHARLES FRANÇOIS, Duke of Piacenza: statesman; b. at St.-Sauveur-Lendelin, Normandy, France, Mar. 19, 1739; was for several years secretary to Maupeou, and, when the latter became chancellor, Lebrun was his most influential adviser. After the accession of Louis XVI. and the downfall of Maupeou he lived in retirement, and applied himself to the study of literature, publishing translations of *Jerusalem Delivered* and the *Iliad* which were highly praised. In 1789 his pamphlet, *La voix du citoyen*, attracted considerable attention. He was elected a deputy to the States-General, and as a member to the Constituent Assembly he acquired both influence and authority by his moderation and by his insight in financial matters. Having been imprisoned during the Reign of Terror, he entered, under the government of the Directory, the Council of Five Hundred, and was chosen its president Feb. 20, 1796. He allied himself very closely to Gen. Bonaparte, and was made third consul by him Nov. 9, 1799, with the supreme direction of the finances and of the internal administration. He became Minister of Finances, or arch-treasurer, of the empire, was created Duke of Piacenza, and as Governor of Liguria gained the good will of the Genoese for France. In 1810, on the abdication of King Louis, he was appointed governor of Holland, whence he was driven by the allies in 1814. After the first restoration he was made a peer of France by Louis XVIII., but having during the Hundred Days received the title of grand master of the university from Napoleon, he was excluded from the Chamber of Peers on the second restoration. In 1819, however, he was allowed to take his seat, and in the debates he sided with the constitutional op-

position. D. at St.-Mesme, near Dourdan, June 16, 1824. His *Mémoires* were published in 1829 by his son.
Revised by F. M. Colby.

Lebrun, Marie Anne Elisabeth Vigée, called Madame Vigée-Lebrun: painter; b. in Paris, Apr. 16, 1755. She was the daughter of Louis Vigée, a painter of some ability, and was married young to J. B. P. Lebrun, a dealer in works of art and a writer. Her facility as a portrait-painter was shown at an early age. She painted many portraits of the Queen, Marie Antoinette, and was popular with the court nobles. She was made a member of the Academy in 1783. In 1783 she left France and resided at Rome, Naples, Vienna, and other cities, always busy. Portraits of Lady Hamilton, Lord Byron, and the Prince of Wales, afterward George IV., date from this time. In Paris, under Bonaparte's influence, she painted his sister, Caroline Murat, and other persons of the imperial court. Her favor continued under the Restoration, and few portrait-painters can boast of so long and undisturbed a popularity. Her work has, even to modern eyes, much grace, agreeable though not forcible color, and a certain simple intensity and directness, even in the symbolic and allegorical pictures which she painted sometimes. Undoubtedly she is the most famous artist among women, and deservedly so. The best opportunity to study her work is in the Louvre, where are seven or eight important pictures. D. Mar. 30, 1842. Russell Sturgis.

Lebrun, Pierre Antoine: poet and dramatist; b. in Paris, France, Dec. 29, 1785. He won reputation by patriotic odes under the empire. His greatest success was the drama *Marie Stuart* (1820), after Schiller; in 1825 he wrote also *Le Cid d'Andalousie*. In 1828 he published the poem *Voyage en Grèce*, and was chosen to the Academy. D. May 27, 1873. There is an edition of his *Œuvres complètes*, 5 vols. (2 vols., 1844; 3 vols., 1863). A. G. Canfield.

Lebrun, Ponce Denis Écouchard, sometimes called Lebrun-Pindare: lyric poet; b. in Paris, France, Aug. 11, 1729. He studied at the Collège Mazarin, where he developed a decided taste for writing verses. He was secretary to the Prince of Conti. He cultivated especially the ode and the epigram. He addressed odes to Voltaire and Buffon; celebrated in turn Louis XVI., the Revolution, and Napoleon, from whom he received a pension of 6,000 francs; pointed epigrams against almost all the contemporary men of letters; and planned a long Lucretian poem, *La Nature*, which was not finished. D. in Paris, Sept. 2, 1807. Ginguené edited his *Œuvres complètes* (4 vols., 1811). A. G. Canfield.

Le Cap, le-kăap′: See Cape Haytien.

Lecce, let′chā: the former *Terra di Otranto*, a province of Italy, belonging to the division of Apulia. Area, 3,293 sq. miles. It is traversed by the Apennines, and produces corn, tobacco, wine, olives, and in some places cotton, but often suffers from severe droughts. Pop. (1890) 613,565.

Lecce: the ancient *Lycia* or *Lupia*, one of the most beautiful towns in Southern Italy (see map of Italy, ref. 7–H). It is situated in the province of Lecce, lat. 40° 42′ N. and lon. 36° 40′ E., on a plain between the Adriatic on the N., the Gulf of Taranto on the W., and the Ionian Sea on the S. The town is regularly built of a remarkably fine white stone, and has many interesting edifices, especially churches and convents, some of which contain admirable works of art. At the gate of St. Biagio is a triumphal arch erected in commemoration of the entrance of Charles V. The royal manufactory of tobacco is an old establishment, but has been provided with the best modern machinery, and the first quality of Leccese tobacco is said to be equal to that of Seville. There is a public library and there are well-established day and evening schools, and numerous charitable institutions. Lecce (probably of Cretan origin) was very flourishing during the Roman period, escaped the barbarians, and in 1000 A. D. was governed by its own counts, among whom were Tancred and Bohemond. Pop. 23,000.

Lecco, lek′kō: town; in the province of Como, Northern Italy (see map of Italy, ref. 2–C). It is delightfully situated on the Adda, near the point where it flows out from the southeast arm of Lake Como, at the foot of the Resegone. Lecco existed under the Romans, and continued a town of considerable importance through all the vicissitudes of the Middle Ages. It is now one of the most industrious and prosperous of the small towns of Lombardy. Its iron and silk manufactories are extensive. A picturesque road on the east bank of the lake connects Lecco with Colico, while it has direct railway communication with Bergamo. Pop. 7,000.

Lech, lech: a river of Southern Germany which rises in the Vorarlberg, runs N. through Tyrol and Bavaria, and joins the Danube after a course of about 140 miles. A little below Füssen it becomes navigable for small boats, and for larger from Augsburg, but it has no great commercial importance on account of the irregularity of its course, bottom, banks, etc. Many mills are worked by its waters.

Lechæum: the port of Corinth (*q. v.*).

Lechevalier, le-she-vaă′li-ā′, Jean Baptiste: traveler and archæologist; b. at Trelly, Normandy, France, July 1, 1752; studied theology at the Seminary of St. Louis in Paris, but did not take orders; accompanied in 1784 the Count of Choiseul-Gouffier as secretary to Constantinople, and participated with great energy in his explorations of the plain of Troy; traveled much in Spain, England, Germany, and Scandinavia, and was appointed director of the library of Ste.-Geneviève in Paris in 1805, which position he held to his death, July 2, 1836. His *Voyage dans la Troade* (1794) and *Voyage de la Propontide et du Pont-Euxin* (1800), in which he pretended to have made many great discoveries concerning the geography of the Homeric epics, made a great sensation at their first appearance. He located the site of Troy at Bunárbaschi, alleging that he had found the two warm springs mentioned in Homer, but Schliemann's discoveries have forever settled this question in favor of Hissarlik. He is also the author of a work entitled *Ulysse-Homère* (1829), in which he attempts to prove that Ulysses wrote the *Iliad* and the *Odyssey*. See Noël, *Jean Baptiste Lechevalier* (Paris, 1840). Revised by Alfred Gudeman.

Lech′ford, Thomas: a lawyer from London who settled in Boston, Mass., in 1638, the first of his profession to practice in New England. He returned to England in 1641, much dissatisfied with his experience; published in 1642 *Plaine Dealing, or Newes from New England's Present Government*, etc., and in 1644 *New England's Advice to Old England*. He is said to have died soon after. A new edition of the *Plaine Dealing*, with introduction and notes by J. Hammond Trumbull, was published in 1867. Though hostile to New England, Lechford's work contains valuable information.

Lecithine, lek′i-thin [from Gr. λέκιθος, yolk of an egg]: the *matière visqueuse* of Gobley, a name given to phosphuretted fatty bodies, found in the yolk of eggs, the brain, bile, blood, the roe of fish, yeast, corn, wheat, peas, etc. Every lecithine is a fat (glyceride) in which one of the three fatty acid radicals is replaced by the radical of phosphoric acid in combination with neurine. Brain and nerve substance contains the *palmitic oleïc lecithine*.

Lecky, William Edward Hartpole: historian; b. near Dublin, Ireland, Mar. 26, 1838; studied at Trinity College, Dublin, and graduated in 1859; published anonymously in 1861 *The Leaders of Public Opinion in Ireland* (new ed. 1872); traveled extensively on the Continent; settled in London, devoting himself to historical and philosophical researches, and surprised the learned world in 1865 by the *History of the Rise and Influence of the Spirit of Rationalism in Europe* (5th ed. 1872), a work which united to an elegant style a judicial impartiality and a more than German erudition. It was speedily republished in the U. S., as were also his next works, *A History of European Morals from Augustus to Charlemagne* (2 vols., 1869; 3d ed. 1877) and *A History of England in the Eighteenth Century* (8 vols., 1878–90), which displayed the characteristics of its predecessors in a still higher degree. All these works were translated into German by Dr. H. Jolowicz, and the *History of Morals* has become a text-book in more than one German university. Lecky published a lecture delivered before the Royal Institution on the *Influence of the Imagination in History*. He has been an occasional contributor to periodicals, and since the division in the Liberal party has spoken in public in favor of Liberal-Unionism. He married about 1870 a maid of honor of the Queen of Holland.

Leclerc, le-klãr′, Joseph Victor: classical scholar; b. in Paris, Dec. 2, 1789; was teacher at various lycées and the Faculté des Lettres, and a member of the Académie des Inscriptions. D. in Paris, Nov. 12, 1865. He published *Nouvelle rhétorique française* (1822; 11th ed. 1850); *Des journaux chez les Romains* (1838); a translation of *Cicero* (30 vols., 1821–25; 2d ed. 35 vols., 1823–27); and an editor of the *Histoire littéraire de la France* (vols. xx.–xxiii., 1842–56). See E. Renan, *Joseph Victor Leclerc* (*Revue des Deux Mondes*, Mar., 1868). Alfred Gudeman.

Leclerc, Victor Emmanuel: general; b. at Pontoise, near Paris, France, Mar. 17, 1772. He joined the republican army in 1791, fought at Toulon, in the Ardennes, and in Italy; was commandant at Marseilles in 1795; and, having attained the rank of brigadier, married in 1797 Pauline, the sister of Gen. Bonaparte. Later he accompanied his brother-in-law to Egypt, and after his return was prominent in the overthrow of the Assembly. The First Consul made him major-general, and intrusted him with important commands. In 1801 he was at the head of an army sent against Portugal, and forced the treaty of Badajoz. In Dec., 1801, he was given command of 25,000 men (subsequently re-enforced by 8,000), destined to subdue the French portion of the island of Santo Domingo, then in revolt, and to conquer the Spanish portion. With this force he sailed from Brest in a fleet of forty-three ships of war and transports, commanded by Admiral Villaret de Joyeuse. The expedition reached Cape Samana Feb. 1, 1802, and was there divided. The Spanish colony was easily reduced, but the blacks of the western portion, under their leader, Toussaint Louverture, made a desperate resistance, and the French had lost 5,000 men before Toussaint finally capitulated. He was allowed to retire to his estate, but on suspicion that another uprising was intended he was arrested and sent to France (May, 1802). Soon after the blacks revolted under Dessalines and Christophe, and an epidemic of yellow fever caused terrible devastation in the army. Gen. Leclerc himself was at length stricken with the disease and died at Cape Français, Dec. 2, 1802. His wife, who had established a kind of court in the island, accompanied her husband's body to France; she was subsequently prominent in European politics. The French, after losing nearly all their army, abandoned the island. Herbert H. Smith.

Leclercq, Michel Théodore: dramatist; b. in Paris, France, Apr. 1, 1777. He held from 1810 to 1819 a subordinate place in the civil service, but was not dependent upon it. He was a man of the world rather than a professional author. He wrote several short stories and the novel *Le Château de Duncan*, but is chiefly known for his *Proverbes dramatiques*, a slight dramatic form invented by Carmontelle, adapted rather for private theatricals than the stage. In these he shows a keen observation of the intimate and familiar phases of social and domestic life, and in some, particularly between 1824 and 1831, colors them with political significance and approaches regular comedy. Among these are *Le Retour du Baron*, *Le Père Joseph*, *L'Intrigant malencontreux*. D. Feb. 15, 1851. The *Proverbes dramatiques* appeared in 1823 (7 vols.); *Nouveaux proverbes dramatiques* in 1836 (2 vols.). A. G. Canfield.

Lecocq, *le-kok'*, Alexandre Charles: composer; b. June 3, 1832, in Paris; educated in the Conservatory there. He is best known as the composer of numerous *opéras-bouffes*, of which *Les Cent Vierges* (1872), *La Fille de Madame Angot* (1873), *Giroflé-Girofla* (1874), *La Marjolaine* (1877), and *Le Petit Duc* (1878) are the best known. His works have had a remarkable popularity in Paris, London, and New York, almost entirely displacing those of Offenbach. D. E. Hervey.

Lecomte, *le-kōnt'*, Louis: priest and author; b. at Bordeaux, France, about 1655; was one of the six Jesuits selected for their mathematical attainments to undertake a semi-scientific mission in China. They embarked at Brest Mar. 3, 1686, with the Chevalier de Chaumont, ambassador to Siam, where they arrived in September, and were detained two years by the reigning monarch, Phra Narai, who prided himself upon his knowledge of mathematics. Arrived at Peking in Feb., 1688, they made astronomical observations in various parts of the empire for several years, and became well acquainted with the condition of the country and people, and had considerable success in making proselytes to Roman Catholicism—a success much facilitated by their tolerance of many pagan ceremonies which the missionaries of other orders condemned as idolatrous. Lecomte was sent to Rome in 1692, became soon afterward confessor to the Duchess of Burgundy, and wrote a work, *Nouveaux Mémoires sur l'État présent de la Chine* (3 vols., 1696–97–1701), combining much information with an exaggerated panegyric upon the Chinese, who were represented as having always retained a knowledge of the true God. This work, together with *Sur les Cérémonies de la Chine* (1700), was censured by the faculty of theology at Paris and by the Congregation at Rome. Lecomte died at Bordeaux in 1729.

Le Conte, *lĕe-kont'*, John, M. D., LL.D.: physicist; son of Lewis Le Conte (1782–1838), naturalist; b. in Liberty co., Ga., Dec. 4, 1818; prepared for college under Alexander H. Stephens; graduated in 1838 with high honors at Franklin College, Athens (now University of Georgia); studied medicine, taking his degree in 1841 from the New York College of Physicians and Surgeons; in 1842 began practice at Savannah, Ga., and from that time forward contributed largely to the prominent medical journals of the U. S.; was elected in 1846 to the chair of Natural Philosophy and Chemistry in Franklin College, and resigned in 1855 to become lecturer on Chemistry in the College of Physicians and Surgeons, New York; accepted in 1856 the new professorship of Natural and Mechanical Philosophy in the South Carolina College, Columbia; in 1869 became Professor of Physics and Industrial Mechanics in the new University of California at Oakland, and was president after the resignation of President D. C. Gilman in Apr., 1875, till Aug., 1881, when he resumed the chair of Physics. He was a member of the leading scientific societies of the U. S. Published *Philosophy of Medicine* (1849): *Study of the Physical Sciences* (1858); contributed *The Nebular Hypothesis* to *The Popular Science Monthly* for Apr., 1873, and many other articles to periodicals, including *Sound Shadows in Water* (*Am. Journal of Science*, 1882); *Apparent Attractions and Repulsions of Small Floating Bodies* (*Am. Journal of Science*, 1882); *Physical Studies of Lake Tahoe* (3 papers, 1883–84); *Vital Statistics and the True Coefficient of Mortality, Illustrated by Cancer* (1888). In 1857 he delivered a course of lectures on *Physics of Meteorology* at the Smithsonian Institution, Washington, and in 1867 one of four lectures on the *Stellar Universe* at the Peabody Institute in Baltimore. By the burning of Columbia, S. C., in Feb., 1865, he lost the nearly completed manuscripts of a treatise on *General Physics*. D. at Berkeley, Cal., Apr. 29, 1891.

Revised by W. Le Conte Stevens.

Le Conte, John Eaton: naturalist; brother of Lewis Le Conte; b. near Shrewsbury, N. J., Feb. 22, 1784; entered the engineer corps of the U. S. army in 1813; was long employed on surveys and fortifications; retired with the rank of major in 1831; devoted himself to the study of botany and zoölogy, making a specialty of coleoptera. He published *Monographs of the North American Species of Utricularia, Gratiola, and Ruellia*; *Observations of the North American Species of Viola*; *Descriptions of the Species of North American Tortoises* in the *Annals of the New York Lyceum of Natural History*, vols. i., ii., iii.; and *A Monograph of North American Histeroides* in the Boston *Journal of Natural History*, vol. v. D. in Philadelphia, Pa., Nov. 21, 1860.

Le Conte, Joseph, M. D.: geologist; son of Lewis Le Conte, naturalist; b. in Liberty co., Ga., Feb. 26, 1823; graduated with distinction at Franklin College, Georgia, in 1841, and in medicine in New York in 1845; settled in 1848 as a physician in Macon, Ga.; studied natural history under Agassiz at Cambridge in 1850; became Professor of Natural History at Franklin College in 1853, and was Professor of Chemistry and Geology in the University of South Carolina from 1856 to 1869, accompanying his brother John in 1869 to California, where he took the chair of Geology in the University of California. He was vice-president of the international congress of geologists in 1891, and president of the American Association for the Advancement of Science in 1892. He is most widely known through his *Elements of Geology* (1878), but wrote also on optics, aëronautics, biology, art, education, philosophy, and the relations of religion and science. D. July 6, 1901. G. K. Gilbert.

Le Conte, Lewis, M. D.: naturalist; b. near Shrewsbury, Monmouth co., N. J., Aug. 4, 1782; descended from one of the Huguenot settlers of New Rochelle, N. Y.; graduated in 1799 at Columbia College; studied medicine in the office of Dr. David Hosack, but never practiced, and soon settled in Liberty co., Ga., taking charge of his father's estate and establishing a botanical garden especially rich in bulbous plants from the Cape of Good Hope. By his observations he enriched the monographs of his brother, Major John Le Conte, and aided other botanists. Dr. Le Conte devoted much attention also to ornithology, chemistry, and mathematics, but his manuscripts were lost by the burning of Columbia, S. C., in Feb., 1865. D. in Liberty co., Ga., Jan. 9, 1838. Revised by Charles E. Bessey.

Leconte de Lisle, *le-kont'de-leel'*, Charles Marie: poet; b. at St.-Paul, Island of Réunion, Oct. 23, 1818. He made several journeys to France during his youth, and settled in Paris in 1847. For a time he took some part in politics, but

soon turned to poetry. His first volume was *Poèmes antiques* (1853). The volume was accompanied by a preface of importance. It distinctly expressed the ideas of the so-called neo-pagan movement. It arraigned romanticism and modern art altogether for its abandonment to the personal and emotional element. In inner sympathy with the growing positivism of the century, it demanded the elimination from art of the display of the personal feeling of the artist, laid emphasis on the material object and fact, sought beauty in perfection of form, and in general asserted the impersonality and impassibility of art. The plastic charm and splendid serenity of the poems of this volume exemplified the doctrine and visibly influenced the young generation of poets. A group of writers followed his lead and were called Impassibles. *Poèmes et poésies* followed in 1855, *Poèmes barbares* in 1862, and *Poèmes tragiques* in 1883. The poems usually take their subjects from the sacred traditions and myths of various peoples, and attempt to penetrate and exhibit the essential spirit of the great historic phases of humanity. Their philosophy is a somber pessimism. He has also published excellent translations of the Greek poets—Theocritus and Anacreon (1861), Homer (1866–67), Hesiod (1869), Æschylus (1872), Sophocles (1877). He was received into the Academy in 1887, succeeding Victor Hugo. D. at Louveciennes, July 17, 1894. A. G. Canfield.

Lecouvreur, le-koov′rür′, Adrienne: actress; b. at Damery, near Épernay, France, Apr. 5, 1692. In 1702 her parents settled at Paris, and after receiving some instruction from the actor Legrand she went on the stage at Strassburg in 1716. In the following year (May 14, 1717) she made her *début* at the Théâtre Français in Paris, where she very soon attained the first place both in comedy and tragedy. Her acting was touching rather than impressive, and her principal power was a most wonderful mimicry. Maurice of Saxony was her lover, and when he was made Duke of Courland she sold her diamonds and jewels in order to lend him the money necessary to take possession of the country. It was alleged that another of his mistresses, the Duchess of Bouillon, poisoned her from jealousy. She died Mar. 20, 1730. Her remains were not allowed to rest in consecrated ground, but were buried secretly in a private place. Roused by indignation, Voltaire wrote an ode on her death, but public opinion was so fixed on this point that he had to leave the city. Revised by B. B. Vallentine.

Le Creusot: a town of France. See Creusot, Le.

Le′da (in Gr. Λήδη): in Greek mythology, daughter of Thestios, King of Ætolia, and wife of Tyndareos, King of Sparta, to whom she bore Timandra, Philonoë, and Clytæmnestra. Her beauty enthralled Zeus, who assumed the shape of a swan and surprised her in the bath. Though she was already pregnant by her husband with Clytæmnestra and Castor, yet by her divine lover she conceived Pollux and Helen, and was delivered of all four at the same time. Leda and the swan were favorite subjects among the ancient artists, who depicted the visit of Zeus to Leda in a great variety of ways. J. R. S. Sterrett.

Lederer, John: German surgeon; known only as an early explorer of the mountain region of Virginia; wrote in Latin an account of his travels, which was translated and printed in 1672 by Sir William Talbot, under the title *The Discoveries of John Lederer in Three Several Marches from Virginia to the West of Carolina and other parts of the Continent, begun in March, 1669, and ended in September, 1670* (quarto, 27 pp., with a map). Sir William states in the preface that Lederer was driven out of Virginia by ill-treatment from the populace—that he made his acquaintanee in Maryland, and induced him to write this treatise as a vindication.

Ledesma Buitrago, lā-des′mäă-bweĕ-traa′gō, Alonso, de: poet; b. in Segovia, Spain, in 1552; d. in 1623. Writing chiefly religious verse, of a peculiar mystical kind, he is noteworthy as the first important representative of the school known as *Conceptistas*, of which later Quevedo (*q. v.*) was the best exponent. Affecting to preserve the poetical manner of the previous period, in antagonism to the growing Italian influence, Ledesma and his followers indulged in all the quaintnesses and perversities of the decaying Middle Ages. Allegory is carried by them to an absurd point, and true poetry disappears in the midst of mere quibbles. Still the influence of the school long survived, and is plainly to be seen in Lope de Vega and several of his contemporaries. The first and best of Ledesma's works is the *Conceptos espirituales* (1600; an additional volume in 1612). Besides this we have *Juegos de la Noche Buena* (Barcelona, 1611; put in the *Index Expurgatorius* of 1667); *El Monstruo imaginado* (1615): *Epigramas y Geroglificos á la Vida de Cristo*, etc. (1625). The best of Ledesma's poems are printed in vol. xxxv. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1872). A. R. Marsh.

Ledochowski, led-ō-*k*hov′skeĕ, Miecislas Halka, de, Count: cardinal; b. at Ledochow, Galicia, Oct. 29, 1822; studied theology at Warsaw, Vienna, and Rome; became domestic prelate and prothonotary apostolic to Pope Pius IX.; and entering the papal diplomatic service was auditor of the nunciature successively at Madrid, Lisbon, Rio de Janeiro, and Santiago de Chili, nuncio at Brussels, and Archbishop of Thebes *in partibus infidelium* in 1861; and at the request of the King of Prussia was appointed in Jan., 1866, Archbishop of Gnesen and Posen, becoming thereby *ex officio* primate of Poland. On May 26, 1873, he headed the protest signed by the clergy against the new Prussian ecclesiastical laws which placed the choice of bishops and priests in the hands of the people of the diocese or parish. Persistently refusing to appear before the courts to justify his action, his property was taken in payment of fines, and he was imprisoned at Ostrowa 1874–76, after which he took up his abode in Rome, though continuing his opposition to the Prussian Government. While in prison he was exhorted to constancy by a papal brief of Nov. 3, 1873, and in the secret consistory of Mar. 15. 1875, was made a cardinal. In 1892 he was appointed prefect of the Propaganda. D. in Switzerland, July 28, 1894.

Ledru-Rollin, lā′drü′rō′lăń′, Alexandre Auguste: revolutionist; b. in Paris, Feb. 2, 1807; began to be known soon after the revolution of July, 1830, as an advocate in important political cases, as an editor of republican newspapers, and as the author of pamphlets and memoirs in which he opposed the repressive measures ordered against individuals or public liberties. He was at the same time a favorite and celebrated lawyer in ordinary lawsuits, and published dogmatic works and periodical reviews on jurisprudence. In 1841 he was elected member of the Chamber of Deputies, and upheld openly the doctrines of republicanism in the chamber. Too radical even for a considerable portion of his own party, and ridiculed in the chamber as a general without soldiers, he nevertheless became the leading representative of republicanism with the masses. With Lamartine and Louis Blanc he addressed the people at the workingmen's banquets, asserting the doctrine of the right of labor (*droit pour travailler*) and advocating universal suffrage. For a short time he was the most conspicuous figure in the revolution of 1848. He checked the plans of the monarchists and as Minister of the Interior, one of the provisional government of the republic, he put in practice his theory of universal suffrage. He was a candidate for the presidency, but received only a small vote. On June 13, 1849, he headed a demonstration against the Roman policy of the government, and though he protested his peaceful intentions, the movement was regarded as an actual insurrection, and he was forced to flee. He took refuge in England, where he co-operated with Mazzini, Kossuth, and other revolutionary leaders in propagating democratic principles. While there he wrote a work on the *Decadence d'Angleterre*. Returned to France in 1870, he did not wish to re-enter the political arena; but the republicans elected him deputy in 1873, and he was one of the members of the extreme Left in the Versailles Assembly, where he made an eloquent speech on behalf of universal suffrage. D. Dec. 31, 1874.

Revised by F. M. Colby.

Le′dum, Oil of [*ledum* is Mod. Lat., from Gr. λῆδον, a kind of cistus (κίστος) or running ground-plant]: an essential oil obtained by distilling the leaves of marsh tea, *Ledum palustre*. It is reddish yellow, has an acid reaction, smells like the plant, and consists of a hydrocarbon isomeric with oil of turpentine, and an oxygenated oil having the composition of ericinol, $C_{10}H_{18}O$.

Le′dum Palus′tre [Mod. Lat., liter., swamp ledum; *ledum* + Lat. *palus′tris*, swampy, marshy, deriv. of *pa′lus*, swamp, marsh]: a small evergreen shrub growing in swamps and other wet places in the northern parts of Europe, Asia, and America, and in mountainous regions of more southern latitudes. It bears the popular name of marsh tea. The leaves have a balsamic odor and an aromatic, camphorous, bitter taste, and contain, among other ingredients, a volatile oil and tannin. They are thought to

possess narcotic properties, and have been employed to allay irritation in whooping-cough, dysentery, leprosy, and scabies. (*U. S. Disp.*) They are said to protect clothes from moths, are sometimes used as a substitute for hops in beer, and are employed in Russia to tan goat, calf, and sheep skins into a reddish leather of an agreeable smell, as also in the preparation of oil of birch, for making what is generally called Russia leather.

Ledyard, John: traveler. See English Literature.

Lee: town (settled in 1760, incorporated in 1777); Berkshire co., Mass. (for location of county, see map of Massachusetts, ref. 2–C); on the Housatonic river, and the N. Y., N. H. and Hart. Railroad; 10 miles S. of Pittsfield. It is noted for its fine marble quarries, which supplied the stone for the extension of the National Capitol in Washington and the erection of St. Patrick's Cathedral in New York, and for the extent of its manufactories, which include 25 paper-mills, 3 machine-shops, 2 iron-foundries, and several woolen-mills. The first paper-mill was erected here in 1806. The town has a trotting-park, public library (opened in 1874), and weekly newspaper. Pop. (1880) 3,939; (1890) 3,785; (1900) 3,596. Editor of "Valley Gleaner."

Lee, Alfred, D. D., LL. D.: bishop; b. at Cambridge, Mass., Sept. 9, 1807; graduated at Harvard in 1827; was admitted to the bar in 1830; practiced law at Norwich, Conn., 1831–33; graduated at the General Theological Seminary, New York, 1837; was ordained a deacon of P. E. Church in 1837, and a priest in 1838; rector of Calvary church, Rockdale, Del., 1838–41; consecrated Bishop of Delaware in 1841, and became also rector of St. Andrew's, Wilmington, Del. On the death of Bishop Benjamin Bosworth Smith, of Kentucky, Bishop Lee became presiding bishop of the American Episcopal Church, and held the office till his death. He was author of *Life of St. Peter* (New York, 1852); *Life of St. John* (1854); *Treatise on Baptism* (1854); *Memoir of Susan Allibone* (Philadelphia, 1856); *Harbinger of Christ* (New York, 1857); *Co-operative Revision of the New Testament* (1881); and *Eventful Nights in Bible History* (1886). D. in Wilmington, Del., Apr. 12, 1887. Revised by W. S. Perry.

Lee, Ann: religious leader; b. at Manchester, England, Feb. 29, 1736; worked in a cotton-mill, and afterward became a cook; was married to a man named Stanley, and soon began to take part in the conventicles of James and Jane Wardley, the original "Shaking Quakers," whom she succeeded as the leader of the sect in 1771, soon after which she was for a time confined in a jail, and then in a madhouse. After her release she was acknowledged as a "mother in Christ," and assumed the title of "Ann, the Word." In 1774 she went with a few followers to New York, and in 1776 settled at Watervliet, near Albany. Here she was charged with high treason and witchcraft, and imprisoned at Albany and Poughkeepsie. This imprisonment, regarded as a persecution, brought her many followers. (See Shakers.) D. at Watervliet, N. Y., Sept. 8, 1784.

Lee, Arthur: diplomat; son of Thomas Lee, colonial Governor of Virginia; b. at Stratford, Westmoreland co., Va., Dec. 20, 1740; was educated at Eton and at Edinburgh University, where he received the degree of M. D. and a diploma approving him a "general scholar"; returned to Virginia and practiced medicine at Williamsburg, but having a strong taste for political life, and desiring to aid the colonies in their constitutional struggle with Great Britain, returned to England about 1766, studied law in the Temple, London, and was admitted to the bar in 1770. While carrying on a successful practice he devoted much time to politics in their relation to the North American colonies; published letters, signed *Monitor* and *Junius Americanus*, in defense of the colonies, and a pamphlet entitled *An Appeal to the English Nation*; and further aided the colonies as a member of a society called Supporters of the Bill of Rights. In 1770 he was appointed by the Assembly of Massachusetts agent of that colony at London, in association with Franklin, and in 1774 presented the addresses of Congress to the king and to the people of England. In Nov., 1775, Congress appointed a committee of secret correspondence with the friends of the colonies in England and other countries, and Lee acted as their agent in London. In 1776 he removed to Paris, where, in connection with Franklin and Silas Deane, he secured a treaty of alliance with France. In 1777 he visited Madrid and Berlin as a commissioner from the U. S., and during 1778–79 was sole commissioner to Spain and acting commissioner to Prussia. His suspicious and irritable disposition involved him in quarrels with his fellow commissioners, and led him to attack Franklin and Deane with great bitterness; consequently he was recalled in 1779 by Congress, which, however, did not censure him. In 1781 he was elected to the State Assembly of Virginia, and in 1782 to Congress, in which he served till 1785. In 1784–85 he traveled through New York and Pennsylvania on a commission appointed to treat with Indian tribes; from 1784 to 1789 served on the Board of Treasury of the confederated States. He then retired to his estate at Urbana, Middlesex co., Va., where he died Dec. 12, 1792. See Richard H. Lee, *Life of Arthur Lee, with his Political and Literary Correspondence* (2 vols., Boston, 1829); Parton, *Life and Times of Benjamin Franklin* (vol. ii., 1864).

Lee, Charles: soldier; b. at Dernhall, Cheshire, England, in 1731; was the son of a colonel in the British army. When eleven years old he is said to have entered the service; was in Braddock's expedition as lieutenant of the Forty-fourth Regiment of British regulars, and was wounded at Ticonderoga in 1758; distinguished himself in Portugal, but never rose higher in the British service than a half-pay lieutenant-colonel, his meddlesome disposition, quarrelsome temper, and sarcastic speeches about his superiors interfering with his promotion. He became later a soldier of fortune; aide-de-camp to the King of Poland and a major-general; entered the Russian service against the Turks, and became notorious as a duelist. In 1773 he went to North America, purchased an estate in Berkeley co., Va., and became an ardent Whig. In 1775 he was chosen major-general of the Continental army; took part in the defense of Charleston; and in 1776 was taken prisoner at Basking-ridge, N. J. It is now considered certain that while in prison Lee made treasonable propositions to the enemy. In 1778 he was exchanged, and at the battle of Monmouth his insubordination nearly lost the day. He was court-martialed, suspended for one year from command, and soon afterward was wounded in a duel by Col. John Laurens, who challenged him because of disrespectful language used to Washington. He retired to Virginia, where he led the life of a hermit, and a disrespectful letter sent by him to Congress caused his dismissal from the service. D. in Philadelphia, Oct. 2, 1782. His *Life* has been written by Sir H. Bunbury, by Edward Langworthy, and by J. Sparks. See also *Treason of Charles Lee*, by G. H. Moore (1858)

Lee, Fitzhugh: See the Appendix.

Lee, Francis Lightfoot: statesman; son of Thomas Ludwell Lee, statesman; b. at Stratford, Westmoreland co., Va., Oct. 14, 1734; received a careful classical and English education from a private tutor; inherited a large estate; served in the House of Burgesses from 1765 to 1772, and four terms as delegate in the Continental Congress from 1775 to 1779; was a signer of the Declaration of Independence; member of important committees, and frequently chairman of the committee of the whole. He rendered important services in framing the old Articles of Confederation, insisting, as conditions of peace with England, upon the right to the navigation of the Mississippi, and to the Newfoundland fisheries, thereby justly earning the gratitude of New England. He seldom spoke in Congress, but exercised great influence, and was a consistent friend and supporter of Washington in the most critical times. Retiring from Congress in 1779, he resumed the life of a country gentleman, distinguished for geniality and wit, but averse to politics, in which he did not again figure except by a brief service in the Virginian Senate. D. at Richmond, Va., Apr. 3, 1797.

Lee, Frederick George, D. D., D. C. L., F. S. A.: clergyman and author; b. at Thane Vicarage, Oxfordshire, England, Jan. 6, 1832; graduated at Oxford with high honors in 1854; was ordained deacon in 1854, and priest in 1856; became successively curate of Sunningwell, assistant minister of Berkeley chapel, incumbent of St. Mary's, Aberdeen, and vicar of All Saints', Lambeth. His honorary degree of D. D. is from Washington and Lee University, Virginia (1879); his D. C. L. from Oxford (1864). Dr. Lee was from 1857 to 1869 a secretary of the Association for the Promotion of the Union of Christendom, founded *The Union Review* in 1863 and conducted it until 1869, and has been a frequent contributor to *The Church Magazine*; has written several volumes of poems and many theological essays, of which *Glimpses of the Supernatural* and *Lyrics of Light and Life*, both published in 1874, attained considerable popularity. Dr. Lee is one of the originators and officers of the

Order of Corporate Reunions established in 1877 and is supposed to have received episcopal consecration under the anspices of this organization. His most important works are *The Validity of the Holy Orders of the Church of England Maintained and Vindicated* (1870); *The Christian Doctrine of Prayer for the Departed* (1874; 2d ed. 1875); *Historical Sketches of the Reformation* (1878); *The Church under Queen Elizabeth* (2 vols., 1880); *King Edward VI., Supreme Head* (1886); *Reginald Pole* (1887). Dr. Lee's *Glimpses of the Supernatural* (2 vols., 1875) and *More Glimpses of the Unseen* (1878) are deeply interesting.

Revised by W. S. Perry.

Lee, Harriet: author; b. in London, England, in 1756; published in 1786 a novel in five volumes, *The Errors of Innocence*, and in 1787 a drama, *The New Peerage*; followed at later dates by two other dramas and another novel. She is best known as associated with her sister Sophia in the authorship of the *Canterbury Tales* (5 vols., 1797–1805), once extremely popular, and reprinted in New York in 1857. Eight of the ten tales were from her pen, the most remarkable being *The German's Tale*; and *Kruitzner*, which supplied Byron with the plot, the machinery, and some of the language of *Werner*. D. at Clifton, Aug. 1, 1851.

Lee, Henry: soldier; the father of Robert E. Lee, soldier, and a distant relation of Richard H. Lee, statesman; b. in Westmoreland co., Va., Jan. 29, 1756; graduated at Princeton in 1773; in 1775, at the beginning of the Revolutionary war, was appointed captain of a company of Virginia cavalry, and served afterward both in the North and South in command (as major and afterward as lieutenant-colonel) of a partisan corps known as Lee's Legion, while Lee himself was familiarly known as Light-horse Harry. He became renowned for boldness, activity, and efficiency, and in the opinion of Gen. Greene did more than any other man to accomplish the defeat of the British in the Southern States. He returned from the army soon after the battle of Eutaw, in which he distinguished himself greatly. He was in Congress in 1786; was a member of the Virginia convention of 1788 that ratified the Federal Constitution; was Governor of Virginia 1792–95; commander-in-chief of the expedition against the whisky insurgents 1794; and again a member of Congress in 1799. In his celebrated eulogy on Washington, prepared by direction of Congress, occur the words, "First in war, first in peace, and first in the hearts of his countrymen." In 1809 he was confined for debt in Spottsylvania co., Va., and wrote his *Memoirs of the War in the Southern Department* (1809). In 1814 he was in Baltimore, the guest of Mr. Alexander C. Hanson, a Federalist, at the time when the house of that gentleman was attacked by a mob. Gen. Lee took part in the defense of the house, and was afterward put into the city jail for safety, but the mob entered the jail, and killed or cruelly maimed the whole party. Gen. Lee never recovered from his injuries. He went for his health to the West Indies, and died on the return journey, on Cumberland island, Ga., where he was the guest of Mrs. Shaw, a daughter of Gen. Greene, Mar. 25, 1818.

Lee, Henry Washington: bishop; b. at Hamden, Conn., July 26, 1815; received deacon's orders in 1838; in 1840 became rector of a church at Springfield, Mass.; in 1848 assumed charge of St. Luke's church at Rochester, N. Y., where he remained till 1854, when he was chosen Bishop of Iowa, which position he held at his death in Davenport, Ia., Sept. 26, 1874. Bishop Lee published several episcopal charges, sermons, and addresses. He compiled a *Manual of Family Prayers*, and wrote several books for the young. He was the founder of Griswold College at Davenport, and by his exertions the episcopate fund of the diocese was endowed and the cathedral and bishop's house erected.

Revised by W. S. Perry.

Lee, Luther, D. D.: b. at Schoharie, N. Y., Nov. 30, 1800; joined the Genesee conference of the Methodist Episcopal Church in 1827; lectured in favor of temperance and the abolition of slavery, being mobbed several times; became agent of the Massachusetts Anti-Slavery Society in 1839; seceded on account of slavery from the Methodist Episcopal Church in 1842; joined the new body of Wesleyan Methodists; became pastor in Syracuse 1843; was president of the first Wesleyan Methodist general conference in 1844, and editor in New York of *The True Wesleyan*. In 1856 he was chosen president of Michigan Union College at Leoni, Mich.; resigned and spent several years in Ohio; became in 1864 professor at Adrian College, Mich.; returned to the Detroit conference of the Methodist Episcopal Church in 1867, of which he remained a member until his death at Flint, Mich., Dec. 13, 1889. He wrote *Universalism Examined* (New York, 1836); *Systematic Theology*; *Immortality of the Soul* (1846); *Slavery Examined in the Light of the Scriptures* (1855), etc.

Revised by J. F. Hurst.

Lee, Richard Henry: signer of the Declaration of Independence; son of Thomas Lee, colonial Governor of Virginia; b. at Stratford, the family-seat of the Lees, in Westmoreland co., Va., Jan. 20, 1732. He was educated in England, and after his return marched with a company to join Braddock, who rejected his services with an ill-judged expression of contempt for the provincials. He was early chosen to the House of Burgesses, where he at once took a commanding position on the side of popular rights. He was in Congress 1774–79, 1784–85, and 1787. He was the author of the famous motion of June 7, 1776, "That these United Colonies are, and of right ought to be, free and independent States," etc., and advocated the Declaration of Independence in a bold and brilliant speech. During 1780 he was for a portion of the time in the field at the head of the militia of Westmoreland County. He was a Senator from Virginia 1789–92, and, though not a Federalist, supported the administration of Washington with zeal. D. at Chantilly, Va., June 19, 1794. He was a man of amiable and noble character, of commanding presence, excellent abilities, and self-sacrificing patriotism. See his *Life and Correspondence* (1825), by R. H. Lee, his great-grandson.

Lee, Robert, D. D.: preacher and author; b. at Tweedmouth, North Durham, England, Nov. 11, 1804; entered the University of St. Andrews in 1824; was ordained in the Church of Scotland in 1832; was minister at Arbroath (1833) and at Campsie (1836), and in 1843, on the disruption of the Scottish Church, was appointed by the town council of Edinburgh to the pastorate of the Old Grey Friars' church. In 1844 he published a translation, with a preface, of *The Theses of Erastus touching Excommunication*, as a reply to the writers of the Secession Church, who charged the adherents of the establishment with Erastianism. In 1847 he became Regius Professor of Biblical Criticism in the University of Edinburgh, and in 1854 published the great work of his life, *The Holy Bible, with about 60,000 Marginal References and Various Readings, revised and improved.* In 1857 he published a volume of *Prayers for Public Worship*, and in 1864 *The Reform of the Church of Scotland in Worship, Government, and Doctrine*, in which he discussed liturgy, postures in worship, instrumental music, and the propriety of observing certain festivals and fasts, with a tendency toward bringing the Church of Scotland into greater harmony with the age. The General Assembly of 1863–64 reported favorably upon these views, and on Apr. 22, 1864, an organ was first opened in his church of Grey Friars—an event which marked an era in the national Church. The action of 1864 was, however, reversed by the General Assembly of 1865, and Dr. Lee was preparing to contest his favorite views before the civil courts when he was attacked with paralysis, and died at Torquay, Mar. 14, 1868. Dr. Lee was the acknowledged leader of the liberal party in the Scottish Church. See his *Life and Remains*, by Rev. R. H. Story (2 vols., London, 1870).

Lee, Robert Edward: general; son of Gen. Henry Lee, of the Revolutionary army (Light-horse Harry); b. at Stratford House, Westmoreland co., Va., Jan. 19, 1807; graduated from the U. S. Military Academy at West Point 1829; entered the U. S. army as lieutenant of engineers; was employed in the most important duties of his corps, in the improvement of harbors and navigation; was promoted captain of engineers in 1838; was in the Mexican war as first chief engineer on the staff of Gen. Scott; won high distinction, and was regarded at the close of that war as the one officer best fitted to succeed Scott as commander-in-chief. From Sept., 1852, to Mar., 1855, he was superintendent at West Point Military Academy; was promoted lieutenant-colonel of cavalry 1855; had command of the department of Texas during 1860; and was promoted colonel in 1861. He is said to have been offered the command of the Federal army. He resigned Apr. 25, when Virginia seceded from the Union, and became by acclamation commander of its forces, with the rank of major-general. His letters at the time show that while he regretted secession, his sincere belief in the rights and authority of his State drew him to her side when war was threatened. Entering upon the duties of his new position in Apr., 1861, he organized the forces of Virginia, and directed the occupation of

the important strategic position of Manassas Junction. Meanwhile, Virginia having joined the Confederacy, Richmond became the capital, and Lee was made third in rank of the five generals appointed under the act of the Confederate Congress. He remained in Richmond as military adviser to President Davis until the autumn, when he was assigned to the command of the forces confronting the Federal armies in Western Virginia. In this campaign, with the great difficulties to be encountered in the impassability of the mountain roads, and in the want of harmony among his subordinate commanders, it was impossible to accomplish much. At its close he was sent to Charleston, S. C., to perfect the defenses of the city and establish a line of defense of the coast. This work he accomplished with great wisdom and skill. He was next called to Richmond by President Davis, and invested with the office of commander-in-chief. Gen. Joseph E. Johnston having been severely wounded at the battle of Seven Pines (or Fair Oaks), near Richmond, on May 31, 1862, Lee was appointed to succeed him in the command of the Army of Northern Virginia. He drew his troops back nearer to the city, and stood quietly upon the defensive while gathering all possible re-enforcements from the southward. By June 25, 1862, he had drawn to him some 25,000 men, including Jackson's forces from the valley. On the next day, Lee leaving Magruder on the south side with some 25,000 men, crossed the Chickahominy, and began his attack on McClellan's right, forced Fitz John Porter's corps to retreat from Beaver Dam, and defeated him at Cold Harbor (Gaines's Mill) on 27th, with heavy loss. McClellan retreated to Harrison's Landing on the James river, having been again severely defeated at Frazier's farm, but having repulsed the Confederate assaults at Malvern Hill with the aid of the Federal gunboats. Lee at once detached Jackson to meet the Federal army under Gen. Pope, which threatened an advance on Richmond from the north side. Jackson defeated a portion of Pope's forces in the battle of Cedar Mountain, near Culpeper Court-house. Ten days later Lee moved with his main army to attack Pope—a movement of signal audacity in execution, which ended in the complete discomfiture of the Federal army in the notable battles of Manassas on Aug. 28, 29, and 30, 1862. He crossed the Potomac and advanced to Frederick City, Md., and by a detached operation under Jackson captured Harper's Ferry, with numerous prisoners and many guns. However, a copy of Lee's orders in detail, sent to his generals of corps and divisions, giving the points for the detached operation and of reconcentration of his divisions, was found by the Federals near Frederick City. McClellan, having thus full information as to Lee's plans, moved forward with a rapidity most unusual for him, and gained possession of the Boonesboro Gap, which was held by a Confederate division. In the battle of Sharpsburg, or Antietam, on Sept. 17, Lee repulsed McClellan's attack, and lay in his front awaiting a renewal of it the next day. On the night of the 18th Lee recrossed the Potomac, McClellan slowly following. McClellan was removed from his command Nov. 7. His successor, Gen. Burnside, made Acquia Creek his base, and on the 17th took position on the N. of the Rappahannock. Then came the bloody battle of Fredericksburg, in which Burnside attacked and was defeated, with great loss to the Federals and small loss to Lee's army. On May 2, 1863, Hooker, who had succeeded Burnside, moved across the Rappahannock above Fredericksburg. At Chancellorsville Lee gained another signal victory. In this battle Gen. Stonewall Jackson was killed. Lee made a movement northward to forage upon the foe, and if opportunity offered to give another crushing defeat to the Federal army, having but little doubt that such would secure recognition of the Confederacy abroad. His plan was submitted to President Davis and approved by him. He threw a corps forward and defeated Milroy at Winchester, moved rapidly north, crossing the Potomac at different points, and moved on to Chambersburg, Pa. The unforeseen delay of Gen. Stuart's arrival with the cavalry gave him serious trouble, but, ascertaining from a scout the movement of the Federal army, now under Meade, he pushed on to Gettysburg with Ewell's and Hill's corps in front, and engaged the Federal forces which had come up.

Lee defeated Reynolds's corps heavily on the first day; also on the second in Longstreet's attack on the Federal left. The third day he ordered an assault by Pickett's and Pettigrew's divisions, supported by other divisions. These divisions were not supported as planned by Lee, and failed in the assault, and he retreated quietly to the Potomac near Williamsport, with 6,000 prisoners.

Summing up, it may be said that the Gettysburg campaign was executed by Lee with a masterly knowledge of the theater of operations, unsurpassed celerity and secrecy of movement, with all possible care of his communications, and though it failed he withdrew and recrossed the Potomac with consummate method and skill.

With the exception of Meade's fruitless advance in Dec., 1863, no attempt was made to attack Lee's army resting on the Rapidan for ten months. In the spring of 1864 Gen. Grant, with 140,000 men, who had wintered N. of that stream, moved across it, and was attacked by Lee in a wooded region called the Wilderness. Lee's infantry numbered 55,000, yet he took the initiative in attack, and defeated the Federal forces, inflicting heavy loss. Foiled in the Wilderness, Grant moved on the right flank of the Confederate army, only to find Lee on his front at Spottsylvania Court-house, where after several bloody battles he learned that Lee's position was impregnable. In the aggregate, in the third week, his losses were more than 40,000 men. Making another flank movement, he found Lee in his front again at the North Anna, May 21. Re-enforced by Smith's corps, and moving to turn the Confederate right, Grant met his foe at Cold Harbor, the scene of McClellan's defeat in 1862. June 3 he attacked the Confederate lines, and was repulsed with great loss. Lee's cavalry also did brilliant service in this campaign.

After Grant's defeat Lee detached Early to meet and defeat Grant's second column under Hunter at Lynchburg—a work which he accomplished, and was soon on his march across the Potomac to threaten Washington.

Lee pushed on to Petersburg, and on June 18 repulsed Grant's forces, which Beauregard was holding at bay against heavy odds.

On that day a new campaign of 300 days' siege was opened. During this period were fought the battles of Jerusalem Plank Road, Burgess's Mill, Reams's Station, Sappony Church, Dinwiddie Court-house, the Crater, and others. Lee's lines of 40 miles long were held by less than 40,000 men. They were broken on Apr. 1, 1865. After a serious disaster to the forces under Pickett on his right at Five Forks, Lee withdrew from Petersburg in the direction of Lynchburg, but missing his supplies *en route*, after several bloody encounters, his infantry having dwindled to some 8,000 muskets, he surrendered at Appomattox Court-house Apr. 9, 1865, He advised his men to accept the situation, to go home, and to be good citizens.

A short time after the war Lee accepted the presidency of Washington College at Lexington, Va., and died there Oct. 12, 1870, aged sixty-three. A beautiful mausoleum has been erected over his tomb in Lexington, and there is a splendid bronze equestrian statue of him in Richmond, Va.

CHARLES S. VENABLE.

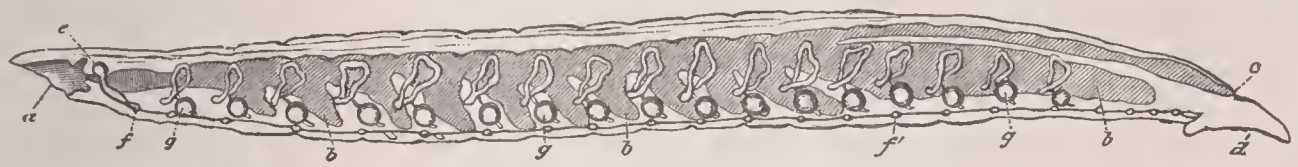
Lee, SAMUEL, D. D.: Hebrew scholar; b. at Longnor, Shropshire, England, May 14, 1783; received his first instruction at a charity school, and was at the age of twelve apprenticed to a carpenter. While laboring at this trade he acquired the chief classical, Oriental, and modern languages, and at the age of thirty was enabled to enter Queen's College, Cambridge, as a student, graduating in due course, taking orders in the Church, becoming in 1819 University Professor of Arabic, and Regius Professor of Hebrew in 1831. He published a *Hebrew Grammar*, which had a wide circulation (1830); translations of the *Travels of Ibn Batuta* (1833); and of the *Book of Job* (1837); and a *Hebrew and English Lexicon* (1840). D. Dec. 16, 1852.

Lee, SAMUEL PHILLIPS: See the Appendix.

Lee, THOMAS LUDWELL: colonial Governor of Virginia; b. in Stafford, Va., about 1730; was third son of Richard Lee, a member of the council and grandson of Richard Lee, the founder of the family in America, who as a cavalier played a distinguished part in Virginia along with Berkeley in securing the allegiance of that colony to the Stuarts. Thomas Lee succeeded to the ancestral estate at Stratford, Westmoreland County, on the Northern Neck; became president of the council; and his commission as governor had just been made out when he died in 1759. He had married Hannah, daughter of Col. Philip Ludwell, a member of the council, and by her had six sons, all of whom were distinguished for their public services during the Revolution: Philip Ludwell, a member of the council; Thomas Ludwell, b. about 1730, member of the House of Burgesses, of the conventions of 1775 and 1776, of the committee of safety, and one of the judges of the Supreme Court, died soon after,

aged forty-seven; Richard Henry, Francis Lightfoot, and Arthur (*qq. v.*); and William, the fifth son, b. at Stratford, Va., in 1737; was agent of Virginia in England; elected sheriff of London in 1773 and alderman in 1775. When the Revolutionary war broke out he retired to France; was appointed by Congress commercial agent at Nantes in 1777, and was afterward diplomatic agent of the U. S. at The Hague, Vienna, and Berlin, but was recalled in 1779. D. at Greenspring, Va., June 27, 1795.

Leech [M. Eng. *leche*, physician < O. Eng. *lǣce*: O. H. Germ. *lāhhi*: Goth. *lēkeis*; cf. O. Eng. *lācnian*, heal: Goth. *lēkinōn*]: any one of the members of the order *Hirudinei*. Leeches have an elongate flattened body (nearly cylindrical in a few), terminated at either end by a sucking disk. The body is ringed externally, but except at the anterior and posterior ends these annulations are more numerous than the internal segments. The mouth is in the center of the anterior sucker, and in the jawed leeches (*Gnathobdellidæ*) it is surrounded by three radiating jaws, each of which is double, the halves each resembling a segment of a circular saw. By means of these the leech makes the incisions through the skin which were so familiar in the days when blood-letting was regarded as a panacea for every ill. The alimentary canal is sacculated, the sacs corresponding to the segments of the body, and the vent is placed above the posterior sucker. Paired excretory organs occur in each segment, alternating with the digestive pouches, but the body cavity (cœlom) is greatly reduced. The nervous system is much like that of the Annelids. Two kinds of sense organs occur; eyes varying in number, upon the anterior segments, and corresponding to these other organs, possibly for taste or smell, upon the rest of the body. The sexes are united in the same individual. The order *Hirudinei* is subdivided into *Gnathobdellidæ* and *Rhynchobdellidæ*, accordingly as jaws are present or absent.



Section of medicinal leech: *a*, mouth; *b*, pouches of alimentary canal; *c*, vent; *d*, posterior sucker; *e*, brain; *f*, ventral nerve cord; *g*, excrementary organs (after Leuckart).

Leeches are parasites, living upon blood or upon the mucus which covers the surface of fishes or other aquatic animals. In France they were for a long time bred in ponds to supply the market. The medicinal leeches (*Hirudo officinalis, H. medicinalis*) will draw five or six times their weight of blood, and when gorged can only be used again by removing the blood by the use of salt or by pressure. A few leeches live in the sea; most are inhabitants of fresh water, and a few live on the land. These land-leeches form an intolerable pest in the warmer regions of Asia, and their habits have been described in a graphic manner by Tennent and Haeckel. They are active and alert, ready to fasten themselves to any man or beast which may pass through the damp forests where they abound.

The *Hirudinei* have formed the basis of many investigations, and the reader is referred to Leuckart's *Human Parasites*, Moquin-Tandon's *Monographie des Hirudinées*, and the papers by Prof. C. O. Whitman upon their structure and development. Despite several descriptive papers, the American species are scarcely known. The *Hirudinei* (Lat. *Hirudo*, a leech) are often called *Discophori*, in allusion to their sucking disks; *Sanguisugaria*, on account of their blood-sucking habits; or *Bdellodea* (Gr. Βδέλλα, a leech).

J. S. Kingsley.

Leech, John: illustrator and draughtsman; b. in London, Aug. 29, 1817. He studied medicine, but had to support himself from the age of eighteen or nineteen, and began to do so by lithographic drawings, illustrating *Bell's Life in London*, and in 1837 Theodore Hook's story *Jack Brag*. In 1840 he began to publish full-page etchings in *Bentley's Miscellany*, and this he continued for several years, illustrating Barham's *Ingoldsby Legends*, Albert Smith's *Adventures of Mr. Ledbury*, etc. These were as good etchings as he ever published, though afterward he illustrated Douglas Jerrold's *Shilling Magazine* with the serials *St. Giles and St. James* and the *Story of a Feather*, and later still many etchings appeared in *Punch's Pocket-book* and Surtees's various sporting novels. He worked for *Punch* for twenty years, and laid down his pencil for the last time beside a drawing which came out in *Punch* on Nov. 5, 1864. He illustrated with wood-cuts also some volumes of *Hood's Comic Annual*, Dickens's *Christmas Carol* and in part *The Chimes*, *The Cricket on the Hearth*, and *The Haunted Man*; Gilbert A'Beckct's *Comic History of England* (in which were also some etchings), Pennell's *Puck upon Pegasus*, and especially the periodical *Once a Week*, begun in 1859. He published also several series of designs in lithography, of which the best is *The Children of the Mobility* (1841), an admirable set of studies of the poor little children of London. Leech's power is not in caricature, nor in very laughable design, except in a few cases, such as the pictures of *Divorce a Vinculo* in *Once a Week*. It is rather as a shrewd and yet very kindly and optimistic observer that he appears in his studies from English life. He has far less tragic power and a far more limited scope than Cruikshank, nor was he so great an artist in black and white as Charles Keene. His merit is peculiarly that of the close student of human nature, preferring its more kindly and pleasant sides, but capable of indignation and contempt, as in his *Fox-hunters of the Old School* in *The Illustrated London News* (1856), and in the *Bull Fight . . . with a little of the Tinsel Off*, in *Punch*, about 1860 or 1861. He enjoyed landscape, and many of his designs show a remarkable faculty for landscape art. D. in London, Oct. 29, 1864. See the paper by his intimate friend Thackeray in *The Quarterly Review*, Dec., 1854; Dr. John Brown's *John Leech* (1882); Everitt's *English Caricaturists* (1886); and the *Life*, by Frith (2 vols., 1891).

Russell Sturgis.

Leechburg: borough (incorporated in 1851); Armstrong co., Pa. (for location of county, see map of Pennsylvania, ref. 4–B); on the Kiskimmetas river, and the Penn. Railroad; 35 miles N. E. of Pittsburg. It is in a coal and natural-gas region, and has 2 rolling-mills, 2 flour-mills, foundry and machine-shop, tin-factory, and carriage and wagon factory, all using natural-gas fuel obtained from a well 1,200 feet deep. There are 9 churches, school building that cost $20,000, 3 weekly newspapers, and 9 coal mines. Pop. (1880) 1,123; (1890) 1,921; (1900) 2,459.

Editor of "Advance."

Leech Lake: a body of water in the northern part of Cass co., Minn. It is about 20 miles long, 16 miles wide, and discharges its waters into the Mississippi by the Leech Lake river. Elevation, 1,330 feet. It is situated in a well-timbered region which is inhabited by the Leech Lake Indians, a band of Chippewas.

Leeds: town in the West Riding of Yorkshire, England; the chief seat of the woolen trade of the United Kingdom; on both banks of the river Aire; 185 miles N. of London, and 55½ miles W. of Hull (see map of England, ref. 6–H). It is a parliamentary and municipal borough, and a county in itself, and is, as regards population and industry, the principal town in Yorkshire. It is the assize town for the West Riding division of the Northeastern circuit.

Area and General Plan.—The area of the administrative county of Leeds is 21,572 acres. For municipal purposes it is divided into sixteen wards, and for parliamentary into five divisions, each of which returns one member to the House of Commons. The river Aire is crossed by six bridges. The older parts of the town lie S. of the Aire, and include the populous manufacturing suburbs of Hunslet and Holbeck, the principal public buildings, shops, and residences of the well-to-do being on the north side of the river. Among the public recreation-grounds is Woodhouse Moor, an open space to the N. W., and Roundhay Park, one of the most picturesque public parks in England.

Public Buildings and Institutions.—The general architecture of the newer parts of the town is unpretending, and of the older parts mean; but the modern warehouses and banks are often handsome, and there are several fine public buildings. The chief of these is the town-hall, in the Roman Corinthian style, forming a rectangle 2,500 feet in length and 200 feet in breadth. The municipal buildings form an imposing pile in the Palladian style. The Royal Exchange is in the Perpendicular Gothic style. The Corn Exchange was erected by the corporation at a cost of about £60,000. The Municipal Art Gallery and Museum, with free public li-

brary, have for their façade that of the municipal buildings. The free public library contains about 40,000 volumes. The central library has connected with it eighteen branch libraries, as well as nineteen others for juvenile readers. The Coliseum covers an area of more than 14,000 sq. feet, and includes a large hall for concerts and public meetings. The Grand theater and opera-house will seat 2,600 persons. The General Infirmary, established in 1767, is in Great George Street. It was erected at a cost of more than £100,000. The general arrangement is on the pavilion principle, each ward forming a separate and isolated building. It is one of the finest and most complete structures of the kind in Europe. The institution is supported by voluntary contributions. It can accommodate more than 400 in-patients, besides ministering to many out-patients. The medical school is near the infirmary, with which it is intimately associated. The Borough Fever Hospital, Burmantofts, for the isolation and treatment of infectious diseases arising within the borough, has twenty-two wards, calculated to hold 100 patients. Her Majesty's prison, formerly the Borough Gaol, is in Armley, on the south side of the Aire. The chief educational institution is the Yorkshire College, constituted in 1874, and occupying handsome buildings erected in 1885. The specialty of the institution is science, and technical training above all. During the session of 1891–92 there were 1,050 students, of whom about 600 were day students. The title of associate is conferred for proficiency, and the college is affiliated to Victoria University, Manchester. The Grammar School, founded in 1552, and now situated on the south side of Woodhouse Moor, includes a science department, and educates 200 boys. The school board controls fifty-six board schools, which have an average attendance of about 40,000. The Philosophical and Literary Society has a lecture hall, a library of over 16,000 volumes, and two museums. The Mechanics' Institution has a lecture hall, science school, a boys' school, a reading-room, and a library of 20,000 volumes.

Churches and Chapels.—The parish church, St. Peter's, probably the fifth erected on the same site, was completely rebuilt in 1839–41. St. John's church was built by a rich merchant in 1634. In 1870 it was completely restored. Nonconformity is strong in Leeds, especially Methodism, and several of the Nonconformists' places of worship have considerable architectural pretensions. At Kirkstall, 3¼ miles from Leeds, are the remains of the Cistercian Abbey of St. Mary (1152), which since 1889 have been the property of the corporation of Leeds.

Government and Administration.—The borough, which in 1891 had a ratable value of £1,297,408, is divided into sixteen municipal wards, and governed by a town council—a mayor, sixteen aldermen, and forty-eight councilors. The gas-works, the water-works, and the cattle, produce, and other chief markets are the property of the corporation.

Manufactures and Industries.—Leeds still continues to be, as of old, the chief center of the woolen-manufacture, though certain branches of this are more productive in other Yorkshire towns. The staple woolen industry is cloth of every description. Tweed cloths, woven by power now form a large part of its manufacture. Felt carpeting and druggets are a most important item of the woolen industry. In 1891 the woolen-cloth manufacture employed 12,304 persons, and dyeing and printing 1,028. The stuff trade has mainly migrated to Bradford, for which town, however, Leeds does much in dyeing and finishing, while in 1891 there were still 2,600 persons employed there in the manufacture of worsted stuffs. A decrease in the industry of Leeds has been in the manufacture of flax into yarn. The vicinity of coal and iron mines—in the borough alone 2,520 persons were registered in 1891 as employed in coal mines—has contributed to the greatness of its manufacture of iron, which in that year in engine and machine making alone employed 9,033 persons. The Airedale foundry turns out locomotives, engines, and boilers, and covers 4 acres of ground. The Wellington foundry manufactures mill-machinery of all kinds, and the Fowler works makes steam-plows. There are several extensive forges where the best iron is manufactured, and brass-founding is a considerable industry. In 1891 the tanneries employed 13,204 persons, the production of boots and shoes 7,662 more, the production of clothing 15,689 persons. Leeds is the chief seat of the cap trade. There is an extensive tobacco-manufacture, and the chemical works turn out a great variety of products. A field of fine clay at Burmantofts has caused the establishment of terra-cotta and faïence works; coal for baking the clay is on the spot. Leeds has railway communication with all parts of England, Wales, and Scotland, while by the Leeds and Liverpool Canal on the one side and the Aire and Calder Navigation on the other there is easy access by water to Liverpool and Hull.

History.—The etymology of the name Leeds is uncertain. Bede, who first mentioned it, calls it Loidio-en-Elmeto. The town received a charter from Edward I., and then began to thrive. During the civil war of the seventeenth century it declared for the Parliament, and was garrisoned by the Royalists, whom Fairfax besieged and drove from it. It first sent a member to the House of Commons under the Commonwealth, when the town was already noted for its cloth-trade. It made great progress during the eighteenth century, and during the nineteenth became the fifth city in size in England.

Population.—The population of the borough was, at the census of 1891, 367,506, an increase of 58,387 since 1881; in 1901 it was 428,953. In 1801 the population of the area now covered by the borough was only 53,162. See Baines, *Yorkshire Past and Present* (1871–77); Kelly's *Directory of the West Riding of Yorkshire* (1893); local guide-books, parliamentary papers, etc. F. Espinasse.

Leek: town; in the county of Stafford, England; on the Churnet; 24 miles N. N. E. of Stafford (see map of England, ref. 9–G). It has manufactures of silk and agricultural implements, and many good educational institutions. Its church, dedicated to St. Edward the Confessor, dates from the latter part of the twelfth century, but has undergone much remodeling. In the neighborhood are the ruins of the Cistercian monastery De la Croix (*Dieulacres*), built by Ranulf de Blondeville in 1241. Pop. (1891) 14,128.

Leer, lār: town in the province of Hanover, Prussia, on the Leda; 32 miles N. W. of Oldenburg (see map of German Empire, ref. 3–D); has manufactures, and is important for ship-building and commerce. Pop. (1890) 11,075.

Leesburg: town; capital of Loudoun co., Va. (for location of county, see map of Virginia, ref. 4–H); on the Rich. and Danville Railroad; 2 miles W. of the Potomac, 38 miles N. W. of Washington. It is in an agricultural region, has an abundant supply of water, and contains a school for girls, a graded public school, electric-light plant, steam saw and planing mill, and two weekly newspapers. Near the town is the battle-field of Ball's Bluff. Pop. (1880) 1,726; (1890) 1,650; (1900) 1,513. Editor of "Washingtonian."

Leeser, lā'zer, Isaac: Hebrew scholar; b. in Neukirch, Westphalia, Dec. 12, 1806; removed to Richmond, Va., in 1824; was at first engaged in commerce, but in 1829 became rabbi of the principal synagogue in Philadelphia, and wrote several works relating to Jewish history and doctrine, among which are *The Jews and the Mosaic Law* (Philadelphia, 1833); *Discourses, Argumentative and Devotional, on the Subject of the Jewish Religion* (1836); *Portuguese Form of Prayers* (1837); *Descriptive Geography of Palestine*, from the Hebrew of Rabbi Joseph Schwartz (1850), and a *Translation of the Holy Scriptures from the Original Hebrew* (1845–53). In 1843 he established a monthly magazine, *The Occident and American Jewish Advocate*; retired from the ministry in 1850. D. in Philadelphia, Feb. 1, 1868.

Leet Court: See the Appendix.

Leeto'nia: village (incorporated in 1865); Columbiana co., O. (for location of county, see map of Ohio, ref. 3–J); on the Erie and the Penn. railways; 65 miles N. W. of Pittsburg. It is in an agricultural and coal-mining region, has 4 blast furnaces, rolling and planing mills, extensive coal mines, coke-ovens, boiler-works, foundry, and lumber-yards, and contains 5 churches, graded public school, and a weekly newspaper. Pop. (1880) 2,552; (1890) 2,826; (1900) 2,744.
Editor of "Reporter."

Leeu'warden: town; in the province of Friesland, Netherlands (see map of Holland and Belgium, ref. 2–G). It is 10 miles from the sea, but in the fourteenth century it lay on the shore of a deep inlet, which by degrees has been filled with banks of sand and mud and become solid ground. It has, however, easy communication by rail and by canal with the surrounding country and with Amsterdam. The canal to Harlingen, built in 1507, even opens up a channel for trade with the United Kingdom. The city is intersected by canals, and is neatly built, with many elegant houses. The beautiful town-hall contains a valuable library rich in MSS., and a gallery of paintings. Its trade in cattle, swine, butter, flax, and spirits, and its manufactures of linen and paper, are considerable. Pop. (1890) 30,433.

Leeuwenhoeck, lü'wen-hook, Antonius, von: microscopist; b. at Delft, Netherlands, Oct. 24, 1632; went in his sixteenth year to Amsterdam, and entered a merchant's office, but returned after the lapse of a few years to his native city, and devoted himself exclusively to the study of natural science. He manufactured optical instruments, especially microscopes, and these he applied with the most brilliant success to his researches in physiology. His principal discoveries were that of the red globules of the blood in 1673, that of the infusorial animalcules in 1675, that of the spermatozoa in 1677, and that of the capillary circulation of the blood in 1690. The last discovery filled a gap in the theory of Harvey by showing that the blood passes from the arteries into the veins through a network of extremely minute vessels, the thin walls of which allow the fluid to transude into the tissues it traverses, and thus to furnish them with the necessary nutrition. Another of his great discoveries was that of the *Rotifers*. He was the first to recognize their peculiar power of resuscitation, even from a state of being completely dried up, whenever the water necessary to the maintenance of their vitality was furnished to them. By these discoveries he attracted general attention, and established connections with all learned men and learned societies of his age, such as Leibnitz, the Royal Society of London, and others. His writings were published partly in book-form at Leyden, partly as communications to scientific journals, *Acta Erudita*, *Philosophical Transactions*, etc., and collected in 1724 in 4 vols. under the title *Opera omnia, sive arcana naturæ ope exactissimorum microscopiorum detecta*. D. at Delft, Aug. 26, 1723.

Leeward Islands: a colony of Great Britain; in the West Indies, N. of the Windward islands colony. The colony was created in 1871, and embraces the islands of Antigua, St. Kitts, Dominica, Montserrat, and the British portion of the Virgin islands, with their dependencies (Barbuda, Redonda, Nevis, Anguilla, etc.; see under these names). The entire area is 701 sq. miles. Pop. (1891) 127,723. Antigua is the seat of the central government and the residence of the governor-general. There are five presidencies, corresponding to the principal islands. The legislative council (of ten elected members and ten nominated by the crown) meets once a year. See Leeward Islands in the Appendix.

Lefébure-Wély, *le-fā'bür'vā'lee'*, Louis Jacques Alfred: organist and composer; b. in Paris, Nov. 13, 1817, and entirely educated there. He was one of the greatest organ-players of the French school. Held several positions as organist, but is best remembered as organist of St. Sulpice, 1863 to 1869. He was a member of the Legion of Honor, and a Knight of the Order of Charles III. of Spain. His compositions include an opera, a cantata, three masses, three symphonies for orchestra, upward of 200 pieces for the pianoforte, and numerous organ pieces in all styles. D. Jan. 1, 1870. D. E. Hervey.

Lefebvre, *le-fāvr'*, François Joseph: Duke of Dantzic, marshal of France; b. at Ruffach, Alsace, Oct. 25, 1755; enlisted in the French guard Sept. 10, 1773, and distinguished himself by courage and valor on several occasions during the Revolution. In 1792 he was made captain of the Thirteenth Infantry regiment, and his talents now developed very rapidly; in 1794 he was made a brigadier-general. Having been appointed commander of the Seventeenth Military division, to which Paris belonged, he supported Napoleon on Nov. 9, 1799, and was made a marshal of France at the establishment of the empire. In the war against Prussia he also distinguished himself, especially by the siege and capture of Dantzic (May 26, 1807), whence he derived his title of duke. His most brilliant exploit was his campaign in Spain in 1808. He took Bilbao, and defeated the British under Blake on Nov. 7. In 1814 he commanded the left wing of the army opposing the invasion of the allies, but after the abdication of Napoleon he submitted to the Bourbons, and was made a peer of France by Louis XVIII. June 4, 1814. D. in Paris, Sept. 14, 1820.

Lefebvre, Jules Joseph: figure and portrait painter; b. at Tournan, France, Mar. 14, 1834; became a pupil of Léon Cogniet; was awarded the Grand Prix de Rome in 1861; medals, Salons 1865, 1868, and 1870; first-class medal at the Paris Exposition 1878; medals of honor, Salon 1878 and Paris Exposition 1889; became officer of the Legion of Honor in 1878. He is one of the leading artists of the French school, and his work is distinguished by fine drawing and good composition. *Nymph and Bacchus* (1866) and *Truth* (1870) are in the Luxembourg Gallery, Paris. One of his most important compositions is *Diana Surprised* (1879). Studio in Paris. William A. Coffin.

Lefebvre'-Desnouettes', Charles, Count: general; b. in Paris, France, Sept. 14, 1773; served in the French army in Belgium under Dumouriez in 1792; was aide-de-camp to Napoleon at Marengo; distinguished himself at Austerlitz; became brigadier in 1806, and general of division in 1808; began the siege of Saragossa in Spain; was taken prisoner by the British; escaped from England; took a prominent part in the Austrian (1809), Russian (1812), and German (1813) campaigns, and in the defense of France from invasion (1814); was made a peer by Napoleon in 1815; fought at Fleurus and at Waterloo; was condemned to death by the royalists, but escaped to the U. S.; joined with Baron Lallemand in the attempt to found a colony of French refugees in Alabama; was in correspondence with Napoleon for the purpose of effecting his rescue from St. Helena; received 150,000 francs by the will of that monarch, and while returning to Europe was lost at sea near Kinsale, Ireland, Apr. 22, 1822.

Lefèvre, Tannegui (commonly known as Tanaquil Faber, from the Latinized form of his name): classical scholar; b. at Caen, France, in 1615; was educated at the Jesuit College at La Flèche, where he devoted himself especially to philosophy and classical literature. Cardinal Richelieu appointed him inspector of the press of the Louvre. After the death of Richelieu his salary was irregularly paid, and he was obliged to sell his library. Having resigned his position, he retired to Langres, afterward to Preuilly, where he embraced Protestantism; was soon after appointed professor in the Reformed Academy of Saumur. His works were chiefly annotated editions of the classic authors—e. g. of Longinus, Ælian, Lucretius, Horace, Phædrus, Terence, Anacreon, Sappho, and several others. He translated also into Latin iambics the *Fables of Lokman* (Saumur, 1673), and wrote *Vies des Poëtes grecs* and *Méthode pour commencer les Humanités grecques et latins*. D. at Saumur, Sept. 12, 1672. He left one son and two daughters, one of whom was Madame Dacier. His *Life* was written by F. Graverol (Paris, 1686). Revised by S. M. Jackson.

Lefkosi'a [= Mod. Gr. Λευκοσία. The anc. (Lat.) *Leucosia* = Gr. Λευκοσία]: capital of Cyprus, now called Nicosia (*q. v.*).

Lefort', François: soldier and statesman; b. at Geneva in 1656, of Scottish descent; enlisted at an early age in the Swiss guard in the French service; in 1674 entered the service of the Netherlands, and distinguished himself at the siege of Oudenarde, and went in 1675 through Archangel to Moscow, where he first held a position as secretary to the Danish ambassadors, and then became a captain in the Russian army. In 1682 he became acquainted with the czar, Peter the Great, at that time only ten years old. He became his teacher, soon also his friend, and after the revolution of 1689, which made Peter the Great sole ruler of Russia, and in which Lefort had done the czar great service, he was the chief minister. To his influence may be ascribed some of the most important and beneficial measures of Peter's reign. He reorganized the army on the model of the armies of the great powers. He directed the formation of a navy, which with the new army proved its utility at the taking of Azov in 1696. He promoted the religious toleration of foreigners, thus opening Russia to emigrants from more enlightened states, and he encouraged the policy of inducing the Russians to visit other countries in the interest of their own education. D. at Moscow, Mar. 12, 1699. Revised by F. M. Colby.

Lefuel, *le-fü'el'*, Hector Martin: architect; b. at Versailles, France, Nov. 13, 1810. He was a student at the École des Beaux-Arts and received the great prize of Rome, and lived at Rome till 1845. He was architect of the buildings of the national porcelain-factory at Sèvres, of the palace of Meudon, and in charge of the château at Fontainebleau, where he built the theater. On the death of Visconti he was employed upon the new buildings connecting the Louvre with the Tuileries, and he was busy with these from 1854 until their practical completion and until the fall of the empire in 1870, so that the most prominent and admired buildings of that group were his work. He was commander of the Legion of Honor and a member of the Institute. D. Dec. 23, 1880. Russell Sturgis.

Legacy [from Lat. *lega're*, depute, appoint, appoint by will; cf. Legates]: a bequest or gift of personal property

by will or testament, as distinguished from a devise, which is a gift or conveyance by will of real estate.

Legacies, with respect to the manner in which the subject-matter of the gift is designated, are of four kinds—general, specific, demonstrative, and residuary. A *general* legacy is one which does not amount to a bequest of any particular portion of, or article belonging to, the personal estate of the testator, as distinguished from all others of the same kind. A *specific* legacy, on the contrary, is a bequest of specified property, which is particularly designated or described, so as to be definitely distinguished from the rest of the testator's estate. Thus a bequest of a sum of money, the amount of which is named, is a general legacy, while a bequest of all the money in a particular receptacle is specific. A bequest of a horse, of silver plate of a certain named value, or of any article described in this indefinite way, would be a general legacy; but a bequest of the horse in the testator's stable, or of all the plate which should be in a certain house, etc., would be a specific legacy. A general legacy of a chattel, as of a horse, is valid, even though the testator had no property of the sort, and the executor is obliged, if there be sufficient assets, to procure an article of the kind mentioned, to meet the bequest. When a legacy is specific, only the particular property designated is to be given to the legatee, and if the testator owned no such property the legacy fails. General legacies are sometimes termed pecuniary legacies, but the designation is inaccurate, as specific legacies may also be pecuniary, as the examples already given indicate. A *demonstrative* legacy is a bequest of a certain amount of money to be paid out of a particular fund; as, for example, a bequest of $500 payable out of the proceeds of the sale of certain property. This form of legacy is intermediate between a general and a specific legacy, and partakes of the legal characteristics of both. Demonstrative legacies resemble specific legacies by not being subject to abatement with the general bequests, while they are distinguished from them by not being subject to ademption. A *residuary* legacy is a gift or allotment by the will to a designated person of all the personal assets remaining after paying or satisfying all general, specific, and demonstrative legacies.

Abatement and Ademption.—The importance of distinguishing between these various kinds of legacies is principally with reference to the doctrines of abatement and ademption which are applicable to the subject of legacies. *Abatement* is a proportional reduction of the bequests to various legatees when there are not sufficient assets to make full payment. It is the duty of an executor under a will, after discharging all the testator's lawful debts from the personal assets, to apply the residue to the payment or satisfaction first of the specific legacies, then of the demonstrative legacies, and finally of the general legacies, and then to turn over to the residuary legatee any residue that may still remain, or, if no residuary legatee be named, to the next of kin. (See Kin, Next of). If there be insufficient assets so to satisfy the legacies in either of these three classes successively, those in the same class will be reduced proportionally by the law of abatement. The specific legacies are to be paid, even though other legatees are entirely or partly deprived of a share in the assets. Neither specific nor demonstrative legacies will abate with general legacies, unless the testator particularly directs that certain general legacies shall have precedence of those which are specific. In some cases general legacies of a particular character will be preferred to other general legacies. Thus if there be any valuable consideration for the testamentary gift, as where a general legacy is given in consideration of a debt owing to the legatee, or of the relinquishment of her dower by a widow, such legacy will be entitled to a preference of payment over the other general legacies.

Ademption is an extinguishment or destruction of a legacy as a result of the loss of the property bequeathed, or of some change in it so that it does not answer the description of the article specifically bequeathed, or of its non-existence, or of the substitution of some other provision for the person named as legatee which is deemed a satisfaction of the legacy. The first part of this definition applies more appropriately to specific, the latter to general legacies. Thus if the subject-matter of a specific legacy is not owned by the testator at the time of his death, the legacy fails entirely, and the legatee has no claim against the testator's estate. A legacy of this kind is also adeemed when the specific property designated, though it formed a part of the testator's estate at the time of making the will, was subsequently so altered by him in form as to change its identity, as if it were a gold cup, and the testator should have it made into jewelry. So if a debt specially bequeathed be received by the testator, the legacy is adeemed because the subject of it is extinguished. Ademption may also occur as a result of a removal by the testator of the articles bequeathed from one place to another. Thus if the testator should bequeath all his furniture as being situated in a particular house, and afterward remove it to another house, the legacy would fail. This would not be the case, however, if the goods were removed by reason of a sudden emergency, as to save them from fire, or if the removal were effected by fraud or without the knowledge or consent of the testator. An ademption may be partial, as where a portion of the property bequeathed is found among the assets of the deceased, but not the whole. A pledge or mortgage of the property by the testator is generally held not to occasion an ademption. In regard to the rule of ademption, demonstrative legacies differ from those which are specific. If the fund out of which a demonstrative legacy is to be paid is not in existence at the testator's death, the legatee will have a valid claim for satisfaction out of the general fund of assets, and the bequest to him will rank among the general legacies.

The doctrine of ademption is applied in courts of equity to general legacies when a parent or other person *in loco parentis* (i. e. standing in the place of a parent) bequeaths a legacy to a child or grandchild, and afterward in his lifetime gives a portion to or makes a provision for the same child or grandchild, without expressing it to be in lieu of the legacy. If this portion or provision be equal to or exceed the amount of the legacy, be certain and not merely contingent, and be a gift of the same general nature as the legacy, it will be deemed a satisfaction or extinguishment of the legacy. This is on the ground of the presumed intention on the part of the testator to substitute one portion for another which he has already made.

Legacies are distinguished with reference to the acquirement by the legatee of his right of enjoyment into vested and contingent. A legacy is *vested* at the time of the testator's death, when the legatee acquires an absolute present right of present or future enjoyment. It is *contingent* when the right of enjoyment depends upon the happening of some contingency. Thus a legacy given to a man *if* he reaches the age of twenty-one will not vest until he attains that age; but if it be given *to be payable* when he becomes twenty-one, it vests at the testator's death, the right being absolute, though the time of enjoyment is deferred. A conditional legacy is a bequest whose existence depends upon the happening or not happening of some uncertain event by which it is either to take place or be defeated. (See Condition.) A contingent legacy is a form of conditional legacy in which the vesting of the estate is dependent upon a condition precedent. A *cumulative* legacy is one additional to a previous legacy given in the same will. The general rule of construction which is followed in determining whether it was the intent of a testator that a second legacy should be cumulative (so that the legatee is entitled to both) instead of merely a repetition of a previous bequest, so that only a single gift is bequeathed, is that when the testator has not plainly declared a different intention: (*a*) two or more legacies of the same article or the same amount of money given to the same person in the same instrument amount to but a single gift; (*b*) bequests of different articles or of different amounts of money, or of the same amount in different instruments, will be generally considered cumulative legacies. Other distinctions between legacies are not of enough importance, or are too technical in their nature, to be given specific mention.

As a general rule, all classes of persons may be made legatees. In Great Britain and also in many of the U. S. it has been provided by statute that a legacy given to any subscribing witness to a will shall be void. This enactment has been made on account of the danger of permitting a will to be supported by persons who are beneficially interested in its contents. In some cases, however, this rule is modified by the provision that if the witness would have been entitled to a share in the estate in case the will was not established, he shall receive so much of this share as does not exceed the value of the legacy. Alien enemies also, at common law, are incapable of taking legacies. In England bequests to uses declared by statute to be superstitious are void; as, for example, to maintain a chantry priest or to pay for the saying of masses for the testator's soul, etc. For the law governing bequests to "charitable uses" in England, see Uses. In the U. S. the right to make bequests for

charitable uses in general exists, unless controlled by statute. (See Trusts.) In this way legacies may be given to trustees, though not incorporated for charitable uses. Corporations may take property by bequest, so far as is consistent with the general purposes for which they were formed and the provisions of their charters. The right of a corporation to take personal property by bequest must not be confounded with the power to take land by will. (See Will and Corporation.) In regard to capacity to make a will and convey legacies, see Will.

Payment and its Incidents.—(*a*) *When payable.*—At common law, legacies are not payable until the expiration of a year from the time of the testator's death. This period is allowed to the executor to ascertain the nature and value of the property, to collect the assets, to determine the extent of the testator's indebtedness, to satisfy charges against the estate, etc. In the U. S., where the subject is frequently regulated by statute, the same limit is generally adopted. It is a general principle applicable to all legacies that the legatee does not become fully entitled to the bequest, so as to obtain a right of action in a court of law, until the assent of the executor is obtained. He can not, accordingly, take possession of the legacy without such assent, and if he does, may be sued by the executor, who may recover the value of the property. The assent of the executor may be express or it may be implied; as, e. g., where he acquiesces in the taking of the property by the legatee. This rule, however, does not affect the right of a legatee to proceed to recover his legacy before a court of equity or a probate court. (*b*) *When interest runs.*—As a general rule, interest is to be reckoned upon the amount of the legacy, for the benefit of the legatee, from the end of the year when the legacy becomes payable; but where the legacy is given in payment of a debt due, it will bear interest from the death of the testator. So when a bequest is given by a parent to his child by way of maintenance, or by a husband to his wife in lieu of dower, interest will run from the time of death. (*c*) *To whom paid.*—If a legacy be given to an infant, the executor will not be justified, by the rules of common law, in paying it to the infant, or to the father or to any other relative of the infant, without the sanction of a court of equity. If payment should be made without such sanction to the father or relative, the executor might be compelled to pay the legacy again to the infant when he became of age. This subject is now largely regulated by statute, as in England, where it is provided that the executor may in such a case pay the legacy into the Bank of England. A legacy given to a married woman must at common law be paid to the husband, unless it be given for the wife's separate use. This is true, even though the husband and wife are divorced *a mensa et thoro*; but courts of equity may compel a husband, on receiving a legacy given to his wife, to make a suitable provision for her support. Until such support is provided the executor may decline to pay him the legacy. In a number of the U. S. it is provided by statute that married women may take property by bequest in the same way as if they were single. Legacies given to one person in trust for another should regularly be paid to the trustee. When a legacy is bequeathed by a testator to his creditor, it is a general rule in equity that it is to be deemed as given with a view to the satisfaction of the debt, if the bequest be equal to or greater than the amount of the debt. This rule, however, is not favored, and will not be applied except under these special circumstances, and when the legacy is of the same general nature as the debt.

Liability of Paid Legatees in Case of Deficiency of Assets.—If after the legacies are paid by the executors debts are subsequently proved of which the executor had no knowledge, and if there are no assets remaining to discharge them, he may bring a suit in equity to compel the legatees to refund to an amount equal to this indebtedness, if he acted prudently in paying the legacies. The residuary legatee would first be compelled to refund, and next the general legatees proportionally, so far as is necessary to satisfy the debt. So if one legatee received full payment of his share, and it afterward appeared that there was an original deficiency of assets to pay all the legacies in full, the other legatees may compel him to refund, so that all in the same class may receive proportional amounts upon their respective shares. This would not be the case, however, if the insufficiency of assets were attributable to the negligence, default, or misconduct of the executor, and the executor would himself be solely liable to make up the deficiency. If there be a contingent claim against the testator's estate, the executor may retain the assets from the legatees, if necessary, to meet the demand when the contingency occurs. If, however, the legatee offers to indemnify the executor against the future claim, the indemnity must be accepted and the legacy paid over. If payment be made without requiring a bond of indemnity, the executor will be liable for the satisfaction of the demand, when it becomes due, out of his own estate; but it is frequently provided by statute that claims against the estate of a deceased person must be presented within a short period after the issue of letters testamentary, if the executor give due notice of his appointment.

Jurisdiction in regard to legacies is vested in general either in probate courts or in courts of equity. The jurisdiction in equity, independent of statute, is exclusive where the bequest involves the execution of trusts charged upon land, or where remedies of a peculiarly equitable nature are sought. No suit will be maintainable in a court of law to recover a legacy unless it has been assented to by the executor; but in all cases where actions at law may be brought upon legacies the jurisdiction of equity is concurrent. For the rules of law regulating different specific questions regarding legacies, see the articles Lapse, Interpretation, Executor, etc. See also the following treatises: Williams *On Executors*; Jarman *On Wills*; Redfield *On Wills*; Roper *On Legacies*; Redfield *On the Law and Practice of Surrogates' Courts.* Revised by F. Sturges Allen.

Le Gallienne, Richard: See the Appendix.

Leg'ates and Lega'tion [from Lat. *lega're*, depute, delegate, appoint. The Latin word *legatus* was used of persons commissioned or acting as delegates, and especially of ambassadors, of adjutants or deputy commanders of an army usually appointed by the senate, occasionally by commanders themselves, and of the emperor's provincial governors]: in international law, embassy, the right of legation, the right to send an ambassador, or the whole subject of the nature and powers of public envoys; and legate, the envoy or minister himself. The popes, borrowing the word from the old Roman state, called their principal envoys to the Roman Catholic nations legates *a* or *de latere.* These were cardinals, and represented the pope in spiritual matters chiefly, but nuncios (from *nuntius*, a messenger, an envoy) were not, and thus were a lower grade of papal envoys, doing business of any sort. Revised by T. S. Woolsey.

Legazpe, or **Legaspi**, lā-gaaz'pĕ, Miguel Lopez, de: conqueror of the Philippine islands; b. at Zumarraga, Guipúzcoa, Spain, about 1510. He went to Mexico, where for several years he was chief secretary of the city government. In 1564 he was given command of the expedition fitted out by the viceroy, Velasco, for the conquest of the Philippines. The fleet of four vessels left La Navidad, Mexico, Nov. 21, 1564, and reached the islands in Feb., 1565. The first Spanish settlement, called San Miguel, was founded in Zebú soon after, and various expeditions were made to the other islands. The conquest of Luzon was begun in 1570, and in May, 1571, Legazpe founded Manilla, where he died Aug. 20, 1572. Herbert H. Smith.

Leg'ends [from O. Fr. *legende* > Fr. *légende* < Late Lat. *legen'da*, liter., things to be read, neut. plur. of *legen'dus*, to be read, deriv. of *le'gere*, read]: a term which appears to have been originally applied in the ecclesiastical dialect to portions of Scripture, and at a later period also to other writings of religious instruction or edification, appointed to be read, not chanted, intoned, or recited, in church services; and it therefore nearly corresponded in signification to the modern *lesson.* However, while considering legend in this narrower sense, one must bear in mind that the term is also applied to that form of tradition which the Germans call *sage* (W. Grimm's *Heldensage*) and the Scandinavians *saga* (P. E. Müller's *Sagabibliothek*), as well as to similar tales preserved from the childhood of other races; whence, by reason of the predominance of myth or fabulous adventure, the word is further stretched to include any account which is based upon tradition, or even upon poetic fancy, and which inclines to the wonderful. This article will be confined to the legend of the Christian Church, which came to signify any religious narrative not taken directly from the Old or New Testament, whether composed in prose or in poetry, and whether meant for the ear of the public or for the eye of the monkish scholar.

The legend evidently acquired its place in the church lesson (*lectio*) through a desire to celebrate the life, sufferings, and death of post-apostolic saints and martyrs; but the beginning and growth of the movement are by no means

clear. From earliest times reading of the Scriptures (*lectio*) formed part of the services of the church, at first only in the mass, but later in the prescribed worship of the different canonical hours, such as matins, for example. At first, as is learned from certain decrees, only the Holy Scriptures were read, lest accounts of even the most meritorious characters, yet based upon mere anonymous records, should be incorporated in the service. This strictness, however, was soon relaxed. Days were set apart in commemoration of the saints and martyrs; and since it was fitting that the lives of these illustrious men should be kept in vivid remembrance, a short account, a legend of the saint in question, came to be read during divine service—generally before the epistle—and was afterward recalled or explained in the sermon, by preference in the form of an *exemplum*, an illustration of virtues or martyrdom. Still more natural would be the reading of these legends before the members of a religious body; and such readings became universal. It is within the monasteries therefore that one must look for the most potent forces which worked upon the development of the legend. For clergy and laity the Scriptures, together with a moderate use of the *Acta Sanctorum*, might well have sufficed; but there sprung up a new literature, designed primarily for the instruction of persons severed from the general body of the faithful, and devoted to a religious life, and this literature, chiefly concerned with monks and hermits as its heroes, evidently was stimulated to greater activity by the separate institutions and orders recognized by the Church as permanent bodies corporate. It is in the shape of literature that these legends come down to us, but the beginning of them was undoubtedly a short, informal account read aloud during service, thence, by reason of increasing length, only begun in service and finished elsewhere—in the refectory, probably, while the brothers ate their meal. From this to wider scope, to formal literary composition, is a very easy step. We may thus assume a regular cult of the legend within the limits of these religious bodies; and from the eighth century it is found assuming a more and more dominant attitude in regard to letters in general. It is unquestionably the chief element in mediæval literature. The legend began in the shape of mere calendars or lists of martyrs—the so-called martyrologies—with brief accounts of their deeds and death; but it rapidly became much more than this as soon as the great Church writers recognized its capabilities. Thus we are told that Alcuin was asked to write a legend concerning the life and miracles of a certain abbot, and that he wrote it in double form—in prose, that it might be read in church before the assembled monks and people, and again in verse—that the learned of the clergy should have congenial reading. This was in the eighth century; but as a matter of literature, legends were certainly composed as early as the time of Hieronymus (about A. D. 374), who—significant fact—was one of the earliest to organize the monastery in the interests of clerical culture. From the eighth century the legend kept pace with the rapidly increasing worship of saints, and by the thirteenth century had thus lost nearly all historical value. New saints, new martyrs, new festivals demanded new legends; truth, and even the respect for a semblance of truth, yielded to an emotional and artistic necessity which sought by any means to impress the festival upon popular fancy. Hence the enormous growth of the miraculous elements in the legend. So far legends have been regarded as property of the Church alone; but they could not remain a purely clerical affair, nor be confined, even as literature, to the Latin tongue. In the homily or sermon, as we have pointed out, an *exemplum*, the life of a given saint, was rehearsed to the people; and in time this story was taken altogether out of the sermon and told for its own sake. Its value as a narrative tempted to careful composition in the vernacular, and in this way it enriched every literature of Europe. Inasmuch, however, as the prevailing form of popular narrative was in verse, a large number of the legends which were composed in the vernacular took a poetic form. As early as the fifth century it had been a favorite pastime with Churchmen to turn lives of saints into Latin hexameters; but this later and popular legend adopted a meter as well as a language familiar to the people.

Such, in rude outline, was the development of the legend. Like the drama, it began in the Church and for the Church; meeting a genuine need of the people at large, it spread among them as a substitute for their older popular epic. It became the sacred counterpart of their secular ballad; but this was no immediate process. As distinctly sacred literature the legend is divided by Ebert into two classes: First, those panegyrical accounts—half sermon, half glorification of the saint or martyr in question—which are so largely efforts of clerical rhetoric; and second, a simple story of the miraculous deeds of such a saint, and of the power of his relics—popular narrative. Similar to the legend, and in some sense a base of it, is the *Vita*, or formal life of a saint. The early *Passionalia*—brief accounts of the primitive martyrs—are lost; but they were succeeded by more formal efforts, which included confessors and founders, bishops, missionaries, and benefactors of every sort. An early example is the widely read *Vita S. Martini*, by Severus, written about 400 A. D. Some of the most valuable material for the history of mediæval Europe is contained in the earlier *Vitæ*—e. g. Beda's lives of certain abbots of his own monastery who had been his teachers and friends. Here the miraculous element—what we call legendary—is easily kept in the background; but as the liking for such literature increased, lives of half-forgotten saints were composed in such a way that the poverty of authentic biography was outweighed by the wealth of miraculous details. The more obscure its hero, the more a *Vita* needed astonishing and overwhelming credentials. It is therefore evident that a general verdict in regard to the credibility and historical value of the legend is not only difficult, but impossible. No one test of truth can be applied to this enormous mass of literature from every time and clime of mediæval Europe. It is a matter of historical criticism, of minute investigation and sifting of details. History and biography of undoubted truth, misunderstood tradition, facts distorted but not utterly false, forgery, falsehood ordinary, monstrous, or palpable—with all these degrees of truth and error must the critic reckon. The only practical modern interest involved in this criticism is connected with the occasional canonization of a saint by the Church of Rome, when the evidence of miracles wrought on the intercession of the candidate is submitted to a board of cardinals specially named for the occasion, and reported on to the pontiff, who finally adjudges upon its sufficiency, and in the affirmative case pronounces the alleged facts established, and decrees, first the beatification, and later the enrollment of a new saint upon the calendar. It is sometimes hard to distinguish the line between sacred and secular legends, as in those of the Holy Grail, where legend and romance are closely interwoven; nor can we forget the heathen divinities and demigods who crept into mediæval literature, and often appear in the most absurd disguises. Finally, we have to reckon with many short stories, parables, and even longer narratives which abound in our sacred legend, but which have been proved to be importations from the ancient literature of the East. In some cases, too—so far as a model is concerned, Hieronymus was under this obligation—Western Christianity has borrowed from the Christian literature of the Eastern Church.

The literature of the legend is of vast extent. Conspicuous among the collections are the *Vitæ Patrum, de Vita et Verbis Seniorum, seu Historia Eremitica* (best edition, that of Rosweyde, 1 vol. fol., Antwerp, 1628); the widely circulated *Legenda Aurea*, or *Historia Lombardica*, one of the most important books in all the Middle Ages, compiled by Jacobus de Voragine in the thirteenth century, and first printed in Paris in 1474 (by 1500 seventy-one editions had appeared); the *Flos Sanctorum* of the Jesuit Ribadineira, commonly known as the *General Legend* (first published in Spanish in 2 vols. fol., Madrid, 1599–1610): this has been augmented by supplements, and printed in many languages and in hundreds of editions, and is the source from which most smaller collections of legends have been drawn; and the *Acta Sanctorum*, edited by a Jesuit association known as the Bollandists, from the name of its founder. Of this vast collection, begun in 1643, there had appeared in 1887 as many as sixty-one folio volumes. Moreover, there is much material in the histories of separate organizations such as the Benedictines. In the English language there is a goodly number of legends in prose and verse. To the former category belong Ælfric's collections, dating from the end of the tenth century, and a number of legends and legendary sermons, down through the fifteenth century. An English translation of the *Legenda Aurea* was made in 1438, and printed, with additions, by Caxton, 1484 and 1487 (?). Poetical legends begin with those attributed to Cynewulf in the eighth century (e. g. his *Elene, or The Finding of the Cross*), and make their way into modern English literature. See Horstmann, *Altenglische Legenden* (Heilbronn, 1878), and especially the *Neue Folge* (1881), which contains

an admirable essay on the legend itself (pp. iii.–xxxix.), and an exact account of the different English and Scottish legends (pp. xl.–cxxxviii). For the general literature of European legends, see Ebert, *Allgemeine Geschichte der Literatur des Mittelalters im Abendlande* (3 vols., Leipzig, 1874–87, and since issued in a second edition), and Milman, *History of Latin Christianity*. For a discussion of the legends from a philosophical point of view, see Lecky, *History of Rationalism in Europe*. Many legends have grouped about the Virgin Mary, and there is a collection of these in 10 vols., the Portuguese *Santuario Mariano*, 1709–23, which gives account of more than 2,000 miraculous images of the Virgin in the Peninsular possessions of Portugal alone. It would lead too far to attempt to trace the legend in later literature; a good example of such a narrative, treated both by the poet and by the ballad-making public, is found in the *Prioresses Tale* of Chaucer and the popular ballad of *Sir Hugh*.

F. B. Gummere.

Legenda Aurea: See Jacobus de Voragine.

Legendre, *le-zhăăndr'*, Adrien Marie: mathematician; b. in Paris in 1752. He early distinguished himself as a successful teacher of mathematics in the military school at Paris, and before attaining the age of thirty made his *début* in the world of science by one of his finest memoirs—that on *The Attraction of Spheroids*—by which he gained admission to the Academy of Sciences (1783). His equally important investigations of the *Figure of the Planets*, considered as made of spheroidal strata whether homogeneous or otherwise, soon followed, and in 1805 his *New Method for Determining the Orbits of Comets*. His *Elements of Geometry* has been translated into all languages, and has become a classic in that species of literature. He assisted de Prony in the calculation of his great logarithmic tables; invented the rule of the least square of errors; was author of a work, the *Exercices sur le Calcul intégral*, and of researches on the *Eulerian integrals*; both of which were developed into the great work of his life—the *Traité des Fonctions elliptiques*. D. at Auteuil, Jan. 9, 1833. Legendre, though inferior in range and power of intellect to all of his three great contemporaries—Laplace, Lagrange, and Euler—was nevertheless inferior only to them; and was one of that age who most powerfully contributed to the advancement of mathematical science. According to Prof. Forbes, he was the first to imagine and employ those artifices of calculation known usually by the name of Laplace's functions. When toward the close of his life the discoveries by Abel and Jacobi of the really distinctive characteristic of elliptic functions—their periodicity—gave an unlooked-for extension and generalization to the applications of these functions, he welcomed them with a liberality (says Prof. Forbes) "worthy of all commendation." Legendre's life, spent in privacy and strenuous devotion to science, was uneventful. Consult Verhulst, *Des Fonctions elliptiques*, and Briot and Bouquet, *Théorie des Fonctions doublement périodiques*.

Leger, Paul Louis: writer; b. in Toulouse, France, Jan. 13, 1843. He early turned his attention to the history and philology of the Slav peoples, subjects then little studied in France, but which he has done much to make known. In 1864 he made the first of his many visits to foreign countries, where he has been intimate with men like Palacky, and he has learned nearly every language in Europe. In 1869 he gave a supplementary course at the Sorbonne; in 1871 he began to teach at the École Spéciale des Langues Orientales, where six years later he was made full professor; and in 1885 he was appointed Professor of the Slav Languages and Literatures at the Collège de France. He teaches also at the École de Guerre and the École des Sciences Politiques. Besides many contributions to magazines and papers, he is the author of *Études Slaves* (1875); *La Russie et l'Exposition de 1878* (1878); *Nouvelles Études Slaves* (1880; 2d series 1886); *Contes Slaves* (1882); *Chronique Russe dite de Nestor* (1884); *La Save, le Danube, et le Balkan* (1884); *La Bulgarie* (1885); *Grammaire Russe* (1878; 2d ed. 1886, a much revised and improved edition of the grammar of Reiff, by whose name it still goes); *Histoire de l'Autriche-Hongrie* (1878; 3d ed. 1889, an excellent short history which has been translated into English); *Russes et Slaves* (1890); *La Littérature Russe* (1892).

A. G. Canfield.

Legge, James, D. D., LL. D.: Sinologist; b. at Huntley, Aberdeenshire, Scotland, Dec. 20, 1815; educated at King's College and University, Aberdeen, and at the Highbury Theological College in London; went as a missionary to China in 1839 and settled in Hongkong; returned to Great Britain in 1873, and in 1875 was made Professor of the Chinese Language and Literature at Oxford, where he died, Nov. 30, 1897. He published *The Chinese Classics*, with a translation, critical and exegetical notes, etc. (8 vols., London and Hongkong, 1861–71); *The Texts of Confucianism* (vols. iii., xvi., xxvii., and xxviii. of the *Sacred Books of the East*, Oxford, 1876–90); *The Religions of China* (London and New York, 1880); *Records of Buddhistic Kingdoms* (Oxford, 1886); *The Texts of Taoism* (2 vols., Oxford, 1891); and some minor works.

Leggett, Mortimer Dormer: See the Appendix.

Leggett, William: journalist; b. in New York city in 1802; graduated at Georgetown College in 1822; was midshipman in the U. S. navy from 1822 to 1826; published in 1825 a volume of poems, *Leisure Hours at Sea*; wrote for *The Mirror* his *Tales by a Country Schoolmaster*, and established *The Critic*, a weekly newspaper, in 1828; was associated with William Cullen Bryant in the editorship of *The Evening Post* from 1829 to 1835; edited *The Plain Dealer* in 1836; was appointed in 1839 diplomatic agent to Guatemala, but died suddenly at New Rochelle, N. Y., May 29, 1839. Two volumes of his political essays were published by Theodore Sedgwick, Jr., in 1840.

Leg'horn (Ital. *Livorno*): a large maritime town in the province of Leghorn, Italy; lat. 43° 32′ N., lon. 10° 18′ E. (see map of Italy, ref. 4–C). It stands on a tongue of land between the mouth of the Calambrone on the N. and the lowest spur of the Tuscan Apennines on the S.; 62 miles W. S. W. of Florence and 12 miles S. S. W. of Pisa. A navigable canal connects it with the Arno, which enters the sea 7 miles N. of the town, and smaller canals intersect it in various directions. There are two harbors, the old and the new, the latter—S. of the former and overlooked by the large lighthouse—being capable of receiving vessels of heavy tonnage, and even ships of war. The first notices of Leghorn are of the ninth century, and relate to the building of a church there, but it had little importance for a long time. At the close of the fourteenth century it was under the protection of the French king, who in 1407 sold it and its territory to Genoa for 26,000 gold ducats. Genoa ceded it in 1421 to Florence for 100,000 gold florins, and this republic, aware of the value of her new possession, spared no pains to increase its prosperity. Under the Medici the harbor was improved, the fortifications were strengthened, and exceptional privileges and immunities granted to the inhabitants; religious toleration was also established, so that merchants of all nations flocked thither. Toward the end of the eighteenth century Leghorn fell into the hands of the French, who impoverished it by forced contributions and forced loans, from which it recovered but slowly. The port was for a long time free, except for government monopolies, but since 1867 it no longer enjoys special privileges. Notwithstanding this change the port is one of the most frequented in the Mediterranean, and the commerce and general prosperity of the town are constantly increasing; fine public and private buildings are being erected; facilities for communication between its different quarters are multiplying; its suburbs are being extended and embellished; and it is every year more and more resorted to as a fashionable bathing-place. It has a beautiful cathedral and a costly synagogue. The import trade embraces cotton, wool, cutlery, hardware, etc., and colonial products generally. The export trade is in silks, straw hats, borax, coral, and many of its own manufactures, which consist chiefly of oil, soap, tobacco, salt, etc. In 1890 the exports amounted to 38,800,000 lire, and the imports to 74,400,000 lire. Pop. (1890) 78,998; with suburbs, 89,980.

Legion [Lat. *legio*, from *legere*, to gather, collect]: a military organization of the ancient Romans, combining all the constituent elements of an army, and numbering from about 3,000 to about 6,000 men. See Infantry.

Legion of Honor, Order of the: a French order of merit instituted May 19, 1802 (19 floréal, an 10), by the First Consul, Napoleon Bonaparte. The order has received several modifications since then. It consists of several ranks, viz., grand officers, grand crosses, commanders, and knights. Its distinctions are conferred for civil, but more especially for military achievements. The order possesses considerable wealth, of which the proceeds are paid out in pensions to wounded and disabled members and others. Its house at Paris was burned by the Communists May 24, 1871.

Legislative Bodies. See Legislatures.

Legislatures [deriv. of Lat. *legis*, genit. of *lex*, law + *latus*, used as p. p. of *ferre*, to bear]: law-making bodies. In modern constitutional states there prevails a threefold division of the functions of government: (1) the legislative department or legislature, which makes the laws and exercises more or less complete control over their administration, especially with regard to public finance, (2) the judiciary department, or the courts, which expound and apply the laws, and (3) the administrative department, or the executive, which enforces them.

Organization of the Legislature.—The chief purpose of the legislature is (see LAW-MAKING) to determine what of right should be; not to ascertain the popular will, but to discover the course appropriate to the necessities of the occasion. Because it has proved best suited to accomplish this purpose, the bicameral system—in other words, the organization of the legislature in two houses—has been adopted in all save the smallest states, and has met with nearly uniform approval from political theorists. Independent deliberation upon proposed measures in each of two more or less dissimilar bodies affords a safeguard against hasty lawmaking. It also checks legislative encroachments upon the executive, inasmuch as the resolutions of one house alone have not the force of law. These are not, however, the considerations which called the bicameral system into existence. In Great Britain, where it originated, it was, on the contrary, rather an historical product than a political device. It was subsequently adopted, on account of its merits, first by the U. S. and later by almost all the nations of Europe, where it often supplanted previous legislatures composed of three or more bodies (estates).

Although the two houses of the legislature have, as a rule, substantial parity of powers, the more popular branch, because it is considered the direct representative of the people, has in some countries (e. g. France, Great Britain) superior power in voting taxes and expenditures. It should be noted, however, that, in spite of this apparent concession to the idea that representatives are simply delegates, bound by the will of the electors, the positive law of all constitutional states in Europe and America conforms to the best political theory in regarding the franchise not as a private right of the voter, but as a political function whose exercise is conferred upon certain individuals for the public good. The power of the legislature to vote taxes as well as to make laws is derived therefore not from its constituents, but from the state. The election is not the source but the consequence of its existence. The state through the constitution creates the legislature and defines its powers. The electorate simply decides who shall from time to time exercise those powers. When a so-called representative has been chosen, he is under no legal obligation whatever to respect the wishes of his constituents. His duty is to the constitution and the laws—to the whole state and to that alone.

Composition.—The desired dissimilarity between the two houses of the legislature may be achieved in various ways: by basing the membership in one—the so-called upper and generally the less numerous—house wholly or partly upon birth or office, or both, whereas the lower house is commonly elected; or else by providing an indirect and more elaborate method of electing the upper house or the elected members of it. Further, the term of membership in the upper house is generally longer, and the house is commonly renewed by parts, whereas the renewal of the lower house at each election is as a rule total. In the U. S. the upper house, the Senate, is composed of two members elected from each State by the Legislatures thereof for a term of six years. One-third of the Senators retire every two years. The lower chamber, the House of Representatives, is now (1894) composed of 356 members, elected for a two years' term by congressional districts within each State, and in the same way as the more numerous branch of the State Legislature—that is to say, by secret ballot and direct plurality vote. Senators are frequently re-elected, but to Representatives the principle of "rotation in office," sometimes after one, sometimes after two terms, is generally applied.

The upper house of the British Parliament, the House of Lords, is composed, in addition to the hereditary peers of the realm (numbering 495 in 1893), of 16 representative Scottish peers, chosen for the session by the body of Scottish peers; 28 representative Irish peers, chosen for life by the body of Irish peers; 2 archbishops and 24 bishops; and 2 lords of appeal in ordinary, appointed by the crown for life. The 670 members of the House of Commons are elected for seven years by direct secret ballot. In general, one member is chosen by each district. The eight universities elect nine members, and a few towns retain historic rights to be represented by one member, in some cases by two, although their population falls below that required for one or two regular districts. (See PARLIAMENT.) British custom does not confine a candidate to his home constituency. Any candidate may be put in nomination before any constituency in the land. The result is the almost uninterrupted re-election of the more able members of the House of Commons.

The members of the French lower house, the Chamber of Deputies, are chosen for four years by direct secret ballot, one member for each of the 584 arrondissements or districts into which France and its colonies are divided. The French Senate consists of 300 members, of whom 75 were originally to have been life senators. In 1884 the law was changed, and vacancies in life senatorships are now filled, like other vacancies, by senators elected for nine years. In 1893 there still survived 23 life senators. The eighty-seven departments return from 1 to 10 senators each, according to their population. Senators are chosen by an electoral college composed of the deputies from the department, its general council, i. e. the departmental legislature, the general councils of the arrondissements within the department, and special delegates chosen by the municipal common councils. One-third of the senators retire each three years.

The Prussian National Diet (Landtag) comprises a House of Lords (Herrenhaus) of about 310 members and a House of Deputies (Abgeordnetenhaus) of 433 members. The composition of the Herrenhaus is complex. It includes as hereditary members such adult royal princes as the King may summon and 98 heads of families of the higher nobility, and further, as life members, those whom the King names as a mark of confidence and others presented by the minor nobility, by the cities (44 members), by the provinces, the universities, etc., and especially by the large landlords possessing old estates, the landed gentry. The latter nominate about 90 members. Election to the House of Deputies is indirect. The voters (*Urwähler*) of each district are divided into three classes according to the amount of taxes they pay, the gross tax paid by each class being equal. Each class selects by open ballot an equal number of electors (*Wahlmänner*), who choose the deputy. The effect of this arrangement is that many voters of the third or most numerous class do not take the trouble to vote.

The Federal Council (Bundesrath) of the German empire consists of 58 members, appointed and removed at will by the sovereigns of the several states, subject of course to the provisions of their respective state constitutions. Of these members Prussia names 17, Bavaria 6, Saxony and Würtemberg each 4, Baden and Hesse each 3, Brunswick and Mecklenburg-Schwerin each 2, the other states and the three free cities each 1. The Imperial Diet (Reichstag) consists of 397 members, elected for five years by direct district vote and secret ballot.

The Spanish legislature (Cortes) is composed of a Senate and a Congress. There are some 80 "senators in their own right," i. e. adult royal princes, grandees of large incomes, and certain high officials of Church and state, 100 life senators nominated by the crown, and 180 elected senators, chosen some by the city councils, some by the provincial legislatures, some by the Church, some by the universities, some by the heaviest taxpayers, etc., for a term of ten years. The congress consists of 431 deputies, partly chosen by a system of minority representation. See REPRESENTATION.

The Portuguese Cortes comprises a House of Peers and a House of Deputies. The law of July 24, 1885, abolishes hereditary peerages by a gradual process, upon the completion of which there will be in the upper house, in addition to princes of the royal blood and 12 bishops, 100 life peers appointed by the king, and 50 elective peers, chosen 5 by the University of Coimbra and 45 indirectly by different administrative districts. There are 149 deputies elected for four years by direct district vote.

The legislature of republican Switzerland consists of a Council of Estates composed of 2 members chosen at will by each of the twenty-two cantons, and a National Council of 147 elected by direct secret ballot on a district ticket in forty-nine districts. The legal term is three years, but a member once chosen is commonly re-elected until he resigns or dies.

The Legislatures of the States of the U. S. are without exception bicameral. The upper house is commonly called the Senate, the lower the House of Representatives, although in six States its name is Assembly and in three House of Delegates. Both houses are as a rule selected in the same

manner by direct secret ballot and plurality vote. Senators serve four years in thirty States, two years in eleven States, three years in two States, and one year in one State. Representatives are generally elected for but one session. Rotation in office is well-nigh universal. The number of Senators varies from 9 in Delaware to 51 in Illinois, and the number of Representatives from 21 in Delaware to 321 in New Hampshire. In New York the members of the Senate and the Assembly number respectively 32 and 128; in Massachusetts 40 and 240, and in Pennsylvania 50 and 201.

Apportionment.—In order to secure a legislature capable of correctly estimating the common interest, membership might be apportioned among social or industrial groups—c. g. farmers, manufacturers, traders, laborers, etc.—and there are historical instances of such apportionment. Representation in the lower house of the legislature is generally proportioned to population, some regard being paid incidentally to geographical or administrative divisions. In the U. S. there is one Representative to about 173,900 inhabitants; in the German empire, one to 124,500; in Prussia, one to 69,180; in France, one to 65,700; in Great Britain and Ireland, one to 56,500; in Spain, one to 50,000; in Switzerland, one to 20,000; in New York, one member of Assembly to 46,700; in Illinois, one to 25,200; in California, one to 15,000; in Georgia, one to 10,400; in New Hampshire, one to 1,140.

Election.—The voter must be as a rule a male citizen residing in the country and generally in the district which the member is to represent. He must be of mature age, commonly twenty-one years; in the German empire, in Prussia, and in Spain twenty-five, in Switzerland but twenty. In all countries criminals and persons of defective intellect, and in most cases paupers, persons in bankruptcy, and members of the active military force, are excluded from the exercise of the franchise. In Great Britain there is a complicated system, or rather want of system, of property qualifications, details of which must be sought in various statutes ranging from 1429 to 1891. These qualifications may be roughly summarized as follows: Only males over twenty-one years of age are permitted to vote. In counties and boroughs the voter must own or occupy either lands or tenements of not less than £5 clear yearly value, or occupy an independent dwelling-house, or a lodging of the clear yearly value, if let unfurnished, of £10. In county constituencies other persons in addition are qualified to vote by a freehold of inheritance of 40*s.* clear yearly value, a copyhold, as well as freehold for life only, of £5 annual value, and a leasehold, if created for a term of over twenty and less than sixty years, of £50, or, if created for over sixty years, of £5 value. The quasi-property qualification of the Prussian system has been described above.

Eligibility.—Citizenship, male sex, and residence within the country are generally required. Frequently the legislator must have attained a certain age. U. S. Senators must be at least thirty years of age and nine years citizens, Representatives at least twenty-five and seven years citizens. In France senators must be forty, deputies twenty-five; in Prussia deputies must be thirty. Certain disqualifications are connected with the holding of office. No man can be a member of both houses. In the U. S. a member of Congress can not hold a Federal office. The British and French systems disqualify officials who are in a position unduly to influence their own elections, and officials whose duties would interfere with the exercise of legislative functions. In Great Britain and on the Continent generally appointment to office unseats an elected member, who may subsequently be re-elected. For the lower houses of all the German legislatures the provisions for the Imperial Diet are fairly typical. All sorts of officials may be elected, but any member who after his election accepts office under the empire or a separate state loses his seat. He may, however, regain it by re-election.

Privileges of Members.—In all cases the members enjoy full liberty in debate. For anything said or any vote given in either house they can not, except in case of the German Federal Council, be called in question in any other place. As a rule, they are exempt from arrest during the session, and for some time before and after it, save in case of flagrant offenses.

Remuneration.—In favor of paying the members of the legislature, it is urged that the salary enables capable men to serve, whether wealthy or poor, and that payment removes, or at least diminishes, the temptation to steal. On the other hand, payment is held to excite the cupidity of incapable persons, and it is asserted that non-payment secures a more intelligent and independent legislature by confining membership to the well-to-do. Members of the British Parliament, of the German Imperial Diet, and of the Spanish Cortes receive no pay. U. S. Congressmen receive $5,000 per year and traveling expenses (mileage); French senators, 15,000 francs per year; members of the Swiss National Council, 20 francs for each day of actual attendance. In the U. S. the members of all the Legislatures are paid by the respective States.

Privileges of the Houses.—The general rule that each house is the sole judge of the election of its own members was first established by the House of Commons, and was once an indispensable defense against the encroachments of the crown. The necessity for such defense has everywhere largely disappeared, and the rule has not always worked well under the conditions of modern partisanship. In 1868 the House of Commons transferred the decision of its contested election cases to the courts. The extension of this practice, as frequently urged, to other countries might perhaps be fraught with danger to the courts themselves, especially in cases where, as in many of the States of the U. S., the judiciary is elective.

Each house, as a rule, elects its own officers, exercises its own discipline, and establishes its own rules of procedure. (See PARLIAMENTARY LAW.) There are exceptions. The Vice-President of the U. S. is *ex officio* presiding officer of the Senate, and a two-thirds vote of either house is necessary to expel a member of it in the way of discipline. The presiding officer of the House of Lords, the Lord Chancellor, is a member of the cabinet, and may be a Commoner. The House of Commons elects its own Speaker, but the other officers of Parliament are permanent, and appointed by the crown. The French chambers likewise arrange their own procedure. Their sessions must, as a rule, be public, and cabinet ministers must be given the floor when they demand it. The case of the German Diet is similar, save that its sessions must in all cases be public, and members of the Federal Council, as well as representatives of the imperial Government, can obtain the floor upon demand. The Federal Council itself is under the presidency of the Chancellor of the empire, who is appointed at pleasure by the Emperor, and the constitution virtually appoints several of its more important committees also. In the several States of the U. S. the Lieutenant-Governor, elected on a general ticket by the State at large, is commonly the presiding officer *ex officio* of the State Senate.

Quorum.—The general principle is that, a majority of the members being present, a majority of those who choose to vote is sufficient to pass a law. The U. S. and French Senates, and the Legislatures of many of the States of the U. S., however, require that a majority be present and also vote, and the U. S. House of Representatives has followed both methods. In the House of Lords three are a quorum, in the House of Commons forty. Business is so entirely in the hands of the responsible cabinet, which must summon all its forces to escape defeat on any important measure, that no danger arises from this rule.

Sessions (their frequency and length, the method of convoking the house, of opening the session, of adjourning—i. e. of interrupting or postponing the session—of proroguing or adjourning without day—i. e. of ending the session—and of dissolution—i. e. of ending the legislature—thereby calling for a new election): In the U. S. the Constitution requires the assembling of both houses on the first Monday in December. The houses separately arrange all ceremonies of opening and closing, and adjourn from time to time. In agreement they adjourn without day—i. e. prorogue themselves. If they are unable to agree the President has constitutional power to prorogue them, but it never has become necessary for him to do so. They sit as long as they please, save that the second regular session of each Congress is prorogued on Mar. 3 by the expiration of the term of the Representatives. The President can call an extra session of both houses, or of the Senate alone, whenever he sees fit. A dissolution can occur only by the expiration of the terms of the members, and the terms of all Senators can not expire at any one time.

According to law the Parliament of Great Britain must meet once in three years, but virtually it must meet annually, as many appropriations are made for one year only. The statutory limitation of its duration is seven years. It is summoned, opened, and prorogued by the crown, and dissolved by the crown, or by the expiration of the term of the Commons. In fact, however, the crown exercises its

rights only upon the advice of a prime minister actually, or previously to the last vote, representing the majority of the house. In the latter case he expects that the election will give him a majority again. So that the House of Commons may be said to prorogue, and, since the average life of a Parliament is less than five years, in most cases to dissolve itself.

The French chambers must sit for not less than five months, beginning in January of each year. The President can prorogue them, but for one month only, and not more than twice in one session. They are also dissolved by the President, but not without the consent of the Senate, and only upon the advice of a minister responsible as a matter of law to both chambers. As a matter of fact the vote of the deputies usually decides the course of the ministry.

For the laws regarding the German imperial legislature the Prussian system served as a model. The Emperor convokes, opens, adjourns, prorogues, and dissolves both houses. He can call a session of the Federal Council alone, or of both bodies together, whenever he sees fit. He must call the Federal Council upon demand by one-third of the members. The Diet must be called at least once a year, and can not be adjourned more than once in a session, nor for more than a month, without its own consent. The consent of the Federal Council is necessary for the dissolution of the Diet, and in case of dissolution the election must be held within sixty days, and the new Diet convoked within ninety days thereafter.

In the U. S. the State Legislatures have all, like Congress, powers of self-assembly, self-adjournment, and self-prorogation, but in some States the length of the regular session has been limited—e. g. in Oregon and Georgia to forty days, California to sixty days, Virginia to ninety days, etc. They are all dissolved only by the expiration of the terms of their members. In all the States save five the sessions are biennial, but adjourned sessions are often held in the intervening years. The Governor can, upon occasion, call an extra session of the Legislature.

Executive Veto.—In the U. S. the President has a veto which can be overcome only by a two-thirds vote in each house. The arrangement in the several States is as a rule similar, but in some of them the veto of the Governor is simply suspensive, not absolute. Likewise in France the President has no real veto, but at his demand the two chambers must reconsider any measure. If a majority in each house still favors it, it becomes a law. The German Emperor has, as Emperor, no direct veto; but if he should declare a bill which in his opinion encroached upon his prerogative to be an amendment to the constitution, and then defeat it by means of the voices which he, as King of Prussia, controls in the Federal Council, there is apparently no way provided by law to secure the passage of such a bill. The direct veto of the British crown has not been exercised since 1707.

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Legitim: See the Appendix.

Legna'no: town in Northern Italy, in the province of Milan; about 17 miles N. W. of the city of Milan (see map of Italy, ref. 3–C). It contains some interesting churches, and, among other fine pictures, an invaluable one by Luini. The town is famous for the victory won by the Lombard League over the Emperor Frederick I. in May, 1176. So complete was the success of the League that Frederick concluded the Peace of Venice in the following year, and subsequently the Treaty of Constance (1183), substantially guaranteeing the independence of the cities. Pop. 6,685.

Legouvé, *le-goo'vā'*, GABRIEL ERNEST WILFRID: author; son of Gabriel Marie Legouvé (1764–1812), author; b. at Paris, Feb. 15, 1807; made his *début* in literature with a poem, *Découverte de l'Imprimerie* (1829), for which he received a prize from the Academy; wrote, in company with Scribe, the plays *Adrienne Lecouvreur* (1849); *Les Contes de la Reine de Navarre* (1850); *Bataille des Dames* (1851); and *Les Doigts de Fée* (with Scribe, 1858). His tragedy, *Médée*, in which Mlle. Rachel refused to play, though the refusal cost her a fine of 5,000 francs, was translated into Italian, and performed with great success by Mme. Ristori. Among other works are the comedies *Béatrix* (1861) and *Miss Suzanne* (1867); the drama in verse *Les Deux Reines de France* (1872); and the one-act drama *Anna de Kerviller* (1879). A complete edition of his dramatic works appeared in 1887–90. He is also the author of a large number of miscellaneous works, including *Histoire morale des Femmes* (1848); *Les pères et les infants au XIX^e^ siècle* (2 vols., 1867–69); *L'Art de la Lecture* (1877; 2d ed. 1881); *La Question de Femmes* (1881); *Soixante ans de Souvenirs* (2 vols., 1885–87; new ed. 4 vols., 1888); and *Une Élève de seize ans* (1890). Legouvé became a member of the French Academy in 1855, has held the position of inspector-general of public instruction in the normal school for young women at Sèvres, and in 1887 was made a commander of the Legion of Honor. Revised by A. R. MARSH.

Legrand du Saulle, *le-grăăn'dü-sōl'*, HENRI, M. D.: alienist; b. at Dijon, France, Apr. 16, 1830; studied at Dijon lyceum, and later studied medicine with Dumenil at Dijon, Morel at Rouen, and Calmeil at Charenton. He gave his entire attention to nervous and mental diseases, his graduation thesis at Paris in 1856 being on *Monomanie incendiaire.* From 1854 to 1862 he was associate editor of the *Gazette des Hôpitaux.* He was for eight years a resident physician at Contrexéville, and in 1865 published a monograph on the effects of these waters. In 1866 he became an associate of Lasègue at the prefecture of police in Paris; in 1867 he was nominated as one of the alienists to Bicêtre, and after that time he devoted himself exclusively to mental and legal medicine. For nine years he was editor of the *Annales medico-psychologiques.* He was one of the originators of the Société de médecine légale. He was president of the medico-psychological society, and an officer of the Legion of Honor. In 1879 he was appointed physician to Salpêtrière, and in 1883 was made chief physician of the special infirmary for the insane in the prefecture of police. He was the author of many valuable papers on mental derangements. His principal work, *Traité de médecine légale*, etc. (Paris, 1886), was crowned by the Institute. D. May 5, 1886.

S. T. ARMSTRONG.

Legu'min [from Lat. *legu'men*, pulse, deriv. of *le'gere*, gather]: one of the vegetable *proteids*, or, as they are sometimes called, *albuminoids.* (See ALBUMINOIDS.) It is very similar in its chemical properties and composition to animal casein, the substance of cheese—that is, of curd of milk. Legumin occurs extensively throughout the vegetable kingdom, but is more especially found in various kinds of seeds and nuts. It derives its name from the fact that, with starch, it makes up almost the whole substance of the seeds of leguminous plants, such as peas and beans. Hence the powerfully nutritious character of these as food—that is, for those possessed of powerful digestion, for vegetable casein is far from being so readily soluble in the gastric liquids as animal casein or curd of milk. Peas and beans contain about one-quarter of their weight of this plant-curd, and are comparable, therefore, so far as richness in nitrogen is concerned, to eggs or to condensed milk. Ordinary cow's milk, according to the highest determinations on record, contains not more than 5½ per cent. of dry casein by weight; woman's milk contains less than 4 per cent.

Voelcker found in legumin precipitated from its solutions by acetic acid, and thus freed from all mineral matters, from 1·38 to 2·18 per cent. of phosphorus.

Legumin was prepared in pure state by Dumas and Cahours from milk of sweet almonds. The kernels are bruised, soaked in warm water for three hours, crushed to pulp, and an equal weight of cold water added. In an hour the mass is pressed through a cloth. The liquid deposits its starch, and is then filtered. Acetic acid (avoiding excess) now precipitates or curdles the legumin as a white coagulum or curd, which is washed on a filter with water, then with alcohol, dried, pulverized, and treated with ether to remove fatty substances. It is more difficult to obtain the vegetable curd pure from beans, as these contain mucilaginous matters which render the filtration troublesome. The legumin thus prepared is stated by other chemists still to retain in admixture some albumen, to separate which requires re-solution in ammonia and reprecipitation with acetic acid. Avenin, obtained from oats, appears to be identical with legumin. According to Ritthausen, plant casein is of three kinds, viz., legumin, conglutin, and gluten-casein. H. WURTZ.

Legumino'sæ [Mod. Lat., from Lat. *legu'men*, pod, pulse]: a family of dicotyledonous flowering plants, with alternate, stipulate leaves, separate and mostly irregular petals, a single simple ovary (rarely 2–15 ovaries), in fruit producing a legume (i. e. a bean-like pod). The many species (7,000) present numerous exceptions to these characters. Three subfamilies are generally recognized, but it is probable that they are entitled to full rank as families, viz.: 1. *Mimosaceæ*, with regular flowers and valvate petals (including about one-seventh of the species, mostly of warm climates). 2. *Cæsalpiniaceæ*, with mostly regular flowers, and imbricated petals (including about one-fifth of the species, mostly of warm climates). 3. *Papilionaceæ*, with bean or pea like papilionaceous flowers (including fully two-thirds of the species, with wide distribution). The species range from tiny herbs a few millimeters in height (some *Astragali*) to enormous trees a meter or more in diameter (*Robinia*, *Gymnocladus*, *Gleditsia*, etc.). Many species are of great economic importance, yielding food for man (beans, peas, vetches, soy, lupines, peanuts, etc.) or for domestic animals (clover, alfalfa, vetches, sanfoin, etc.), wood for fuel or construction (locust, rosewood, mora, wattles, etc.), dyes (indigo, red sandalwood, camwood, Brazil-wood, logwood, etc.), gums (tragacanth, kino, tolu, copal, copaiva, acacia, etc.), medicines (species of *Acacia*, *Cassia*, *Astragalus*, *Tamarindus*, *Glycyrrhiza*, etc.), ornamental plants (species of *Lupinus*, *Lathyrus*, *Wistaria*, *Robinia*, *Phaseolus*, *Acacia*, *Mimosa*, etc.).

CHARLES E. BESSEY.

Leh: capital of Ladak, Kashmir, Northwestern India; the principal market of the region, and the rendezvous of the merchants of India and Turkestan; 155 miles E. of Srinagar and 3 miles from the right bank of the Indus (see map of N. India, ref. 3–E). It is surrounded by walls and contains a celebrated Buddhist monastery. The land about it is sterile, but there are occasional rich agricultural valleys. Pop. about 5,000.

Lehigh River: a stream in Pennsylvania; rises in Pike County, and traverses a region remarkable for its beauty and famous for its great production of anthracite coal. It passes the Blue Ridge at Mauch Chunk, and at Easton unites with the Delaware. It is nearly 100 miles long, and for 70 miles has been fitted for slack-water navigation.

Lehighton: borough (site settled by Moravian missionaries in 1746, laid out as a borough in 1794, incorporated in (1866); Carbon co., Pa. (for location of county, see map of Pennsylvania, ref. 4–I): on the Lehighr iver, and the Central of N. J. and the Lehigh Val. railways; 4 miles S. by E. of Mauch Chnnk, 87 miles N. by W. of Philadelphia. There are 6 churches, 12 public schools, electric lights, exhibition-grounds of the Carbon County Industrial Society, and 2 weekly newspapers. The manufactures include stoves and furnaces, car-springs, carriages, bricks, and tanned leather. Pop. (1880) 1,937; (1890) 2,959; (1900) 4,629.

EDITOR OF "CARBON ADVOCATE."

Lehigh University: an institution founded and endowed by Asa Packer, of Mauch Chunk, Pa.; located at South Bethlehem, in the midst of the great engineering, metallurgical, and mining industries of Pennsylvania. It was incorporated by the Legislature of Pennsylvania in 1866 and the first class was graduated in 1869. It comprises a school of literature, having three courses of study, the classical, the Latin scientific, and the course in science and letters; and a school of technology, which has six distinct courses, civil engineering, mechanical engineering, mining and metallurgy, electrical engineering, chemistry, and architecture. There are five buildings devoted to the general purposes of instruction, and also a chapel, a library building, an astronomical observatory, and a gymnasium. The library contained 100,000 volumes in 1900. The museums have a fine collection of the birds of North America and the Roepper collection of minerals. During the collegiate year 1899–1900 there were 42 professors and instructors, and 475 students. The founder of the university, in addition to the gifts of buildings and money during his lifetime, secured to it by his last will an endowment of $2,000,000, of which $500,000 was specially set apart for the library. The presidents have been Henry Coppée, LL. D., from 1866 to 1875, who was also acting president during 1893–94; John M. Leavitt, D. D., from 1875 to 1880; Robert A. Lamberton, LL. D., 1880 to 1893; and Thomas M. Drown, LL. D., 1895. The number of graduates up to Jan., 1901, was 1,142. No honorary degrees have ever been conferred.

MANSFIELD MERRIMAN.

Lehmann, lā'măn, CHARLES ERNEST RODOLPHE HENRI: painter; b. at Kiel, in Holstein, Apr. 14, 1814, and received his first instruction in the art of painting by his father; but settled early in Paris, where he studied under Ingres, and began to exhibit in 1835. He painted many pictures of religious and poetical subjects, of which *The Oceanides* in the Luxembourg is a good example. He decorated the ball-room of the Hôtel de Ville of Paris (burned in 1871) and the throne-room of the Luxembourg. He painted many portraits, including Liszt, Alphonse Karr, Arsène Houssaye, and Baron Haussmann. D. in Paris, Mar. 30, 1882.

Lehmann, LIZA: See the Appendix.

Lehmann, RODOLPHE: painter; a brother of Charles Lehmann, painter; b. at Ottensen, in Holstein, Aug. 19, 1819; studied under his father and brother until 1866, when he took up his residence in London; resided for the most part in Rome, and painted mostly scenes of Italian life and nature. *Le pape Sixte-Quint bénissant les Marais Pontins*, in the Museum of Lille, is one of his most celebrated pieces.

Lehrs, lārs, KARL: classical philologist; b. in Königsberg, Prussia, Jan. 14, 1802: became privat docent in 1831, professor extraordinary 1835, professor ordinary 1845. D. June 9, 1878. His distinction rests upon his epoch-making work *De Aristarchi studiis Homericis* (1833; 3d ed. 1882), which was the first scientific and exhaustive treatment of our sources of knowledge concerning the Homeric researches of Aristarchus and his school, and of the principles which he followed in the recension and exegesis of the text. In his edition of the *Heroides* of Ovid and particularly of the *Odes* of Horace, Lehrs marks the climax of that hypercritical method of interpretation inaugurated by Hofman-Peerlkamp, which, starting with an ideal of poetic perfection, regards everything not in conformity with this subjective conception of poetic propriety as an interpolation. Of other works we may mention the following: *Pindarscholien*, an investigation into the sources of the extant scholia; *Populäre Aufsätze aus dem Alterthum, vorzugsweise zur Religion der Griechen* (1856); and translations of Plato's *Phædrus* and *Symposion*, perhaps the best version of these dialogues in German. See E. Kammer, *Biographisches Jahrbuch* (1879), pp. 15–28.

ALFRED GUDEMAN.

Leib'nitz, GOTTFRIED WILHELM: b. June 21, o. s., 1646, in Leipzig, where his father was notary public and actuary of the university. The father died when Gottfried was six years old. His mother sent him to school, where he evinced a remarkable love of study and unusual talent. He learned Latin without the aid of a grammar at eight years of age, simply by reading and re-reading Livy and the *Chronological Thesaurus* of Calvisius. At the age of fifteen Leibnitz entered the Leipzig University to prepare himself for active life by the study of law. He read in 1663 his dissertation *De Principio Individui*, and in 1666 published his work *De Arte Combinatoria*. In the same year he left Leipzig, because his age was urged as a barrier to his obtaining the degree of *doctor juris*, and went to the university at Altorf, where he obtained it by his dissertation *De Casibus Perplexis*, and was offered a professorship at the university, which he refused. During the winter he remained at Nuremberg, studying the works of Kepler, Galileo, Bacon, Gassendi, and Descartes, also continuing his law studies. Here he made the acquaintance of the celebrated statesman Baron Boineburg, the former Prime Minister of the Elector of Mentz (Mayence), and accompanied him to Frankfort, where he began to prepare himself for a political life. He there published his famous essay, *Nova Methodus discendæ docendæque Jurisprudentiæ* (1668), which he sent to the Elector of Mentz, accompanied by the sketch of a chart "which would enable any judge or lawyer to decide immediately any given case of law according to the fixed principles of jurisprudence." This pleased the elector and he appointed Leibnitz assistant to Dr. Lasser in the elaboration of a reformed code of Roman law. He was at the age of twenty-four appointed by the elector a member of the court of appeals, the highest judicial tribunal of the electorate. He was specially interested at that time in effecting a reconciliation between Protestants and Roman Catholics, and kept up an extensive correspondence with prominent members of both Churches (with Bossuet among others), having discovered, as he thought, a basis on which the theories of both Churches on the subject of transubstantiation, their main point of dispute, could be harmonized. The preparations made by Louis XIV. for a war against Germany at the same time led him to enter deeply into politics. To the

German electors he submitted a memorial, counseling a friendly feeling toward France and the establishment of a united Germany, which, he said, would alone give peace to Europe. To Louis XIV. he submitted a memorial, through Boineburg, which counseled an expedition of France against Egypt, which was so well received by the French king that Louis XIV. expressed his desire for a personal interview with the author. Accordingly, Leibnitz left Mentz in Mar., 1672, for Paris, where he submitted a memorial to the king. He pointed out the conquest of Egypt as the key to India and the humiliation of Holland. Napoleon afterward carried out the scheme in order to threaten Great Britain's power in the East. Leibnitz's main object was to divert the king's mind from a war with Germany by a foreign enterprise. He visited London and made the acquaintance of Newton, Boyle, and others, and was chosen fellow of the Royal Society. On his return to Paris he formed an extensive acquaintance, became intimate with Cassini and Huyghens, who initiated him into deeper mathematical studies that resulted in the discovery of the differential calculus (in 1676, published in 1684). In 1676 he accepted the third offer made him by the Duke of Brunswick-Lüneburg of a position at his court. In 1678 the duke conferred the rank of counselor upon him, which made him a member of the supreme court. When, some years later, the Princess Sophia Charlotte of Hanover, Leibnitz's pupil, married the Prince of Brandenburg, future King of Prussia, it was deemed advisable in 1687 to send Leibnitz to Italy on a political expedition, but chiefly with a view to collect materials for a history of the House of Brunswick (the Guelph family) from the earliest times. Leibnitz made this the great literary work of his life. After his return to the Hanoverian court, Leibnitz was appointed custodian of the Wolfenbüttel Library. His patron, Ernst August, who in 1692 had become Elector of Hanover, died in 1698, and he accepted a call to Berlin from his former pupil, the Princess Sophia Charlotte, and there established the scientific society which has since grown into the Berlin University. In 1700 he was sent on a political expedition to Vienna, and made another attempt to unite the Protestant and Catholic Churches. On his return to Berlin he found that the skepticism of Boyle had made its way there, and at the solicitation of Sophia Charlotte, now Queen of Prussia, wrote his celebrated *Théodicée* to combat it. When in 1711 he met Peter the Great at Torgau, he induced him to found libraries, observatories, etc., and so interested that monarch that he was invited to another personal conference at Carlsbad. In 1714 Leibnitz visited Vienna for the last time, and there wrote for Prince Eugène his *Monadology*, the work by which he is most widely known as a philosophical writer. Leibnitz returned, finished his history of the House of Brunswick, and plunged into other scientific labors, in the midst of which death overtook him, Nov. 14, 1716. Only one person, his secretary, Eckhart, followed him to his grave.

Leibnitz's writings are astonishing for their number and variety. His unpublished manuscripts fill the whole side of one of the rooms of the Hanoverian library, and range over the subjects of law, history, theology, speculative philosophy, mathematics, and all the natural sciences. There is scarcely a branch of human knowledge which his wonderful mind has not explored and enriched. With all his devotion to science he was never forgetful of practical affairs. An accomplished statesman and politician, he was an untiring correspondent, and in society brilliant and interesting as few men even of his time, when society made great demands. The chief points of his philosophical system are three in number: (1) *The Principle of the Sufficient Reason.*—In human knowledge, says Leibnitz substantially in explanation of this principle, we meet with two different classes of knowledge—one which is based on the formula A = A, and which is self-evident, needing, therefore, no further explanation; and one which says of a thing (A) that it is not only this (i. e. A), but also something else. Now, of this latter class, adds Leibnitz, it will not do to assert merely that they are true, but a sufficient ground must be shown why they must be true; and if we can not show the ground, they are not proved true. By strictly separating this class of propositions from those that are merely analytical or identical, and applying to all synthetical assertions the crucial test of the sufficient reason, Leibnitz contends that the higher sciences of physics, metaphysics, etc., can be as conclusively established as those sciences that rest merely upon the analytical principle. (2) *The Doctrine of Monads.*—Leibnitz founded his doctrine of true substances or Aristotle's doctrine of entelechies or self-determined beings, and in his *Monadology* proposes his theory of spiritual atoms in place of the popular doctrine of material atoms. "Supposing," says he in substance, "that we look upon this universe as an infinite number of spiritual activities, each again containing within itself an infinite number of activities, and each thus limiting the other; then every such monadic activity must be limited or influenced in a more or less degree by all the others, so that even the smallest monad, if it could become conscious of all the impressions directed upon it, would become conscious of the whole infinite world. This limitation appears to each monad as something foreign to itself, and where this limitation ceases there is itself in its own body. Each monad having clearest consciousness of what passes within itself, and increasing that consciousness only as it learns to unravel the impressions produced upon it by the other monads, it is simply by the grade of consciousness attained that the monads are distinguished from each other." (3) *Pre-established Harmony.*—There remained, however, to explain how one monad can influence another one, which also involves the question how communication between body and soul is possible. He had already implied its answer: "The soul," says he, "or every other real unity must have been created in such a manner as to have everything arise in it from its own proper nature, with a perfect *spontaneity* in relation to itself, and yet at the same time with perfect *conformity* to the outside things. Thus it is that each of these substances—each representing precisely the whole universe in its own way and according to a certain point of view, and the perceptions or expressions of the external things reaching the soul in this point by virtue of its own laws, as of a world in itself, and as if nothing existed but God and itself—must be in perfect accord with all others. It is this mutual *rapport*, regulated in advance in each substance of the universe, which produces what we call their communication, and which alone constitutes the *union of body and soul*." The chief characteristic of Leibnitz's mind is his tendency to study everything in its evolution; if not the originator he is the chief inciter to the "comparative method" that has come to prevail.

See Kuno Fischer, *Leibnitz und seine Schule*, in vol. ii. of his *Gesch. der neuern Phil.*; also Erdmann's ed. of his works, 2 vols. (Berlin, 1840); Foucher de Careil's ed., 6 vols. (Paris, 1859); G. H. Pertz's ed. (with Grotefend and Gerhardt), 12 vols. (Hanover, Berlin, and Halle, 1843–63); Onno Klopp's ed., 10 vols. (Hanover, 1864–77), contain the historical and political writings; Guhrauer's *G. W. F. Leibnitz* (2 vols., and ed. of Leibnitz's German writings, Breslau, 1837–46); C. J. Gerhardt's edition of the philosophical works, vol. i. in 1875, vol. vii. in 1890, is the completest; G. M. Duncan's English translation of the most important of Leibnitz's philosophical works (New Haven, 1890): J. Dewey's analysis of the *New Essays* (Chicago, 1888); A. G. Langley's complete translation of the same work (London and New York, 1894). *The Journal of Speculative Philosophy* contains translations of the *Monadology* and many of the minor writings, together with a large portion of the *New Essays.*

Revised by W. T. Harris.

Leicester: county-town of Leicestershire, England; on the navigable river Soar; 97 miles N. N. W. of London and 27 miles S. of Nottingham (see map of England, ref. 9–I). The Soar was called the Leire in Anglo-Saxon times, and from Leire ceastre, the fortress of the Leire, Leicester probably derived its present name. Leicester is a parliamentary and municipal borough, and a county in itself. It returns two members to the House of Commons.

General Features.—The town is well built, and contains many wide and regular streets. It is lighted with gas, and has an ample supply of excellent water. S. E. of the town is the New Walk, a fine promenade with an avenue of trees. At its southern extremity is Victoria Park, of about 90 acres. N. W. of the town is the Abbey Park, of about 68 acres. The new race-course is at Oadby, 3½ miles from the town, and race meetings are held several times yearly.

Public Buildings and Institutions.—The old town-hall is supposed to occupy the site of a hall which belonged to a guild of Corpus Christi, and contains, with some old carvings, stained glass supposed to be of Henry VII.'s time. The new town-hall (1874–75) is an extensive edifice in the Queen Anne style, and cost £51,000. The principal front is 200 feet in length. The tower is 130 feet high, and the council chamber, with its vaulted roof, is in the style of the

sixteenth century. Among the chief remains of Leicester Castle, which existed before the Conquest, is a portion of the Great Norman Hall in which several parliaments were held in the fifteenth century, and now converted into assize and session courts. The town museum is the meeting-place of the Literary and Philosophical Society. The town library contains 800 volumes, chiefly old theological works. The free library contains some 27,000 volumes, and has two branch libraries. The School of Art and Lecture Hall (1874) occupies a portion of the site of the museum. A news-room, with a permanent library, occupies an edifice, in the classic style, erected in 1840. The market house and corn exchange are in the market place, an open area of 4 acres. The opera-house (1877) will seat 5,000 persons, the Theatre Royal 1,500, and the Prince of Wales's Theatre of Varieties 1,260 persons. At the center of the town is a clock-tower erected by public subscription as a memorial of four benefactors of Leicester, foremost among them being the famous Simon de Montfort, Earl of Leicester, who established churches and religious houses in the town. There is an infirmary, opened in 1771, and several times enlarged. A borough lunatic asylum was erected 1869–90, at a cost of £60,000, and a children's hospital in 1889. On the north side of the Newark (New Wark), an area added to the castle by Henry, Earl of Lancaster, Leicester, and Derby, father-in-law of John of Gaunt, is Trinity Hospital, founded by him in 1330, for fifty old men and five women as their nurses. Wyggeston's Hospital for twelve men and twelve women and three chaplains was founded in 1513 by William Wyggeston, a Leicester merchant, and rebuilt on a new site. There are many other old and minor charities.

Churches, Chapels, etc.—There are at least twenty churches and more than forty chapels of different denominations, some of which are large and elegant. To the N. of the borough and on the north bank of the Soar are the remains of Leicester Abbey, founded in 1143, where in 1530 Cardinal Wolsey came to ask "a little earth for charity," and, dying, was buried in the precinct. St. Mary's church, restored in 1875, is an ancient building in the Norman and early English styles. St. Martin's church, cruciform and of great width, restored at a cost of £20,000, is chiefly early English. St. Nicholas, the oldest of the churches, dedicated about 1224, is an example of very rude early Norman. St. Margaret's, a beautiful stone edifice erected in 1444, is Early English and Perpendicular.

Schools.—The bequest of William Wyggeston having reached in value £5,000 a year, the charity commissioners founded with it the Wyggeston schools, with which Queen Elizabeth's Grammar School was incorporated. The old Greencoat School, founded by Alderman Newton with a yearly income of £1,100, has been converted into a public elementary school, with scholarships attached. The school board has erected more than fifteen public elementary schools, with accommodations for nearly 14,000 children.

Government and Administration.—The town is governed by a mayor and corporation, acting also as the urban sanitary authority. The town owns the water-works and gas-works, and has spent large sums in widening the Soar and diverting the Union Canal, and in constructing new weirs, locks, bridges, and flood-channels. There are also public baths.

Manufactures and Industry.—The manufacture of woolen cloth was attempted here in the middle of the sixteenth century. At its close, the hand-knitting of hose was begun and was extensive toward the close of the seventeenth century. Early in the nineteenth century woolen and cotton socks and woolen shirts were made, and gloves and other articles have since been added. In 1891 12,371 persons were employed in the production of hosiery. In the manufacture of boots and shoes the town takes rank after Northampton, and in 1891 gave employment to 24,159 persons. An impetus was given to this industry by the introduction of the elastic web in boot-making. There is a large production of elastic fabrics, to be used by hosiers and glove-makers as well as in the boot-trade. The other chief industries are the woolen and worsted manufactures, which in 1891 employed 1,398 persons, and iron-working, including engine and machine making. The trade owes much to the facilities for communication through the various important lines of railway converging here, as well as by the Soar and the Union Canal.

History.—Leicester was a Roman station, and many remains of the Roman occupation have been discovered in it. The castle, said to have been founded in 914, and to have been rebuilt after the Conquest, had fallen into such dilapidation that when Richard III. passed through the town on the eve of the battle of Bosworth, he preferred sleeping at the Blue Boar, a hostelry long since destroyed. After the battle his corpse was brought to Leicester, and having been buried in the Church of the Grey Friars, it was taken thence at the dissolution of the monasteries and thrown into the Soar. In the civil war Leicester held for the Parliament, was taken by the Royalists, and retaken by Fairfax. Its modern history presents few features of interest.

Population.—The population, which in 1801 was 17,005, had increased in 1871 to 95,220, in 1881 to 122,351, in 1891 to 174,624, and in 1901 to 211,574.

See Thompson, *History of Leicester* (1849–71); Read, *Modern Leicester* (1881); *Hosiery and Lace*, by W. Felkin, in Bevan's *British Manufacturing Industries* (1877); local guide-books; Kelly's *Directory of Derbyshire, Leicestershire, Rutland, and Nottinghamshire*; parliamentary papers, etc.

F. Espinasse.

Leicester: See Montfort.

Leicester, Robert Dudley, Earl of: courtier; a son of the Duke of Northumberland who was executed for trying to make Lady Jane Grey queen in 1553; b. in England, June 24, 1533; married Amy Robsart 1550; was condemned as a traitor, but pardoned 1554; became the favorite of Queen Elizabeth, who made him K. G. and master of the horse 1558. The sudden death of his wife in 1560 aroused strong suspicions that he was aspiring to the hand of the queen. He was created Earl of Leicester in 1564; in 1566 Elizabeth proposed his marriage with the Queen of Scots, and somewhat later his secret marriage with the widow of Essex aroused the anger of the queen. He was sent to the Low Countries as captain-general in 1585 and 1587, but displayed no capacity; was in 1588 generalissimo of the troops raised against the Spaniards. D. in Oxfordshire, Sept. 4, 1588. His character presents a rather perplexing problem. He was tall and handsome, with ingratiating manners, but vain, presuming, and without ability corresponding to his ambition.

Leicestershire: a county nearly in the center of England; bounded on the N. by Nottinghamshire, on the N. W. by Derbyshire, on the N. E. by Lincolnshire, on the E. by Rutland, on the S. E. by Northamptonshire, on the S. W. by Warwickshire, and for a mile or two on the W. by Staffordshire. Area, 824 sq. miles. It has a lord-lieutenant and a county council. It returns four members to the House of Commons, one for each of its four divisions. It contains no parliamentary borough but Leicester, and has only five towns besides Leicester with a population above 5,000—Loughborough, Hinckley, Ashby-de-la-Zouch (the scene of the tournament in *Ivanhoe*), Melton-Mowbray, and Market Harborough. The chief seat of the staple manufacture of the county, hosiery, is Leicester, but it is carried on to some extent at Loughborough and Hinckley, and there are coal mines at Ashby-de-la-Zouch. Otherwise Leicestershire is a great grazing country. According to the agricultural returns for 1893, of 473,399 acres of cultivated land 350,359 were in permanent pasture. The breed of sheep known as New Leicester is not of such repute as it was, but the wool of the Leicestershire sheep is in great demand for the hosiery-manufacture. There are many dairy farms where are made both flat cheeses, which are in great demand, and the famous Stilton cheeses, the latter coming from the Melton-Mowbray district, which has given a name to the also well-known Melton-Mowbray pies. Leicestershire is a great hunting county, and Melton-Mowbray and Market Harborough are the headquarters of hunters during the season. Belvoir Castle, the seat of the Dukes of Rutland, is 12 miles from Melton-Mowbray. At Lutterworth, 13 miles S. of Leicester, the great reformer John Wycliff was rector during the last ten years of his life, 1375–84. Pop. of the county, (1901) 225,895.

F. Espinasse.

Leichhardt, līch'haart, Ludwig: explorer; b. in Trebatsch, Prussia, Oct. 23, 1813; was educated in Göttingen University. He spent many months after 1841 in geological investigations and travels in New South Wales, Australia, the results of which he embodied in his *Contributions to the Geology of Australia*. He started (1844), with seven comrades, and traveled N. from Moreton Bay, near the present city of Brisbane, through the heart of Queensland to Port Essington, one of the most northern points of the continent. From beginning to end the journey, 2,500 miles long, and occupying sixteen months, was a revelation of the unknown. He wrote an account of this expedition (*Journal of an Over-*

land Expedition in Australia from Moreton Bay to Port Essington, London, 1847). He started from Moreton Bay (1847) with a small party to cross the continent, through its central portion, from E. to W. Four months later the last tidings ever heard of him came from Fitzroy Downs, in inner Queensland. He was then journeying W. Two years later began the series of search expeditions, stimulated by offers of large rewards to those who should relieve Leichhardt or learn his fate. Many false reports about him were invented, the latest in 1889, but no authentic information has ever been obtained. The large region from which he sent back his last cheerful message is known as the Leichhardt district, and a river in Northern Queensland bears his name. C. C. Adams.

Leiden: See Leyden.

Leidy, li'di, Joseph, M. D.: naturalist; b. in Philadelphia, Sept. 9, 1823; graduated in medicine at the University of Pennsylvania in 1844; devoted himself to biological researches, especially comparative anatomy and vertebrate palæontology, on which papers were published in *Proc. of Acad. Nat. Sciences* of Philadelphia, *Trans. of Am. Philos. Soc.* and *Smithsonian Contribs. to Knowledge*; in 1853 was chosen Professor of Anatomy in the medical department of the University of Pennsylvania, and in 1871 Professor of Natural History in Swarthmore College, both which positions he long filled. During the civil war Prof. Leidy rendered important service as surgeon at Satterlee Hospital, Philadelphia. His contributions to scientific periodicals number more than 500. Among his more important works are *Memoir on an Extinct Species of American Ox* (1852); *Flora and Fauna within Living Animals* (1853); *Ancient Fauna of Nebraska* (1853); *Memoir on the Extinct Sloth Tribe of North America* (1855); *Cretaceous Reptiles of the United States* (1865)—all published by the Smithsonian Institution; and *Contributions to the Extinct Vertebrate Fauna of the Western Territories* (1873), and *Fresh-water Rhizopods of North America* (1879), published by U. S. Geol. Survey of the Territories. D. in Philadelphia, Apr. 30, 1891. Revised by G. K. Gilbert.

Leif Erikson, or **Ericsson**: the son of Erik the Red (*q. v.*); the discoverer and colonizer of Greenland. Leif Erikson was born in Iceland about the year 970, and in the year A. D. 1000 he became the discoverer of North America (Vinland). The American coast had been sighted fourteen years before by another Icelander, Bjarne Herjulfson, but as he was on his way to Greenland, and the season was far advanced, he did not go ashore. Bjarne's father, Herjulf, had accompanied Erik the Red when the latter went to settle in Greenland. Bjarne was in Norway that year, and when, on his return to Iceland, he learned of his father's departure with Erik he and his crew resolved to spend the winter with his father. The saga relates that after three days' sailing they lost sight of Iceland. Then a north wind and fog set in for several days, and they knew not where they were. Finally the sun appeared, so that they could determine the quarters of the sky, and they saw in the horizon the outlines of an unknown land. On approaching it they saw that it was without mountains and that its hills were well wooded, but, as it did not correspond to the description of Greenland, Bjarne would not go ashore. He knew he was much too far south, and so he sailed on northward, and before reaching Greenland he twice again sighted land on his left. There are no means of determining with certainty what part of the American coast Bjarne saw, but taking into account all the details as given in the saga (the celebrated *Flateyarbók*), the circumstances of the voyage, the course of the wind, the direction of the current, the character of the lands seen, and the presumed distance between each sight of land, it may be confidently assumed that the first land mentioned was some part of New England, the second Nova Scotia, and the third Newfoundland. When Bjarne Herjulfson several years later visited Norway and gave an account of his discoveries, a desire was aroused in the mind of Leif Erikson to find out more definitely what lands Bjarne had seen. The story of the Norse discovery of America is told with slight discrepancies in two sagas, one being found in the *Flateyarbók* and the other in the so-called *Hauksbók*. The *Hauksbók* saga does not mention Bjarne Herjulfson at all, but tells that Leif stumbled on America (Vinland) on his way to Greenland, whither he had been sent by King Olaf Trygvason to introduce Christianity. The best method in such a case would seem to be to accept so far as they can be reconciled the statements of both sagas, thus neither annihilating Bjarne on the one hand nor disputing Leif's mission to Greenland on the other.

The natural inference is that Leif left Norway in the year 1000 with two purposes, one of which was to explore the lands seen by Bjarne and the other to proceed thence to Greenland and preach the Christian religion to the colonists there. He bought Bjarne's ship, sailed with a crew of thirty-five men, and found the lands seen by Bjarne far to the S. of Greenland. He first landed in Newfoundland, which he named Helluland (land of flat stones), then in Nova Scotia, which he called Markland (Woodland), and finally in New England, which he called Vinland (Wineland) on account of the abundance of wild grapes growing there. He spent the winter (1000–01) in Vinland, and sailed for Greenland in the spring. On his way to Greenland he saved fifteen men from a shipwreck, and for this he was called Leif the Lucky. He remained in Greenland, and after the death of his father he became the chief of the colony. He died about the year 1021. The saga account of the Norse discovery of America is fully confirmed by the distinguished canon and historian, Adam of Bremen (*q. v.*). The question whether Columbus possessed any knowledge of the Norse discovery or not can not be answered with certainty. There is no direct proof either way, and the assertion that he did know of Norse visits to lands in the far West is based wholly upon circumstantial evidence. It is claimed that he may have seen a copy of the book written by Adam of Bremen. It is recorded in the life of Columbus, written by his son Ferdinand, that Columbus visited Iceland in Feb., 1477, and it is reasonable to suppose that he obtained information of the lands visited by the immediate ancestors of the Icelanders. Gudrid, the widow of Thorfin Karlsefne, one of the chief explorers of Vinland, made a pilgrimage to Rome, where she was well received, and she doubtless there told about her three years' residence in Vinland. Finally, the attitude of Columbus on many occasions would seem to favor the presumption that he knew there was land in the west. Thus he stated the breadth of the ocean correctly, and spoke of the lands beyond the sea with as much firmness and certainty as if he had already seen them. Down to the time of Columbus the other peoples of Europe were limited in their nautical knowledge to coast navigation. The Norsemen, and foremost among them Erik the Red and his son Leif, taught the world pelagic navigation. They demonstrated the possibility of venturing out of sight of land with nothing but the sun, moon, and stars to guide them, and in this sense at least it may be said with perfect propriety that the Norsemen prepared the way for the great Christopher Columbus. See R. B. Anderson's *America not Discovered by Columbus*; A. M. Reeves's *The Finding of Wineland the Good*; John Fiske's *The Discovery of America*; and C. C. Rafn's *Antiquitates Americanæ*. See Vinland.

Rasmus B. Anderson.

Leigh, lee: town of England; in the county of Lancaster, 16 miles W. of Manchester (see map of England, ref. 7–G). It has large manufactures of cambrics, muslins, silk and cotton goods, and glass. (Pop. 1891) 28,702.

Leighton, lā'tŭn, Alexander, M. D.: religious controversialist; b. in Scotland in 1568; was educated at the University of St. Andrews, in which he was Professor of Moral Philosophy from 1603 to 1613, when he became a Presbyterian preacher in London, where he also practiced medicine; wrote *Speculum Belli Sacri; or the Looking-glass of the Holy War* (1624) and an *Appeal to the Parliament; or Sion's Plea against the Prelacie* (1628). For the latter publication, deemed libelous with respect to the king, queen, and bishops, Leighton was sentenced by the Star Chamber to be twice publicly whipped, to lose both ears, to stand twice in the pillory, to be branded on the cheek with the letters S. S. (sower of sedition), to pay a fine of £10,000, and to suffer perpetual imprisonment in the Fleet. After eleven years' imprisonment he was released by order of the Long Parliament in 1640, received pecuniary indemnity, and in 1642 was made keeper of Lambeth Palace as a state prison, where he died in 1649. He gave an account of his sufferings in his *Epitome* (1646). Revised by S. M. Jackson.

Leighton, Sir Frederick: historical, genre, and portrait painter; b. at Scarborough, England, Dec. 3, 1830. He began the study of drawing in Rome when eleven years of age; studied in Berlin, Florence, Frankfort, Brussels, and Paris, and exhibited *The Procession of Cimabue's Madonna* at the Royal Academy, London, in 1855. It was bought by the Queen, and after that he studied in Paris four years under

Ary Scheffer. He became a Royal Academician in 1869, and was knighted in 1878 when he was elected president; was created baronet in 1885; was awarded a second-class medal, Paris Salon, 1859; first-class medal, Paris Exposition, 1889; was made an officer of the Legion of Honor 1878; was corresponding member of the Institute of France; member of the Academy of St. Luke, Rome, and Academy of Florence; and was awarded medal of honor, Antwerp Exposition, 1885. He was a distinguished sculptor, and received a medal of honor for his works in that branch of art at the Paris Exposition of 1889. A triptych, *Music*, is in the ceiling of the house of Henry G. Marquand, New York, and the *Reconciliation of Montague and Capulet* is owned by Mrs. Joseph Harrison, Philadelphia. Was made a peer Jan. 1, 1896. D. Jan. 25, 1896.

Leighton, Robert, D. D.: archbishop; son of Alexander Leighton, controversialist; b. probably in London in 1611; graduated at the University of Edinburgh (1631), of which he became principal in 1653; was appointed Bishop of Dunblane in 1661, in pursuit of the plan of Charles II., Sharpe, and Lauderdale to Anglicize the Church of Scotland; accepted it with reluctance; appealed twice to the king to adopt milder measures in the attempted reform (1665 and 1669); accepted the archbishopric of Glasgow in 1670, but resigned in 1673 and retired to Broadhurst, Sussex. D. in London at an inn, just where he wished to die, June 26, 1684. His works, all posthumous, are highly esteemed for their broad and liberal views and saintly piety; they include *Sermons* (1692); *Prelectiones Theologicæ* (1693); *Commentary on the First Epistle of Peter* (1693); and *Posthumous Tracts* (1703), and have been often reprinted. See his *Life* by J. N. Pearson, accompanying the *Works*, best in West's edition (London, 1875, 7 vols.).

Leinster, lin'ster, or leen'ster: province of Ireland, comprising the southeastern portion of the island, bordering on the Irish Sea and St. George's Channel. Area, 7,622 sq. miles. Before the English invasion this province formed two kingdoms, those of Leinster and Meath; now it is divided into twelve counties, namely: Dublin, Meath, Louth, Kildare, Carlow, Kilkenny, King's, Longford, Queen's, Westmeath, Wicklow, and Westford. Pop. (1891) 1,187,760.

Leipo'a ocella'ta [Mod. Lat.]: scientific name of the native pheasant of Australia, a gallinaceous bird of the family *Megapodidæ*, somewhat smaller than the turkey. Its flesh is good and its eggs are excellent. The nest is a mass of leaves, dirt, and sticks, the heat of which, produced by fermentation, hatches the eggs. The leipoa is a swift runner, but is very stupid, and often tries to escape the hunter by hiding her head in a bush.

Leipzig, or **Leipsic**: the largest city of the kingdom of Saxony and one of the most important cities of Europe; situated at the junction of the Pleisse, Parthe, and Elster (see map of German Empire, ref. 4–F). Pop. (1900, with the suburbs, which were included in the city in 1891) 455,089, of which eight-ninths are of the Lutheran faith. The city is divided into three tolerably distinct sections—first, the old inner town, the center of the industry and wealth of the city; second, the beautiful promenades, which, surrounding the inner city, occupy the place of the old fortifications and join the most important public square of the city; third, suburbs of modern origin and appearance. In its three sections the city offers sharp contrasts in plan and in architecture. The inner town contains the market-place, with a town-hall erected in the sixteenth century, and other fine old buildings. Among the most interesting buildings of the city are the new theater, built from 1864 to 1867, after plans by Langhaus, in Renaissance style, with a porch on Corinthian columns in the front and a magnificent veranda in the rear; the museum, opposite the theater, finished in 1858 after plans by Lange, and containing on the ground floor a not very important collection of plaster casts, on the middle floor a large collection of pictures, among which are four celebrated landscapes by Calame, and on the upper story a large collection of engravings; the Augusteum, the main building of the university, built by Geutebrück in 1836 after plans by Schinckel; the new university library building, completed in 1891 at a cost of over $500,000, without the site; and the Pleissenburg, the scene of Luther's famous disputation with Dr. Eck in 1519. The most remarkable among the churches are the Nicolaikirche, built in Gothic style in the twelfth century, and the Thomaskirche, built in the fifteenth century, and containing a beautiful marble altar. In several lines of commerce Leipzig is the most important city in Germany. It is the center of the book-trade, over 500 firms being engaged in this business, publishing more than 2,600 works annually. Since the twelfth century it has been the site of the most important *Messe*, or fair, of Germany. There are three of these annually, and, though they have lost something of their old consideration, they still attract from 25,000 to 30,000 foreign merchants each year. During the time the *Messe* is in progress the aspect of the city is much changed, both by the multitude of booths and shops that fill the market-place, the Augustus Platz, and all surrounding portions of the city, and on account of the great bustle in the streets. The chief articles sold at the *Messe* are furs, leather, cloth, wool, linen, and glass. Leipzig is also a center for music and art. An academy for plastic arts, an art industrial school, and the Conservatory of Music (founded in 1843), have a high reputation, the latter being one of the most famous schools of music in Europe. The Gewandhaus, built in 1481, contains the municipal library. A new Gewandhaus has been erected, where the world-celebrated Gewandhaus concerts are continued, and a new building for the Conservatory of Music adjoins it. These concerts were conducted by Mendelssohn 1835–41. The University of Leipzig was founded in 1409, and is the second largest in the German empire. Attendance (1894), 3,518 students. The university has a strong faculty, and is one of the two or three recognized centers of scholarship in the world. Its library contains 500,000 volumes. In addition to the university the city has a number of schools of the highest character. Leipzig appears as a town for the first time in history in 1015. Before that time it was an insignificant village, in which Henry I. built a castle in 922. During the Middle Ages the fortifications of the city protected its commerce, and Charles V. increased the privileges of its *Messe*. In the time of the Reformation it supported the new doctrine, but suffered much from the war, and afterward felt more severely the Thirty Years' war. Tilly took it in 1631; later the Swedes and the imperials held it alternately. Its prosperity was entirely destroyed. The Seven Years' war destroyed its enterprise once more, but its favorable location enabled it to recover rapidly. During the wars of Napoleon new calamities came over it. From Oct. 16 to 18, 1813, the great battle in which Napoleon was defeated raged in and around it, and all great movements in Germany have affected it more or less on account of its central position.

C. H. Thurber.

Leishman, leesh'măan, William: obstetrician; b. in Govan, Scotland, in 1833; was educated at Glasgow University, where he graduated M. D., with honors, in 1855; began to practice in Glasgow, devoting special attention to midwifery and gynæcology, and was appointed to that chair in the professorial staff of Anderson's College; was elected to the chair of Midwifery in the university in 1868, and he occupied it with distinguished honor until 1893, when, on his retirement, he was made emeritus professor. He was a licentiate of the Royal College of Surgeons of Edinburgh and vice-president of the Obstetrical Society of England. In 1873 he published his *System of Midwifery*, a work that has passed through several editions. D. Feb. 18, 1894.

S. T. Armstrong.

Leisler, līs'ler, Jacob: colonial insurrectionist; b. at Frankfort, Germany; went to North America in 1660 as a soldier in the service of the Dutch West India Company; was some time stationed at Albany, where he engaged in trade with the Mohawk Indians, and acquired some wealth. While on a voyage to Europe in 1678 he was taken prisoner by Moorish corsairs, obtained liberty by paying a ransom, returned to New York, and in 1683 became one of the commissioners of the court of admiralty. On May 31, 1689, Leisler headed an insurrection for the preservation of the Protestant religion, took the fort, declared for the Prince of Orange, and planted within the fort a battery of six guns, which gave origin to that name as still applied to the public park at the lower end of Manhattan Island. A committee of safety was formed and Leisler was invested with the powers of a governor. In December he dissolved the committee of safety, appointed a council, and assumed the style of a royal governor, on the strength of a dispatch addressed "to such (person) as for the time being takes care for preserving the peace and administering the laws in His Majesty's province of New York." Early in 1690 he sent a small fleet against the French at Quebec. On the appointment of Sloughter as governor, Leisler refused to surrender the fort and the government (Mar. 1691) until convinced of the former's identity and authority. For this constructive treason Leisler was

soon after imprisoned, with his son-in-law and secretary, Jacob Milborne, and both were condemned and executed May 16, 1691. The memory of Leisler was rehabilitated by an act of Parliament (1695), an indemnity was given to his heirs (1698), and his bones and those of Milborne were honorably buried in the Dutch church. Leisler, during his brief authority (1689), purchased lands at New Rochelle as a place of refuge for persecuted Huguenots.

Leith, leeth: town; in the county of Edinburgh, Scotland, on the Firth of Forth; 2 miles from Edinburgh, whose port it is, and with which it is connected by continuous rows of houses (see map of Scotland, ref. 11–H). Its streets are narrow, tortuous, and filthy, but its harbor is excellent, is 25 feet deep, has a breakwater, and contains two wet and three dry docks. Its ship-building, both in wood and iron, and its manufactures of rope, sailcloth, soap, etc., are considerable, and it imports large quantities of grain, wine, hemp, timber, and tobacco. Pop. (1901) 76,667.

Leitha, lī'tăă: a river which rises in Lower Austria, forms for some distance the boundary between the two divisions of the Austro-Hungarian empire, called, after the river, Cisleithania and Transleithania, breaks through the Leitha Mountains, which rise from 1,500 to 2,000 feet, into Hungary, and joins the Danube at Altenburg.

Leitner, Gottlieb Wilhelm, Ph. D.: Orientalist; b. at Pest, Hungary, Oct. 17, 1830. His father, a German physician, left Hungary in consequence of the revolution of 1849, and settled in Turkey, where Gottlieb, already acquainted with the classical languages, became proficient in Turkish, Arabic, and Modern Greek. He became interpreter to the English commissariat during the Crimean war, after which he went to London, was naturalized as a British subject, and became Professor of Oriental Languages and Mohammedan Law in King's College. In 1864 he was appointed director of a college at Lahore, in the Punjaub. From 1866 to 1868 he was engaged in an exploration of Tibet and other countries N. of the Himalayas, and was the first to make known the remarkable country of Dardistan, with its interesting group of languages. At a later date he extended his philological researches to the languages of Cabul, Kashmir, and Badakhshan, excavated an important series of Græco-Buddhist sculptures, and exhibited at the Vienna Exposition of 1873 an extensive collection of Central Asiatic antiquities. He published a *Philosophical Grammar of Arabic* in the English, Urdu, and Arabic languages; *The Races of Turkey*; a *Comparative Grammar of the Dardu Languages*; *History, Songs, and Legends of Dardistan*; and *Græco-Buddhist Discoveries*. D. in Antwerp, Mar. 24, 1899.

Leitrim, lee'trim: county of Ireland; in the province of Connaught; bordering N. on Donegal Bay. Area, 619 sq. miles. There are numerous lakes, of which Lough Allen, traversed by the Shannon, is the largest. The ground is hilly, very irregular, and rugged; coal, iron, and lead are found. The soil is cold, stiff, and retentive, except in the valleys, where it is very fertile. Rye, potatoes, and oats are the common crops; some cattle are reared. Pop. (1891) 78,-618. The principal town is Carrick-on-Shannon. Pop. 1,568.

Leixner, Otto, von: b. at Saar, Germany, Apr. 24, 1847; studied at Graz and Munich, and lives in Berlin. He made himself known especially as a literary critic and as the author of an illustrated history of German literature. Among his writings may also be mentioned *Gedichte* (1877); *Dämmerungen* (1886); *Deutsche Worte* (1887); *Sociale Briefe aus Berlin* (1891); *Laienpredigten für das deutsche Haus* (1894). Julius Goebel.

Leland, Charles Godfrey: author and educationist; b. in Philadelphia, Aug. 15, 1824; graduated at Princeton College in 1846, after which he spent two years traveling in Europe, and studying at Heidelberg, Munich, and Paris, devoting himself especially to æsthetics and the philosophy of modern civilization. Returning to Philadelphia in 1848, he studied law, but abandoned its practice in order to devote himself to literature; edited in New York *The Illustrated News*, and subsequently was connected with *The Evening Bulletin* in Philadelphia; about 1861 established in Boston *The Continental Magazine*; returned to Philadelphia in 1863 and for several years edited *The Press*; from 1869 to 1880 lived in Europe. He has since devoted many years to the introduction of industrial teaching in the Philadelphia public schools, and published, in furtherance of this object, *Practical Education* (1888), a *Manual of Wood-carving* (1891), and *Leather-work* (1892). Mr. Leland achieved his greatest popularity by productions of a humorous or burlesque character. Among his works are *The Poetry and Mystery of Dreams* (1855); *Meister Karl's Sketch-book* (1855); *Sunshine in Thought* (1862); *Legends of Birds* (1864); *Hans Breitmann's Ballads* (5 parts, 1867–70); a volume of poems (1871); *Egyptian Sketch-book* (1873); *English Gypsies and their Language* (1873); *Fu-Sang* (1874); *Algonkin Legends of New England* (1884); *Etruscan-Roman Remains in Popular Tradition* (1892); besides translations from Heine and Scheffel. In 1875 he published a volume of *English Gypsy Poetry*, assisted by Miss Janet Tuckey and Prof. Edward H. Palmer, in 1882 *The Gypsies*, and in 1891 *Gypsy Sorcery and Fortune-telling*. As a writer of dialect poetry Mr. Leland has a considerable mastery of the quaint speech of the "Pennsylvania Dutch." See his *Memoirs* (New York, 1893). Revised by H. A. Beers.

Leland, or **Laylonde**, John: antiquary; b. in London, England, about 1500; was educated at St. Paul's School and at Oxford; took holy orders, and devoted himself to the study of English antiquities. He was appointed by Henry VIII. one of his chaplains, rector of Popeling near Calais, and royal antiquary (1533). In the latter capacity he was commissioned to make a survey of England, a task which occupied him six years, and was so thoroughly performed that the mass of materials gathered was more than he could arrange. After eight years' solitary labors of classification he became insane in 1550, and died in London, Apr. 18, 1552. His account of British authors, entitled *Commentarii de Scriptoribus Britannicis*, was published in 1709 by Dr. Anthony Hall. His *Itinerary of England* (9 vols.) was published in 1710–12, and his *De Rebus Britannicis Collectanea* (6 vols.) in 1715, both works being edited by an eminent scholar, Thomas Hearne. Leland's manuscripts were deposited in the Bodleian Library at Oxford, and were largely used by Stowe, Camden, and Dugdale in their respective antiquarian works.

Leland, Thomas, D. D.: classical scholar; b. in Dublin, Ireland, in 1722; was educated at Trinity College, Dublin, where he became fellow in 1746. His translation of the *Orations of Demosthenes* (1756–70) was long a standard work; he also published a *History of the Life and Reign of Philip, King of Macedon* (1758); a *Dissertation on the Principles of Human Eloquence* (1764), a controversial work against Bishop Warburton; a *History of Ireland* (3 vols., 1773); *Sermons* (1769), etc. D. in Dublin in Aug., 1785.

Leland Stanford Junior University: an institution of learning in California; founded by the Hon. Leland Stanford and Mrs. Jane Lathrop Stanford in memory of their only child, who died in 1884. A grant of endowment was made by the State Legislature, Nov. 14, 1885. The corner-stone was laid May 14, 1887, and the university formally opened to students Oct. 1, 1891, under the presidency of David Starr Jordan, LL. D.

The site chosen for the location of the university is at Palo Alto in the Santa Clara valley, 33 miles S. E. of San Francisco. The grounds consist of over 8,000 acres, partly lowland and partly rising into the foot-hills of the Sierra Morina. In addition to this estate, the grant of endowment conveys to the university an estate at Vina in Tehama County, of 55,000 acres, and another at Gridley, in Butte County, of 22,000 acres. It is expected that the future endowment of the university will be not less than $20,000,000.

The buildings reproduce on a large scale the architecture of the old Spanish missions of California. The main departments of the university will be included in two large quadrangles, one entirely surrounding the other. The twelve one-story buildings of the inner quadrangle are connected by a continuous open arcade, and inclose an area 586 feet long by 246 feet wide, containing 3¼ acres. The buildings of the outer quadrangle will be similar in construction, but will be two stories high and will have the open arcade on the outside. At the main opening there will be a memorial arch 80 feet wide by 85 feet high, the open archway having a span of 46 feet. In addition there are two large dormitories, a large museum, boiler-house, shops, and foundry, two gymnasiums, and numerous cottages.

The general management and control of the institution is vested in a board of twenty-four trustees chosen for life. The charter provides that the founders during their life shall "perform all the duties and exercise all the powers and privileges enjoined upon and vested in the trustees." To the president, appointed and removable at will by the trustees, is intrusted the selection of the faculty and the determination of the

educational policy of the university. The president has an absolute veto upon all legislation by the faculty or council, and the ordinary routine business is done by committees responsible primarily to him. Each professor is regarded as supreme in his own department, and in all the details of his work is responsible only to the president.

The general scope of the institution as stated in the charter is "that of a university, with such seminaries of learning as shall make it of the highest grade, including mechanical institutes, museums, galleries of art, laboratories, and conservatories, together with all things neeessary for the study of agriculture in all its branches and for mechanical training, and for the studies and exercises directed to the cultivation and enlargement of the mind." The general biological departments of the university are supplemented by the Hopkins Seaside Laboratory at Pacific Grove.

The conditions of entrance are the same for all courses and students. Twenty-six subjects are offered, each reduced to the unit of a high-school year. All students must present ten subjects for entrance, including English. Students with not more than two conditions are admitted to partial standing. There are no prescribed courses of study in the ordinary acceptation of the term. One two-hour course in English composition is required of all students before graduation. With certain limitations all the remaining work is elective. For graduation the equivalent of the usual four years' work is required. There is no time limit, however, and the division into freshmen, sophomore, junior, and senior classes is not recognized. Every student who completes satisfactorily his major subject and the full 120 hours required for graduation is granted the degree of bachelor of arts. One year of satisfactory graduate work in residenee at the university is required of candidates for master of arts. The professional degrees of mechanical engineer (M. E.) and civil engineer (C. E.) are granted to bachelors of arts in engineering on the completion of an additional year in residence and the presentation of a satisfactory thesis. The degree of Ph. D. is given only on the ground of advanced scholarship and the ability to do independent work in some special line. No honorary degrees are given.

The faculty at the beginning of the second year numbered 71. The first graduating class, June 15, 1892, numbered 38, of whom 29 took the degrce of bachelor of arts and 9 the degree of master of arts. The number of students at the opening of the second year was 710, classified as follows: 55 graduates, 483 undergraduates, 172 special students. Of these, 506 were men, 204 women. In 1900 the faculty numbered 85; students, 1,153 (690 men, 463 women). O. L. Elliott.

Lelewel, lā-lā′vel, Joachim: historian; b. at Warsaw, Poland, Mar. 21, 1786; studied in his native city and at Vilna, and became Professor of History at the Lyceum at Kremenets in Volhynia in 1809, and at the University of Vilna in 1814, but was dismissed in 1824, being suspected of participating in secret revolutionary associations. He was elected a member of the Polish diet in 1825, and became one of the most energetic and influential agitators, and one of the most prominent leaders of the Polish rising of 1830. After the failure of the revolution he fled to France, and lived partly in Paris, partly at Lagrange, the villa of La Fayette; but in 1833 he was banished from France on account of his participation in different Polish conspiracies. He went to Brussels, where he resided for the rest of his life, wholly devoted to science. D. May 29, 1861. His writings are very numerous, but they are all of the highest order. His knowledge is always ample, and his style is pure and very impressive. Besides his *Numismatique du Moyen Âge* (Paris, 1835), *Pythéas de Marseille et le Géographie de son Temps* (Paris, 1836), *Géographie des Arabes* (2 vols., Paris, 1851), and *Géographie du Moyen Âge* (4 vols., Breslau, 1852–57), he wrote several works relating to the history of his native country. The principal of these are *History of Poland* (Warsaw, 1829), with a continuation (Brussels, 1843); *Considérations sur l'État politique de l'ancienne Pologne, et sur l'Histoire de son Peuple* (2 vols., Paris, 1844); *La Pologne au Moyen Âge* (3 vols., Posen, 1846–51).

Leloir, le-lwăăr′, Alexandre Louis: genre-painter; b. in Paris, Mar. 15, 1843. He was a pupil of his father, J. B. Auguste Leloir, historical painter: was awarded medals in the Salons of 1864, 1868, and 1870; second-class medal, Paris Exposition, 1878; chevalier of the Legion of Honor 1879. D. in Paris, Jan. 28, 1884. He was a painter of charming talent in both oil and water-color, whose pictures are valued for their beauty of color and fine technical qualities. W. A. C.

Lelong, le-lōṅ′, Jacques: cataloguer; b. in Paris, Apr. 19, 1665. He was destined for the order of St. John, and received his first education at Malta. Later he studied in Paris, and in 1699 was appointed librarian at the *oratorium* of St. Honoré in Paris, where he died Aug. 13, 1721. His *Bibliotheca Sacra*, a catalogue of all editions and translations of Holy Scripture (2 vols., 1709; 2d ed. 1723), and his *Bibliothèque historique de la France* (1719), a catalogue of all French historians and their works, are regarded as model works of bibliography. See his *Memoir* by Desmolets in the second edition of his *Bibliotheca Sacra*.

Le′ly, Peter van der Faes (known as *Sir Peter Lely*): painter; b. at Soest, in Westphalia, in 1618. He studied painting with Grebber, of Haarlem. He was already very successful at the age of twenty-five when the Prince of Orange (William III.) took him to England to paint the royal family on the occasion of his marriage with the daughter of Charles I. In England he immediately received innumerable commissions, great wealth, and the appointment of painter to the king. After the death of Charles I. Cromwell employed him, and Charles II., on his accession to the throne, knighted him and gave him a pension of 4,000 florins, and the post of gentleman of the bedchamber. He made good use of his fortune and zealously pursued his art, but when Kneller came to England and supplanted him in the royal favor he fell ill and died of disappointment and melancholia in London, 1680. W. J. Stillman.

Lemaire, le-mār′, Nicolas Éloi: classical scholar; b. at Triancourt, France, Dec. 1, 1767; was appointed Professor of Latin Poetry in the College of France, afterward in the same department in the Faculty of Letters in Paris (1811); in 1810 Murat named Lemaire as head of his projected University of Naples, but Napoleon was not willing to let him leave France, and settled a pension upon him. After the Restoration, Louis XVIII. favored the publication of a complete series of the Latin authors, of which Lemaire was constituted chief editor. From the list of writers, made by Louis himself, Lucretius was omitted for political considerations. The series was completed in 142 volumes, to which Lucretius was subsequently added by P. A. Lemaire, nephew and assistant of the editor. The value of these variorum editions at the present day consists only in the often exhaustive indexes added to each author. D. Oct. 3, 1832. See *Notice sur N. E. Lemaire par J. L. Gillon*, in appendix to the *Bibliotheca Latina*. Revised by Alfred Gudeman.

Lemaître, le-mātr′, Frédéric: actor; b. at Havre, France, in July, 1798; studied at the Conservatoire of Paris, and acquired some popularity upon his appearance in *Trente Ans, ou la Vie d'un joueur* at the Porte Saint-Martin, but won his first great success in 1832 as the joint author of *Robert Macaire* and the actor in its title *rôle*. Victor Hugo and Alexandre Dumas intrusted to him important *rôles* in their plays, and in Hugo's *Ruy Blas* Lemaître won another triumph. His versatility was remarkable. He acted with success in both tragedy and comedy, but it was especially in the romantic drama and the rendering of strong character parts that he excelled. His last appearance was in 1868 at the age of seventy. D. in Paris, Jan. 26, 1876.

Le Mans, le-măaṅ′: capital of the department of Sarthe, France; situated on the river Sarthe, which is here crossed by four bridges (see map of France, ref. 4–D). It has a beautiful cathedral begun in 1217, a town-hall built in 1757, and vestiges of Roman buildings dating from the second century. Le Mans has a theological seminary, a lyceum, a normal school, a library of 56,000 volumes, a museum of antiquities, and several learned societies. Its chief manufactures are linen fabrics, bells, machinery, leather, and stained glass. Pop. (1896) 60,075. In 1793 the republican army won an important victory near Le Mans, and in Jan., 1871, the Germans defeated the French in a decisive battle.

Le Mars: town; capital of Plymouth co., Ia. (for location of county, see map of Iowa, ref. 3–C); on the Ill. Cent. and the Chi., St. P., Minn. and Omaha railways; 25 miles N. E. of Sioux City. It is in an agricultural and stock-raising region; is an important grain, live-stock, and lumber market; and has flour and planing mills, gas and electric lights, 4 banks, private normal school, business school, and a weekly and 2 semi-weekly newspapers. Pop. (1880) 1,895; (1890) 4,036; (1900) 4,146. Editor of "Sentinel."

Lembcke, Christian Ludvig Edvard: poet; b. in Copenhagen, Denmark, June 15, 1815. From 1850 to 1864 he was rector of a Latin school in Schleswig, from which he was

expelled for his sympathy with the Danes. His best-known poem is *Vort modersmaal er deiligt* (Our Mother-tongue is Lovely). His translation of Shakspeare is the best in Danish, having taken the place of the earlier renderings of the Royal theater. It has been criticised for the too modern and refined character of its language. He also translated many of Byron's poems. D. K. Dodge.

Lem'berg: the capital of Galicia, Austria; situated on the Peltov in a narrow valley surrounded by forest-clad hills (see map of Austria-Hungary, ref. 3–K). It is the seat of the Government, and of Roman Catholic, Armenian, and Greek archbishopries. It has a cathedral, built in 1370 by Casimir the Great, two beautiful synagogues, many splendid palaces, and other magnificent buildings. Its university is attended by about 1,200 students, and has 35 professors. Its manufactures are not important, but its trade, though to a great extent merely transit, is very extensive; it is mostly in the hands of Jews, who number about 40,000. Three languages are spoken in the city, Polish, German, and Ruthenian, and thus three sets of schools are made necessary. Pop. (1890) 127,943.

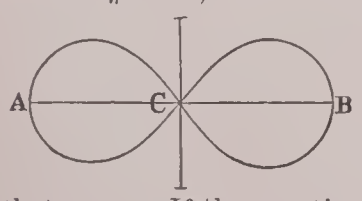
Lem'ma [= Lat. = Gr. λῆμμα, liter., a thing received or taken for granted, deriv. of λαμβάνειν, pf. εἰληφέναι, receive]: an auxiliary proposition demonstrated out of its regular order to facilitate the demonstration of some other proposition. The conclusion of the lemma is needed in the demonstration of the main proposition; and rather than encumber that proposition, a separate demonstration is introduced. The eleventh, twelfth, and thirteenth propositions of book viii., Davies's *Legendre*, are lemmas.

Lemming: a name given to the small rodents of the genus *Myodes*, found in the northern regions of both hemispheres. They have rounded heads, obtuse muzzles, round, stumpy tails, and five toes on each foot. They are vegetable feeders and live in burrows. The Norway lemming, *Myodes lemnus*, is about 5 inches long, clothed in soft yellowish-brown fur, marked with dark brown and black. It is abundant in the highlands of the interior of Norway and Sweden, and is remarkable for the migrations which it makes at intervals of from ten to twenty years. The impelling cause of these migrations seems to be great increase in numbers,

The Norway lemming.

coupled with lack of food. The lemmings move gradually from the highlands toward the sea in countless multitudes, traveling mostly by night. Once started nothing stops them; they swim lakes and rivers, climb hills and struggle through marshes, many perishing on the way. Although preyed upon by all manner of rapacious animals, bears, weasels, hawks, and owls, the numbers of the killed are largely replaced by others born as the host moves on. When the sea or the Gulf of Bothnia is reached the lemmings plunge in, and here all ultimately perish. F. A. Lucas.

Lemnis'cate [from Lat. *lemnisca'tus*, deriv. of *lemnis'cus* = Gr. λημνίσκος, a ribbon hanging down]: a curve of the fourth order, shaped somewhat like the figure 8, as shown in the diagram. It is the locus of the points of intersection obtained by drawing perpendiculars from the center of a hyperbola to the tangents drawn to that curve. If the equation of the hyperbola is



$$a^2y^2 - b^2x^2 = -a^2b^2,$$

the equation of the corresponding lemniscate is

$$(x^2 + y^2)^2 = a^2x^2 - b^2y^2.$$

If the hyperbola is equilateral, that is, if $a = b$, this equation becomes

$$(x^2 + y^2)^2 = a^2(x^2 - y^2).$$

The curve is quadrible; in the latter case the entire area included within the two branches C A and C B is equal to the square of the semi-transverse axis, that is, to a^2. In the figure A and B are the vertices of the hyperbola, and C is its center. At A and B tangents to the curve are perpendicular to A B; the point C is a multiple point, at which tangents to the curve coincide with the asymptotes of the given hyperbola.

Lem'nos [= Gr. Λῆμνος (the modern *Limni* or *Stalimni*)]: an island in the Ægean Sea, S. of Thrace, with an area of 150 sq. miles. It is of volcanic formation, and hence was sacred to Hephæstus; it was the home of the Sintian men who cared for Hephæstus after his fall from heaven. For nine years it was the abode of the lame Philoctetes after his abandonment by the Greek host. The Argonauts found the island inhabited only by women, with whom they begat the Minyans, who were expelled by the Pelasgians. The island submitted in turn to the Persians, Athenians, Macedonians, Romans, and after varying fortunes to the Turks, who hold it to-day. It had two cities, Myrina and Hephæstia. The capital is Castro, with 3,000 inhabitants. It was famous for the lemnian earth (μίλτος, *terra sigillata*), highly prized even down to the nineteenth century as a dyestuff and as an antidote for poison, snake-bites, etc. The island contains 30,000 inhabitants, of whom 5,000 are Turks. See Couze, *Reise auf den Inseln des Thrakischen Meeres* (Hanover, 1860); Tozer, *Islands of the Ægean* (Oxford, 1890, pp. 231–274). J. R. S. Sterrett.

Le Moine: See Le Moyne.

Le Moine, le-moin', Sir James MacPherson: historian and naturalist; b. in Quebec, Canada, Jan. 24, 1825; was educated at Le Petit Séminaire de Quebec, was admitted to the bar in 1850, and since 1868 has held an important office in the inland revenue department. He has devoted more than thirty years to researches and works on early Canadian history, and is an enthusiastic student of natural history and ornithology. He is a descendant of the Le Moyne family, so distinguished in the early history of North America. Among his works are *L'Ornithologie du Canada* (2 vols., 1860); *Legendary Lore of the Lower St. Lawrence* (1862); *Les Pêcheries du Canada* (1863); Maple Leaf Series (1863–73); *Chronicles of the St. Lawrence* (1878); *Historical Notes on Quebec* (1879); *Picturesque Quebec* (1882); *Monographies et Esquisses* (1885); *Chasse et pêche* (1887); *Explorations in Eastern Latitudes* (1889); *Conférences et Mémoires: Histoire, Archéologie* (1882–90). He was knighted in 1897.

Lemoinne, John Emile: See the Appendix.

Lemon [: Fr. *limon* (from Ital. *limone*), from Pers. *līmū*, whence Arab. *laimūn*. Cf. Lime]: the fruit of *Citrus limonum*. The *Citrus* genus, of which the orange and lemon are the familiar representatives, constituted a natural family, *Aurantiaceæ*, which of late is merged by some in the large family *Rutaceæ*. The leaves of these trees have translucent dots which appear like punctures when held between the eye and the light, these dots being oil-glands which give the fine aroma characterizing the genus: the joint below the blade shows the leaf to be a compound reduced to the terminal leaflet; and the petiole below is usually more or less winged with leafy borders. The lemon-tree does not form the close head of deep-green foliage which is so striking in the orange-tree, but is of irregular growth, with paler and sparser leaves. The young shoots are dull purple; the corolla externally purplish and internally white; the delicate aroma distinct from that of the orange-blossom. The fruit is pale yellow, ovoid or oblong, usually crowned by a nipple; the rind firm and adherent to the pulp; the juice sharply acid, but in some varieties sweetish. The roughness of the surface of the lemon is owing to the imbedded oil-cells. These furnish the oil and essence of lemon, obtained either by expression or distillation. Lemon-peel is a well-known flavoring ingredient. Lemon-juice is not only largely used for acidulated drinks and for effervescing draughts, but also for the preparation of citric acid, its important ingredient. This is used in medicine for febrile and rheumatic diseases, and in the arts for certain processes of calico-printing, to discharge colors and deepen the white parts of fabrics dyed with ferric salts. Concentrated lemon-juice is largely employed on shipboard for the prevention of scurvy in long voyages. The commercial article

is derived from the lime and bergamot, as well as from lemons. The lemon is of Indian origin; the tree, which perhaps represents the wild state of both the lemon and the citron, is a native of the forests of Northern India. It is now generally understood by botanists that the lemon should be regarded, systematically, as a variety of the citron, *Citrus medica*, var. *limon*. The introduction of the tree to Europe is due to the Arabians. Its cultivation is an industry on the Mediterranean coast between Nice and Genoa, in Calabria, Sicily, Spain, Portugal, etc. It endures less cold than the orange, and wherever it succeeds well is likely to be a more profitable culture. It is grown in Florida and Southern California.

Revised by L. H. Bailey.

Lemon, Oil of: the volatile oil of lemon-peel (*Oleum citri*), extracted from the grated rind by pressure or by distillation with water. It may also be obtained by putting the grated peel in hot water and skimming off the oil which rises to the surface. That obtained by pressure has more of the peculiar flavor of the fruit, but contains mucilage, etc., which make it more liable to change on keeping than that which is prepared by distillation. Oil of lemon is a volatile liquid, generally yellow, having the odor of the fruit and a pungent, aromatic taste. Its specific gravity is 0·8596. It is sparingly soluble in water; dissolves in 7·14 parts alcohol of specific gravity 0·8317; in 10 parts alcohol of specific gravity 0·85; in any quantity in absolute alcohol; mixes with both fixed and volatile oils. It dissolves sulphur, phosphorus, resins, and fats. Exposed to air and light, it absorbs oxygen, with the formation of ozone, becomes darker and more viscid, and evolves a little carbonic acid. It contains a hydrocarbon, $C_{10}H_{16}$, or an oxygen compound.

Oil of lemon is largely used in perfumery and as a flavoring for ice-cream and sirups, and has the stimulant properties of the aromatics, though in pharmacy it is chiefly used to impart flavor to other medicines. It should not be dark-colored or viscid, and should not leave a permanent stain on paper. It is often adulterated with oil of turpentine, lavender, alcohol, etc. The presence of cheaper oils may generally be recognized by the odor. Turpentine may be detected by noting the behavior of the oil with regard to polarized light before and after heating. With pure oil little or no change will be noticed, but when turpentine is present the dextro-rotary power will be considerably increased by heating.

Le Moyne, or **Le Moine**: a Canadian family of eleven brothers, seven of whom acted prominent parts in advancing French explorations, conquests, and settlements in America.—Their father, Charles le Moyne, b. in Normandy, France, in 1626, went to Canada in 1641; lived some years among the Hurons; obtained extensive land-grants; was distinguished in wars against the Iroquois under Courcelles and Tracy; was held a prisoner by those Indians several months in 1665, and was created in 1668 Seigneur de Longueuil, to which title that of Châteauguay was afterward added. He was for some time military commander of Montreal, where he died in 1683.—Of his sons, Pierre and Jean Baptiste were distinguished in Louisiana, gaining the titles of Sieurs de Bienville and d'Iberville (*qq. v.*).—The eldest brother, Charles, Baron de Longueuil, b. in Montreal, Dec. 10, 1656; served in his youth in the French army in Flanders; promoted colonization to Canada; built a stone fort on his estate at Longueuil; was wounded in the repulse of Sir William Phipps's assault upon Quebec in 1690; was made governor of Montreal and baron in 1700; was commander-in-chief of the colonial forces; fought against the English expedition of Walker and Nicholson in 1711; was in command at Three Rivers in 1720, and at Montreal from 1724 to 1726; rebuilt Fort Niagara in the latter year; was made chevalier of the order of St. Louis, and died at Montreal, June 8, 1729.—Jacques, Sieur de Sainte-Hélène, b. at Montreal in Apr., 1659; was sent in Mar., 1686, with his younger brothers, Pierre and Paul (afterward d'Iberville and de Maricourt), in an expedition under the command of Chevalier de Troyes against the English on Hudson's Bay, where they had built Forts Monsipi, Rupert, and Kichichouanne. These three forts were captured, as well as a vessel of war having on board the English governor-general of Hudson's Bay, Sainte-Hélène having borne a leading part in each action. He was second in command of the expedition which took Fort Corlear (Schenectady) Feb. 9, 1690, and in the same year commanded the batteries which repelled the English squadron at Quebec, on which occasion he was mortally wounded.—Paul, Sieur de Maricourt, b. at Montreal, Dec. 15, 1663; participated, as above mentioned, in Troyes's expedition against Hudson's Bay, being wounded before Fort Monsipi (June 20, 1686); remained with his brother d'Iberville in command of that district up to 1690, when he aided in the defense of Quebec; took part in Frontenac's expedition against the Iroquois, with whom he negotiated peace in 1701, and in Apr., 1704, lost his life, with forty others, in a stockade burned by those Indians.—Joseph, Sieur de Serigny, b. at Montreal, July 22, 1668; became an officer in the French navy, and in 1694 and 1697 commanded vessels in Hudson's Bay in co-operation with the land operations of his brother d'Iberville. Subsequently he commanded a squadron: took to Louisiana some of its earliest settlers, and in 1718–19 surveyed the coast of that colony. He was engaged in the capture of Pensacola from the Spaniards (May 14), and repulsed them from Dauphin island, near Mobile (Aug. 19, 1719); after a siege of a month; was made captain of a ship of the line in 1720, and in 1723 rear-admiral and governor of Rochefort, France, where he died in 1734.—Antoine, Sieur de Châteaugnay, b. at Montreal, July 7, 1683; became an officer of the French army; took a body of colonists to Louisiana in 1704; served under d'Iberville against the English in 1705 and 1706; was royal lieutenant in Louisiana in 1718; was engaged in the Florida campaign against the Spaniards in 1719; taken prisoner at Pensacola Aug. 7, and commanded at Mobile from 1720 to 1726, when he was removed from office and recalled to France; was sent as governor to Martinique in 1727, and afterward to Cayenne; returned to France in 1744; was made governor of Cape Breton in 1745; successfully defended Louisburg against the New England forces under Pepperell, and died at Rochefort, France, Mar. 21, 1747. He inherited the title of Sieur de Châteaugnay from his brother Louis, b. in Jan., 1676, who was mortally wounded in the attack on Fort Nelson, Hudson's Bay, and died Nov. 4, 1694.—Another brother, François, b. Mar. 10, 1666, killed in battle with the Iroquois at Repentigny June 7, 1691, was the first Sieur de Bienville, the title passing on his death to his brother, Jean Baptiste. Sauvolle, the first colonial Governor of Louisiana, has often been incorrectly included as one of the brothers Le Moyne. Revised by C. K. Adams.

Lempa (river): See Salvador.

Lemprière, laăn'pri-ār', John, D. D.: educator and classical scholar; b. in the island of Jersey about 1765; studied at Westminster School and at Oxford; B. A. 1790; took orders in the Church of England; was head master of classical schools at Abingdon and Exeter; became rector of Meeth in 1811, and Newton-Petrock, Devonshire, in 1823, and died in London, Feb. 1, 1824. He published in 1788, in Reading, a small *Bibliotheca Classica*, or classical dictionary, much enlarged in the 2d ed. of 1792, which has since been many times reprinted in Great Britain and the U. S. It was based upon Sabbatier's *Dictionnaire des Auteurs classiques*, published at Châlons-sur-Marne in thirty-six volumes (1766–90), and was in turn the basis of Anthon's well-known classical dictionary. Dr. Lemprière published also a volume of *Sermons* (1791); the first volume of a translation of Herodotus (1792); and a *Dictionary of Universal Biography* (1808) in a single volume, reprinted in New York in 1825 (2 vols.), with additions by Eleazar Lord.

Lemur [from Lat. *lemur*, ghost, specter, so called from its nocturnal habits]: a general name for the members of the sub-order Prosimiæ (*q. v.*), a division of the order *Primates*, containing what Mivart terms the half-apes. The name lemur was applied to these animals by Cuvier on account of their nocturnal habits and spectral appearance. They differ from the monkeys in many important anatomical details, but while they also differ from them externally, it is by no means easy to describe the distinctions. The head of the lemurs is usually long and fox-like, the fur is soft, thick, and woolly, quite different in texture from that of any monkey, and the coloration is frequently soft and delicate. They never have prehensile tails (although this organ may be long, short, or absent), cheek-pouches, or ischial callosities. The great majority of the species are confined to Madagascar, but a few inhabit Africa and a few India and the larger adjoining islands as far E. as Celebes. The ruffed lemur (*Lemur varia*) is sometimes black and white, and sometimes of an almost uniform reddish-brown. It is about as large as a cat, as is also the ring-tailed lemur (*L. varia*), which is of a delicate gray, the tail marked with alternate rings of black and white. The slow lemur (*Nyctice-*

bus tardigradus) is a small, brownish-gray, tailless species found in Malacca, Sumatra, and Borneo. During the day it sleeps curled up in a ball, and at night moves noiselessly about the branches in search of food. It captures small birds by approaching slowly until within reaching distance, and then, with a single quick move, the prey is secured.

F. A. Lucas.

Lem'ures [= Lat. plur. of *le'mur*, ghost, specter]: in Roman mythology, the designation of the spirits of the dead, which, either because of their own guilt or the neglect of proper observances on the part of their friends, could not find rest in the lower world and so still haunted the scenes of life. Their influence was believed to be harmful, and to propitiate them an annual festival called *Lemuria* was celebrated with expiatory rites on the nights of May 9, 11, and 13. In accordance with a common confusion of the liquids *l* and *r*, the designation of this celebration was connected with the name of Remus (as if **Remuria*), to appease whose restless spirit, wronged by death at a brother's hand, the festival was thought to have been instituted. A description of its ceremonies is found in the fifth book of Ovid's *Fasti* (vs. 419 ff.), who adds that on these days the temples were closed and that marriages or other events requiring auspicious beginning were avoided. G. L. Hendrickson.

Lemu'ria: a tract of land supposed to have formerly extended from Africa and Madagascar to Southernmost India. The Seychelles and Maldive islands and the Chagos Banks are considered to be portions of this submerged Lemuria, the former existence of which is believed by many authorities necessary to account for the peculiar distribution of the lemurs and other Afro-Asiatic animals. F. A. L.

Lemur'idæ [Mod. Lat., liter., belonging to the lemur family; Lemur (*q. v.*) + Gr. patronymic ending *-ίδαι*, plur. of *ίδης*, descended from]: a family of the sub-order *Prosimiæ* and order *Primates*. The incisors of the upper jaw are small (sometimes deciduous), and separated into two groups by an interspace. The lower canines resemble the incisors, are contiguous to them, and like them project outward and not upward; hind foot with the second toe armed with a claw, and the other toes provided with flattened nails. This family includes the lemurs, or, as they are sometimes called, half-monkeys, and is confined to the island of Madagascar, the equatorial parts of Africa, and India. A considerable range of variation is exhibited by its several constituents in the general form and proportions, the shape of the head, the development of a tail (which in some is very large and in others wanting), the size of the ears, and the length of the tarsus. For the peculiar relations of the family, see Prosimiæ. Revised by F. A. Lucas.

Lemuroi'dea: a name applied by some to the sub-order Prosimiæ (*q. v.*).

Lena: one of the principal rivers of Siberia. It rises near Irkutsk, in the mountains N. of Lake Baikal, and enters the Arctic Ocean through several branches between lon. 125° and 130° E. It receives the Vitim, Olekma, and Aldan from the right, and the Viliui from the left, passes by Olekminsk and Yakutsk, and is open from May to November. Its length is 2,880 miles, of which 2,680 (from Yigalova down) are navigable. There were six steamers on the Lena in 1890.

Lenartowicz, len-ăar-tō'vich, Teofil: poet; b. at Warsaw, Poland, Feb. 27, 1822, of poor parents; earned his living as a lawyer's clerk 1826–37, and later became clerk of the Supreme Court. His meager education he completed by private studies. He belonged to a group of young poets who published their poems in the *Nadwiślanin*, and was noted for his religious fervor. In 1848 he visited Cracow, Breslau, and Posen, and finally went to Paris, and thence (1854) to Italy, where he settled in Rome. In 1861 he married, and in 1871, on the death of his wife, removed to Florence. He is both a poet and a sculptor. He is a popular poet, and his poems breathe the spirit of the folksong. Patriotism and religious fervor pervade his first works: *Szopka* (Breslau, 1849); *Lirenka* (Posen, 1851); *Nowa lirenka* (same, 1857). The short poems *Zachwycenie* (Ecstacy) and *Blogoslawiona* (The Blessed One) are unequaled in Polish poetry. The following also deserve mention: *Polska ziemia w obrazach* (Poland in Pictures); *Swieta Zofia*, *Fragment o Apostolach*, *Branka*, *Bitwa Raclawicka* (The Battle of Raclaw), which forms a part of the epic *Kościusko*; *Niemcy i Chrobaty* (The Germans and the Croatians); *Cielec Zloty*, a drama; a translation of Dante's *Divine Comedy*, etc. His *Poezye* (Poems) were published at Warsaw (1858) and Posen (1863). *Jagoda z mazowieckich lasów* (A Strawberry from the Forests of Mazow, Warsaw, 1880) is a delightful idyl.

J. J. Král.

Lenau, Nicolaus (pseudonym for Nicolaus Franz Niembsch Edler von Strehlenau): b. at Csatad, Hungary, Aug. 13, 1802; studied philosophy, jurisprudence, and medicine at Vienna, and having inherited a moderate fortune devoted himself entirely to literature. In 1831 he went to Stuttgart for the purpose of publishing the first volume of his poems. Here he met Uhland Kerner and the rest of the Suabian school, and here he also conceived the idea of emigrating to America. He bought 1,000 acres of land in Ohio, and removed to the U. S. in 1832, but soon returned, disgusted and disillusioned. He resided at various places in Germany and Austria, diligently working at his larger poetic productions. Soon after his return from America he met Sophie von Löwenthal, a married woman of great beauty and exceptional talents. They fell desperately in love with each other, but Sophie would not get a divorce from her husband, and neither she nor Lenau had enough moral strength to break off their hopeless relations. This unhappy love affair doubtless precipitated the catastrophe in the life of the poet, who had always been subject to severe attacks of despondency and melancholy, and who doubtlessly was also physically inclined to insanity. In 1844 he became violently insane, and never recovered his senses. D. Aug. 22, 1850, in a lunatic asylum at Oberdöbling, near Vienna. Lenau is one of the greatest German lyric poets of the nineteenth century, but his genius was not counterbalanced by sufficient strength and firmness of character. He never could bring into harmony the idealism of his imaginary world with the reality of his surroundings, and he willingly gave himself over to "the gravitation toward unhappiness," as he calls the melancholic propensity of his mind. Besides, he lived in a time in which the conflict between belief and knowledge occupied the best minds and demanded many victims. With him pessimism and *Weltschmerz* were genuine, and not a mere theatrical pose, as in the case of Heine. Thus he became the greatest elegist of Germany, his poetry abounding with beauty of metaphor and melody of language. His principal publications, beside his poems, are *Faust* (1836), *Savonarola* (1837), *Die Albigenser* (1842), *Don Juan*, all of which show the heavy conflicts in the poet's mind. See Opitz, *Nicolaus Lenau* (1850); Berthold Auerbach, *Nicolaus Lenau* (1876); Emma Niendorf, *Lenau in Schwaben* (1853); Schurz, *Lenaus Leben* (1855); Karpeles, *Nicolaus Lenau* (1873); *Lenaus Briefe an einen Freund* (1853); Ludwig August Frankl, *Lenau und Sophie von Löwenthal* (1891).

Julius Goebel.

L'Enclos, lăăn'klō', Anne, de (called Ninon): b. in Paris, May 15, 1615. She was beautiful and spirited; Scarron, Saint-Évremond, Molière, Fontenelle, Larochefoucauld, and others read their works in her salon; it soon became indispensable for all young men of birth, wealth, and elegant ambitions to be introduced to her. One lover followed the other in rapid succession, and this life went on uninterruptedly for more than half a century. In her old age ladies, even of the highest position and of the finest education, crowded her salon, and for many years her social position was brilliant. For the student her character has little interest, but her life is exceedingly characteristic of the age in which she lived. D. in Paris, Oct. 17, 1705.

Le Neve, le-neev', John: clergyman and biographical writer; b. in Bloomsbury, London, England, Dec. 27, 1679; was educated at Trinity College, Cambridge, although he left the university without taking a degree, and became rector of Thornton-le-Moor, Lincolnshire. D. about 1741. He was a zealous collector of biographical materials; wrote *Fasti Ecclesiæ Anglicanæ* (1716); *Monumenta Anglicana* (9 vols., 1700–19); *Lives of the Protestant Bishops* (1720); *Lives of the Archbishops* (1723); and other minor works. A new edition of the *Fasti* was published in 1854 (3 vols.) by T. Duffus Hardy, assistant keeper of the public records, with a continuation down to that year. While the original edition contained only 11,051 entries, Hardy's edition contained data respecting more than 30,000 clergymen of the Church of England holding positions of prominence, and in the preparation of this edition upward of 6,000 rolls and other records were consulted, besides printed books.

Revised by W. S. Perry.

Lenkoran: a fortified town in the government of Baku, Russia; on the Caspian Sea, at the mouth of the Lenkoran river (see map of Russia, ref. 11–I). It is not far from the

Persian boundary, and previous to 1813, when Russia acquired it, it was a Persian town. The harbor is poor. Pop. about 6,000, mostly Persians and Armenians.

Revised by C. C. Adams.

Len'nep, David Jacob, van: classical scholar; b. at Amsterdam, July 15, 1774; studied there and in Leyden; was professor at the Athenæum of his native city till his death, Feb. 10, 1853. He wrote a learned and highly valuable commentary to Ovid's *Heroides* (2d ed. 1812); edited *Terentianus Maurus* (1825); *Hesiod* (3 vols., 1854); and translated into Latin Bentley's *Dissertation on the Epistles of Phalaris.*

Alfred Gudeman.

Lennep, Jacob, van: poet and novelist; b. at Amsterdam, Holland, Mar. 24, 1802; d. Aug. 26, 1868. The son of a highly cultivated scholar, Prof. David Jacob van Lennep, his youth was passed in an eminently literary atmosphere. He was destined for the legal profession, however, and in 1824 he received the degree of doctor in law from the University of Leyden. He practiced his profession with great success all his life, and held many positions of public trust and responsibility. His leisure, however, was devoted to letters, and the mass of his productions was very great. He felt to the full the Romantic influences of his time, was a friend of Bilderdijk and da Costa, and labored with them for the imaginative reconstitution of the past of Holland. His literary models were primarily Byron and Sir Walter Scott, but the period he most studied and wrote about was the seventeenth century. His literary career began with a rendering of Schiller's *Fiesco* (1825) and of Byron's *Marino Faliero* (first published in 1829). In 1826 appeared *Academische Idyllen*, and these were followed in 1827 by the first collection of *Gedichten* (subsequently reprinted with later volumes in *Gedichten zoo oude als nieuwe*, 3d ed. Amsterdam, 1865). In 1828 was published the first volume of *Nederlandsche Legenden in rijm gebracht*, modeled upon Scott's poetical tales. The revolutionary years 1830 and 1831 moved him to eager production, and his play *Het dorp aan de grenzen* (1830; reprinted in his *Dramatische Werken*, 3 vols, 1852–54) met with great praise. In 1833 his first historical romance, *De Pleegzoon* (The Adopted Son; English trans. by Hoskin, New York, 1847), was received with enthusiasm. This was followed by *De Roos van Dekama* (The Rose of Dekama; English trans. by Woodley, London, 1847); *De Lotgevallen van Ferdinand Huyck* (1840); *Elizabeth Musch* (1850); *De Vrouwe van Waardenburg* (a drama, 1859); *De Lotgevallen van Klaasje Zevenster* (1865); and many other works in prose and verse of a similar character. Extremely popular also were *Onze voorouders in verschillende tafereelen geschetst* (5 vols., 1838–44) and *De voornaamste geschiedenissen van Noord-Nederland aan zijne kinderen verhaald* (4 vols., 1845–49). Besides these numerous works, he collaborated upon about fifty different journals and periodicals. See his *Life* and a bibliography of his works in J. ten Brink, *Geschiedenis der Noord-Nederl. Letteren* (vol. i., Amsterdam, 1888).

A. R. Marsh.

Lenni-Lenape: See Algonquian Indians.

Lennox, Charlotte Ramsay: author; b. in New York in 1720, her father, Col. James Ramsay, being lieutenant-governor of the province; went to London at the age of fifteen, and married; on becoming a widow devoted herself to literature, and wrote novels which obtained great popularity. She enjoyed the friendship of Richardson and Dr. Johnson. Among her works were a volume of *Poems* (1752); *The Female Quixote* (1753); *Shakspeare Illustrated* (1753–54), a collection of tales used by Shakspeare in his plots; *Henrietta, a Novel* (1758); *Philander, a Dramatic Pastoral* (1758); *Sophia* (1763); *Father Brumoy's Greek Theater*; and a translation of the Duke of Sully's *Memoirs* (1761). D. in London, Jan. 4, 1804.

Revised by H. A. Beers.

Lennox, Earls of: See Stewart, Esme, and Matthew.

Lennox, Lord George Henry: general; b. in England, Nov. 29, 1737; was second son to Charles Lennox, second Duke of Richmond; entered the army in 1751; distinguished himself in the German campaigns as aide-de-camp to the Duke of Cumberland (1757) and to the king (1762); entered Parliament in 1761; attended his brother, the third Duke of Richmond, in his embassy to France in 1765; became major-general in 1772; constable of the Tower of London and governor of Plymouth in 1783; general and member of the privy council in 1793. D. at Stoke Park, Mar. 22, 1805.

Lennox, Lord William Pitt: soldier and author; b. in England, Sept. 20, 1799; was the fourth son of the fourth Duke of Richmond, and godson of William Pitt; was educated at Westminster; entered the army; was for some years attached to the staff of the Duke of Wellington; was a voluminous contributor to *The Sporting Review* and to several magazines and newspapers. Among his works are *Compton Audley* (1841); *The Tuft-hunter* (1843); *Percy Hamilton* (1852); *Philip Courtney* (1857); *Merrie England* (1857); *Recreations of a Sportsman* (1862); *Fifty Years' Biographical Reminiscences* (1863); *Adventures of a Man of Family* (1864); and *Drafts on my Memory* (1865). D. Feb. 17, 1881.

Lennoxville: town and railway station of County Sherbrooke, Quebec; 3 miles from Sherbrooke (see map of Quebec, ref. 6–C). It is the seat of the Bishop's College and Bishop's College School. Pop. 800.

Lenormant, le-nōr'maṅ', Charles: art critic and archæologist; b. in Paris, France, June 1, 1802: studied law; traveled in Italy, where he gave special attention to archæology; became in 1825 inspector of fine arts; accompanied Champollion the younger to Egypt in 1828; took an active part as a member of the commission for exploring the Morea; became after the revolution of 1830 chief of the section of fine arts at the ministry of the interior, keeper of books and antiquities at the Royal Library, professor at the Sorbonne (1835), and Professor of Egyptian Archæology at the College of France and conservator of the Royal Library. Omitting his numerous treatises on art, numismatics, ceramics, the religion and history of Egypt, we may mention his *Trésor de numismatique et de glyptique* (20 vols., Paris, 1851); *Introduction à l'histoire orientale* (1838); *Musée des antiquités égyptiennes* (1835–42); *Élite des monuments ceramographiques* (4 vols., 1861); *Questions historiques* (2 vols.: 2d ed. 1854). D. at Athens, Nov. 24, 1859. —His wife, Amélie, who was a niece of Madame Récamier, edited the correspondence of that celebrated lady (1859), besides writing works on *Madame de Staël* (1862) and the *Women of the Revolution* (1865).

Revised by Alfred Gudeman.

Lenormant, François: archæologist; son of Charles Lenormant; b. in Paris, Jan. 17, 1837; was educated by his father. He was especially prominent for his important researches in the Accadian language; and after traveling in Egypt, Turkey, and Greece became in 1874 Professor of Archæology at the Bibliothèque. Among his very numerous works are *Manual of the Ancient History of the East* (3 vols.; 9th ed. in 1881 by Babelon, who also continued the work); *Lettres assyriologiques et épigraphiques* (5 vols., 1871–79); *Chefs d'œuvre de l'art antique* (3 vols., 1869); *Études accadiennes* (1873–74); *La Magie chez les Assyriens* (1874); and *Les premières Civilisations* (1874); *Essai sur la propagation de l'alphabet phénicien dans l'ancien monde* (2d ed. 1875; this otherwise able work is discredited by the fact that Lenormant forged inscriptions for the purpose of proving a pet hypothesis); *La monnaie de l'antiquité* (1879, 3 vols.), one of the best works on the subject; *La Grande-Grèce* (1881–83), the account of an archæological tour in the little-known extreme south of Italy, a supplement to which is *À Travers l'Apulie et la Lucanie* (1883); *Les origines de l'histoire d'après la Bible* (3 vols., 1884). He also edited, from a manuscript of his father, *Mémoires sur les peintures de Polygnote, dans la Lesché de Delphes* (Brussels, 1864). D. in Paris, Dec. 10, 1883. See Babelon, *Biograph. Jahrbuch VII.* (1884, pp. 151 ff.).

Revised by Alfred Gudeman.

Le Nôtre, le-nōtr', André: landscape-gardener; b. in Paris, Mar. 12, 1613; studied painting under Simon Vouet together with Lebrun; laid out the gardens of Vaux-le-Vicomte, Fouquet's famous château, and afterward succeeded his father as director of the gardens belonging to the royal residences. He laid out the gardens of Versailles, Trianon, St.-Germain, and Fontainebleau; also St.-Cloud, Chantilly, Villers-Cotterets, Meudon, Chaillot, Livry, etc., and established thereby the formal and stately style of landscape-gardening which spread over the whole of Europe and maintained itself for nearly a century. In 1664 he first arranged the gardens of the Tuileries. He received many honors and distinctions, and in 1675 was made a noble and a Knight of the Order of St. Michael. He visited England and laid out the parks of Greenwich and St. James. D. in Paris, Sept. 15, 1700.

Lenox, James: See the Appendix.

Lens [from Lat. *lens*, lentil. So called from a double convex lens resembling a lentil-seed in shape]: a transparent body bound by curved surfaces, nearly always by spherical, sometimes by cylindrical, elliptical, or parabolic faces. The typical forms of spherical lenses are shown in Fig. 1. Three of them (1, 2, and 5) are thicker along the axis than at the edges (converging lenses), while three (3, 4, and 6) are thickest at the edge (diverging lenses).

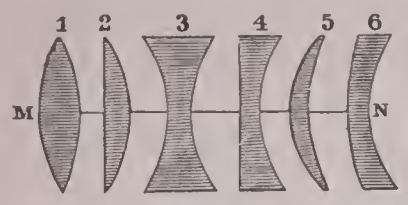


Fig. 1.

Lenses are sometimes used merely to gather the rays from a source of light into a parallel or convergent beam. For this purpose no great delicacy of configuration is necessary. Where a large amount of light is to be concentrated in this way, as in the case of lighthouse lanterns, a series of prisms is used instead of a condensing lens. See Lighthouse.

Another and far more important function of the lens is the formation of an image. To confine our attention to the formation of undistorted images it may be stated as the condition of the image-forming lens that it must be bounded by surfaces such that all the rays falling upon one of its faces from a point, f, will be refracted, and will converge to (or appear to diverge from, another point (f', Fig. 2). When one of the points is at an infinite distance the surface fulfilling this condition is ellipsoidal; when f and f' are conjugate foci it is the surface produced by the revolution of a Cartesian oval. Owing to the comparative ease of construction, however, lenses are almost always ground with spherical faces.

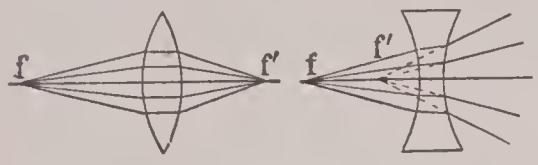


Fig. 2.

Nodal points in a lens (so named by Prof. Listing, of Göttingen) are points located as follows:

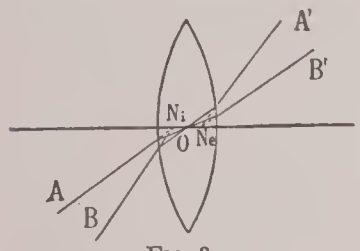


Fig. 3.

In any lens (Fig. 3) let A A′ B B′ be rays passing through the optical center O. If their paths in air be extended without deviation through the material of the lens, they will cut the principal axis in N_i and N_e respectively. These are called the nodal points of incidence and of emergence.

The relation of the points f and f', already referred to, as regards position are defined by the equation

$$\frac{1}{d}-\frac{1}{d'}=\frac{1}{D}$$

where d and d' are the distances from the nodal points N_i and N_e to f and f', the conjugate foci, and D is the distance to the point at which parallel rays come together (see Fig. 4), which is called the principal focus. When f and f' are upon opposite sides of the lens the latter will form an inverted image of any object placed at either f or f'. When f and f' are upon the same side of the lens, which will occur whenever the rays (after transmission under the law of refraction, for the medium of which the lens is composed) diverge, the image will be virtual and erect.

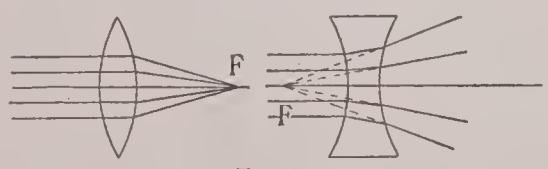


Fig. 4.

For further information upon the geometry of the lens, the reader should consult Glazebrook, *Physical Optics*; Wallon, *L'Objectif Photographique*; or any other good treatise.

All lenses with spherical faces produce what is known as spherical aberration. This phenomenon arises from the fact that in such lenses a given point on the principal axis, for example, possesses not one, but an infinite series of contiguous foci conjugate to it, each corresponding to a particular portion of the lens.

The lens may be regarded as made up of concentric, ring-shaped elements, each with its own focus, these elemental foci approaching the lens along the axis continuously as the diameter of the rings increases. The result is that the focus of the lens taken as a whole is not a point, but an elongated region lying along the axis, at no point in which is there complete definition.

That each element of a lens is really capable of forming a complete image, and that these images in case of spherical lenses are not quite coincident, may be shown by means of the following experiment, which also serves for determining the existence and character of the aberration in a lens to be tested. This is shown in Fig. 5, in which rays A A′, B B′, C C′ are seen to come to focus at different distances from the lens—in accordance with the principle just stated.

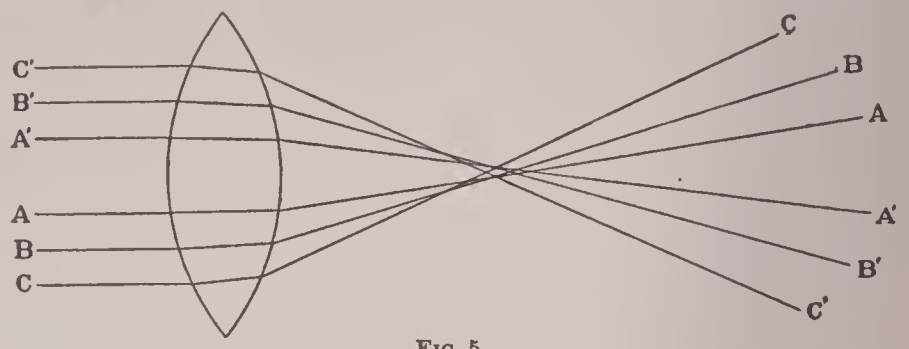


Fig. 5.

If in front of a lens of large aperture an opaque screen be held as close to the surface of the glass as possible, it will be found that with a single small aperture (a) through the screen, so placed that rays from a light-source (C) reach any portion of the face of the lens, a well-defined image will be formed at C′ (Fig. 6). Upon moving the screen perceptible motion of C′ will be noticed, and it will be found that when a is in the axis of the lens, C′ will be in perfect focus at a greater distance than when a allows light to reach some element of the lens near the edge of the latter.

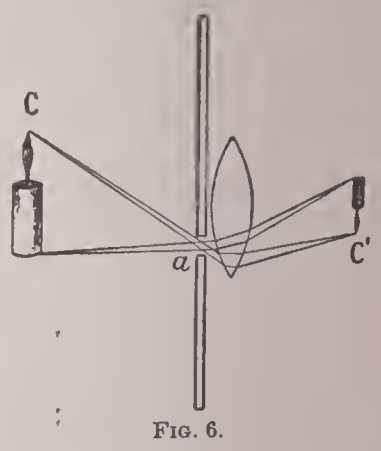


Fig. 6.

If two or more openings be made through the screen permitting light to pass through small portions of the lens not situated in the same annular element, each hole will be found to afford a distinct image of the source of light, the various images overlapping, but not, in general, quite coincident.

If the number of openings be increased indefinitely until the entire aperture of the lens is utilized, then these images will be merged in a single one, which, however, will not be nearly so well defined as the elementary images of which it is composed.

The amount of spherical aberration varies with the ratio between the radii of curvature of the surfaces of a lens, with the thickness of the same, and with the direction of incident rays. It is possible by the proper balancing of these factors to eliminate it almost entirely, an end more easily reached, however, by using a combination of two or three properly proportioned lenses. A system of lenses free from spherical aberration is said to be aplanatic.

Chromatic aberration offers a more serious difficulty in the construction of the lens. This defect arises from the fact that lenses are used for the transmission of composite light varying in wave-length from 0·76μ in the extreme red to 0·40μ or even less in the violet. The index of refraction for the latter wave-length will be much higher than for the red — 1·53 instead of 1·51 perhaps — and such rays, even in the case of lenses free from spherical aberration, will be brought to focus much nearer the lens, as shown in Fig. 7, where V is the focal point for violet and R for red light. Between V and R lie the foci of all interven-

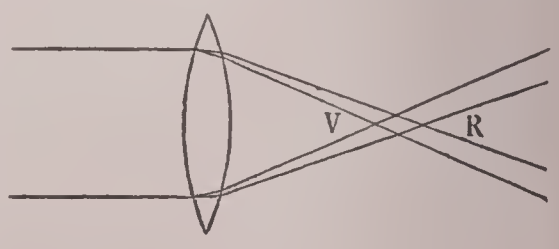


Fig. 7.

ing tints of the visible spectrum, while still nearer to the lens than V the short waves of the ultra violet come to focus.

Fortunately glass is a mixture of variable composition, and is capable of being made with a wide range of optical properties. The indices of refraction of two extreme varieties of glass are given for illustration in the following table:

INDICES OF REFRACTION.

Lines.	Crown-glass. (n)	Dense flint-glass. (n)
A	1·509	1·697
B	1·511	1·701
C	1·512	1·703
D	1·515	1·710
E	1·518	1·719
F	1·521	1·727
G	1·527	1·743
H	1·532	1·757

Thus it is possible to select glass of high or of low dispersive power. The ratio of the indices of refraction for red (C) and blue-green (F) light in the case of crown-glass, for example, may be $\frac{1\cdot521}{1\cdot512} = 1\cdot0059$, while for heavy flint-glass the same rays may give a ratio $\frac{1\cdot727}{1\cdot703} = 1\cdot0141$. The dispersive power of these specimens of glass, computed for the range of $B \ldots H$ by means of the usual formula

$$I = \frac{N_b - N_h}{N_e - 1},$$

is ·0408 (crown) and ·0779 (flint). By making a dispersive lens of the latter and a properly proportioned convex lens of shorter focal length of the former glass, and using the two together (see Fig. 8), it is possible to obtain a combination which will bring red and blue to the same focal point. Such an arrangement is termed an achromatic system or combination, or sometimes simply an achromatic lens.

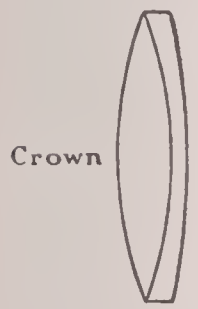


FIG. 8.

The size of the image produced by a lens depends upon the focal length of the latter, and is independent of the aperture, the law being that the linear dimensions of the image are directly proportional to its distance from the lens. *The brightness of the image* is directly proportional to the area of the aperture and inversely proportional to the square of the linear dimensions of the image itself. *The definition of the image* depends upon the accuracy of configuration, the completeness with which the corrections for spherical and chromatic aberration are made, and upon judicious reduction of the aperture by means of suitable diaphragms.

Owing to the supreme importance which optical instruments possess in the advancement of science, great attention has been given to lens-making. The present very high state of the art, as exhibited in the best telescopes and microscopes, has been reached (1) by the development of the process of grinding to a degree of extraordinary precision; (2) by improvements of glass-making, which make it possible to secure great uniformity and homogeneity with freedom from striæ and of other optical imperfections due to internal strains; (3) by the introduction of new varieties of glass possessing the optical properties demanded for the construction of achromatic and aplanatic systems of lenses.

E. L. NICHOLS.

Len'ström, CARL JULIUS, Ph. D., D. D.: poet and critic; b. at Gefle, Sweden, May 7, 1811; studied at Upsala; graduated as a doctor of philosophy 1833, studied divinity, and entered the priesthood 1834; was created a doctor of divinity 1860; was appointed Assistant Professor of Literature in 1836, and rector at the bishop's see of Upsala in 1845; Lenström's writings comprise subjects of the most varied nature—religious science, philosophy, æsthetics, history of literature and art, linguistics, literature. We may mention among his numerous writings *Lärobok i allmänna och svenska Kyrkohistorian* (Compendium of General and Swedish Church History, 1842); *Biblisk theologi eller bibelns tros-och sedelära i system* (Biblical Theology, 1859–62); *Bidrag till den svenska ästhetikens historia* (Contributions to the History of Swedish Æsthetics, 1840); *Svenska poesiens historia* (History of Swedish Poetry, 1839–40); *Sveriges literatur-och konst historia* (History of Swedish Literature and Art, 1841); *Ordbok öfver helsing dialecten* (Dictionary of the Helsing Dialect, 1841); *Gullbröllopet* (The Golden Wedding, an idyl, 1837); *Fahlujuveleń*, a novel dealing with Swedish village life (1838); *Cromwell*, an historical poem (1860); *Gustaf II. Adolf*, historical songs (1860); *De fyra ständen, taflor ur svenskt sedelif* (The Four Classes, sketches from Swedish social life, 1865). Besides, he has published sermons, translations, etc. From 1839–40 he edited the literary journal *Eos*. D. Apr. 6, 1893. P. GROTH.

Lent [M. Eng. *lenten* < O. Eng. *lengten*, spring, lent; cf. O. H. Germ. *lenzin*, *langiz* > Mod. Germ. *lenz*, spring]: the fast of forty days (not counting Sundays) which begins with Ash Wednesday and ends with Easter Sunday. It is observed by the Eastern, Roman, Anglican, Lutheran, and some other churches. It commemorates the forty days' fast of our Lord in the wilderness. The Greek Church lengthens it to forty-eight days. Revised by W. S. PERRY.

Lentan'do [Ital., liter., slowing, pres. partic. of *lenta're*, make slow, from Lat. *len'tus*, slow]: in music, a term which, when applied to a series of notes, signifies a gradual and regular decrease of rapidity. It frequently occurs in connection with final cadences, and in passages marked as expressive, where it has the effect of a gradual dying out or melting away of the sound into comparative stillness.

Lentil [from O. Fr. *lentille* < Lat. *lenti'cula*, dimin. of *lens*, *lentis*, lentil. Cf. LENS]: an annual leguminous herb of the Old World, the *Ervum lens*, resembling the vetch or pea, and extensively cultivated as food. The seed is the part employed. It is smaller, more nutritive, and more digestible than the pea. There are many varieties. It grows well on the poorest lands. Lentil flour is used for invalids. The vine is small, but affords excellent fodder for sheep, horses, and cattle. Fresenius found in 100 parts of air-dried seed—starch 35·5, gum 7, sugar 1·5, legumine 25, fat 2·5, cellulose, pectine, etc., 12, ash 2·3, and water 14.

Lentini, len-tee'nĕe [Ital. < Lat. *Leonti'ni*, the ancient name]: town in the province of Syracuse, Sicily; about 23 miles N. W. of the city of Syracuse (see map of Italy, ref. 10–F). Interesting vestiges of the ancient city, such as remains of aqueducts, cisterns, tombs, etc., exist, and vases, coins, and inscriptions are found. In its neighborhood are the ruins of the castle of Bricinia, mentioned by Thucydides. In 426 B. C. Lentini sent to Athens for help against Syracuse. In 214 B. C. it fell into the hands of the Romans. The present town is composed of respectable buildings, and the streets are commodious. Its trade and industry are considerable. Pop. 12,800.

Lentino, JACOPO, da, commonly known as IL NOTAJO DA LENTINO: early Italian poet; flourished in the first half of the thirteenth century. Dante (*Purg.*, xxiv., 56) speaks of him as one of the leaders of the so-called Sicilian school of poets. Almost nothing is known of his life. He alludes in one of his poems to events of 1237; and Monaci (*Da Bologna a Palermo*, in Morandi, *Antol. della critica moderna*, 9th ed. 1894) thinks he studied at Bologna and lived for some time in Tuscany. We have from him lyrics in the conventional troubadour style of the earliest Italian poets, and a *tenzone* in sonnets with Pier della Vigna and Jacopo Mostacci da Pisa. See Gaspary, *Die sicilianische Dichterschule* (1878). A. R. MARSH.

Len'tulus: the name of a celebrated patrician family of ancient Rome, belonging to the *gens Cornelia*. One of the most conspicuous members of this family was Publius Cornelius Lentulus Sura. He was consul in 71 B. C., but in the following year he was ejected from the senate, together with sixty-three others, on account of the open scandals of his private life. Cherishing the superstitious hope, or belief, that he was the third Cornelius, prophesied by the Sibylline oracle, who should rule Rome (Cinna and Sulla had gone before him), he united himself with Catiline's band, and after the departure of the leader from the city assumed charge of the plans of the conspirators at Rome. Through his irresolution and weakness, the plan of burning the city and of murdering the consul and other patriots was frustrated, while his imprudence in divulging the plans of the conspirators to the ambassadors of the Allobroges made it possible for Cicero to procure evidence sufficient for the arrest of the leaders of the conspiracy. With them he was condemned without trial, and put to death in the public prison (63 B. C.). G. L. HENDRICKSON.

Lenz, lents, JACOB MICHAEL REINHOLD: poet; b. at Sesswegen, Livonia, Jan. 12, 1751; studied theology at Königsberg, and went in 1771 as tutor for two young noblemen to Strassburg, where he met Goethe, Salzmann, and other members of the literary circle. He also met Friderike Brion, with whom he fell desperately in love after Goethe had left her. In 1776 he followed Goethe to Weimar, but was soon expelled from there on account of bad behavior toward one of the ladies of the court. He roved around from place to place, finally became insane, and died in utter misery at Moscow, May 24, 1792. Next to Herder and Goethe Lenz was the most gifted of the poets of the Storm and Stress period. Formerly some of his poems were considered Goethe's property, and even some of his dramas and farces were thought by his contemporaries to be Goethe's. Though lacking the grace of Goethe's style, all his productions show originality, passionate feeling, and force of language. In his desire to be realistic he does not shrink back from representing even the repulsive. His great ambition was to equal Goethe, and in this tragic competition with a genius far superior to his he finally succumbed. See Tieck, *Gesammelte Schriften von Lenz* (1828); K. Weinhold, *Gedichte von Lenz* (1891); E. Schmidt, *Lenz und Klinger* (1878); Froitzheim, *Lenz und Goethe* (1891). JULIUS GOEBEL.

Lenz, OSKAR, Ph. D.: explorer; b. at Leipzig, Germany, Apr. 13, 1848; studied at the university there, and made mineralogy and geology his scientific specialities. After geological researches in Hungary, Slavonia, Bohemia, and the Western Alps, he went to Africa (1874) as a member of the scientific expedition of the German African Company of Berlin. He spent three years studying the regions adjacent to the coast between Gaboon and the Congo. The journey that made him famous was carried out (1879–80) at the expense of the same company. In the disguise of a Mohammedan merchant he crossed the Western Sahara, spent several weeks in Timbuctoo, which had not been visited by a white man for many years, and crossed the Western Sudan by an unexplored route to the mouth of the Senegal river. He corrected some erroneous notions with regard to the Sahara. (See SAHARA.) His most important works are *Skizzen aus Westafrika* (Berlin, 1878) and *Timbuktu* (2 vols., Leipzig, 1884). C. C. ADAMS.

Le'o [= Lat., liter., lion]: a sign of the zodiac, which the sun enters about July 22 and leaves about Aug. 23. The constellation of the same name, one of the finest in the heavens, occupies the zodiacal region corresponding to the sign Virgo, and contains many remarkable nebulæ.

Leo [= Lat., at once Latinization and translation of Gr. Λέων, liter., lion]: the name of six emperors of the Byzantine empire: LEO I., THE THRACIAN (457–474), b. in Thracia about 400, was only a military tribune when the Emperor Marcian died in 457. Aspar, the commander-in-chief of the army, aiming at power, but despairing of the crown himself on account of his foreign birth and Arian creed, raised Leo to the throne, in the hope of using him as a tool. Leo, however, soon emancipated himself from the influence of Aspar, and even seized the very first opportunity of getting entirely rid of him. A magnificent expedition was undertaken in connection with Anthemius, Emperor of the West, against Genseric, King of the Vandals in Africa. The expedition failed utterly, and the odium of the failure was thrown on Aspar. The Vandals being Arians like the Byzantine minister, a rumor of treason arose, and during the riots which ensued Leo had Aspar killed in the interior of the palace. In the beginning of his reign several successful campaigns had been made against the Huns, but in the latter part military calamities were added to inundations, earthquakes, and conflagrations. Leo I. was the first Christian king who at the ceremony of coronation received his crown from the hands of a bishop; he favored the clergy much, and is generally called The Great by the orthodox party; the Arians called him *Macella*, the butcher.—LEO II. (from Jan. to Nov., 474) was a grandson of Leo I., and only four years old at the death of his grandfather.—LEO III., THE ISAURIAN (717–741), b. in Isauria about 680 of poor parents, enlisted in the army, where he rose rapidly, and was commander-in-chief of the Eastern army against the Saracens in 716, when Theodosius III. deposed and exiled Anastasius II. Leo chose not to acknowledge Theodosius III., marched his army against him in the name of Anastasius II., defeated him, and seized the crown for himself. The Saracens followed him, and besieged Constantinople for two years, but having been routed several times, they were at last repelled with great loss. In 726 he issued an edict ordering all images to be removed from the churches of the empire, and thus began the memorable contest known as iconoclasm, which disturbed the empire for more than a century. (See ICONOCLAST.) The immediate result of the edict was a general commotion, especially in the western provinces, and in 728 the exarchate became lost to the Byzantine crown.—LEO IV. (775–780), b. in 750, a son of Constantine V., whom he succeeded. He was mild and tolerant, but weak; his generals, however, were very successful against the Bulgarians and Arabs.—LEO V., THE ARMENIAN (813–820), became commander-in-chief of the army and gained the throne by a long series of treasonable acts; but having once established himself firmly on the throne by his brilliant victories over the Bulgarians and Arabs, he showed himself an administrator of uncommon ability. Reforms were introduced, and the whole administrative system placed on a footing of honesty and justice. He was violent, however, and utterly intolerant. He persecuted the worshipers of images with great severity. At last a conspiracy was formed, and he was murdered on Christmas Day in a church, before the altar.—LEO VI., THE PHILOSOPHER (886–912), b. in 865, a son of Basil I., whom he succeeded. As a ruler he was unsuccessful, and he is chiefly known for his writings. His *Oracula* is a poem in iambic verses, prophesying the fate of the Byzantine empire; there are several editions of it. His *Orationes*, numbering thirty-three, are composed mostly on theological subjects; there is no collected edition of them, but some are found in Baronius's *Annales*, others in *Bibliotheca patrum*, etc. More important was his treatise on military affairs, mostly consisting of extracts from other writers. There exist many editions of this work, as well as an English translation by John Cheke (1554), and a French by Joly de Mezeray (1771).

Leo I., SAINT: pope; regarded by many Protestants as the first real pope, and surnamed THE GREAT; b. about 390, probably in Rome; in early life displayed uncommon zeal, knowledge, and capacity, and was often employed by the popes upon important ecclesiastical and political duties; was chosen pope in 440, though only a deacon. Leo opposed the Pelagian, Manichæan, Priscillian, and Eutychian heresies; labored with great ability for the extension of the Roman primacy; visited Attila in person (452) and induced him to spare Rome, and in 455, when the city was sacked by Genseric, he succeeded in moderating the ferocity of the attack. He was the first pope to hold the monarchical theory of the papacy. Leo died Nov. 10, 461. Of the many editions of his writings, the best is that of the Ballerini (Venice, 753–757). See English translation of his *Select Epistles and Sermons* in vol. xii. of the 2d series of the edition of the *Nicene and Post-Nicene Fathers* (New York). See his *Life* by E. Perthel (Jena, 1843).—LEO II., SAINT, became pope in 682, and died in 683.—LEO III., a Roman, became pope in 795; crowned Charlemagne Emperor of the West, and freed Rome from Byzantine domination. D. June 11, 816.—LEO IV., a Roman, became pope in 847; built the Leonine wall about the Vatican suburb, which is hence called the Leonine City; restored the town of Porto, which he colonized with Corsicans, and founded Leopolis (now deserted), 12 miles from Civita Vecchia. D. July 17, 855.—LEO V., a Benedictine and cardinal, became pope Oct. 28, and died in prison Dec. 6, 903.—LEO VI., a Roman, became pope July 6, 928, and died Feb. 3, 929.—LEO VII., a Roman, became pope in 936, and died in 939.—LEO VIII., a Roman, was made pope by Otho I. in 963, in place of the infamous John XII. Benedict V. was his rival. D. 965.—LEO IX. (*Bruno*), an Alsatian, cousin-german to Conrad the Salic, b. June 21, 1002; became Bishop of Toul in 1026; was celebrated for learning; was nominated pope at Worms in 1048, and recognized at Rome in 1049; was largely under the influence of Hildebrand, afterward Gregory VII. The great events of his pontificate were the Berengarian controversy and the great exertions he and Hildebrand made for the extension of discipline. D. Apr. 19, 1054.—LEO X. (*Giovanni de' Medici*), son of Lorenzo the Magnificent, b. at Florence, Dec. 11, 1475; received the tonsure and was made abbot of Fontedolce and of Passignano when but seven years old; became cardinal *in petto* when thirteen, and full cardinal-deacon when seventeen (1492); was exiled with the other Medici in 1494; served under Julius II. against the French as legate and field-marshal, but was taken prisoner at Ravenna 1512; by the aid of the emperor, the pope, Venice, and Spain restored the Medici to Florence 1512; succeeded Julius II. as pope 1513. His pontificate is memorable for the

splendor of the papal court; his extensive patronage of learning and art; the reorganization of the University of Rome, and the establishment of a committee under the presidency of Lascaris for the publication of Greek manuscripts; the scandalous and open sale of indulgences in order to procure the necessary means of building St. Peter's church; the origination of the Reformation under the influence of Luther, at which he at first laughed as a ludicrous monkish quarrel; the confirmation and extension of the Spanish power in Italy; and the final suppression of the Florentine republic. As a prince, Leo had illustrious qualities; as an ecclesiastic, he certainly failed, as much from a lack of the ecclesiastical spirit as from a want of knowledge of the tendencies of the critical times in which he lived. See W. Roscoe, *Life and Pontificate of Leo X.* (London, Bohn's Library); M. Creighton, *History of the Papacy during the Period of the Reformation* (vols. iii.–v.).—Leo XI. (*Alessandro Ottaviano de' Medici*), a grand-nephew of Leo X., b. at Florence 1535; became Bishop of Pistoia 1573; Archbishop of Florence 1574; cardinal 1583; pope 1605; died Apr. 27, 1605, after a pontificate of twenty-six days.—Leo XII. (*Annibale della Genga*), b. Aug. 22, 1760; became Archbishop of Tyre 1793; cardinal in 1816; pope in 1823; extended papal authority, and reformed some points of the temporal and spiritual administration. D. Feb. 10, 1829.—Leo XIII. (*Giovacchino Vincenzo Pecci*), b. at Carpineto, Mar. 2, 1810, in the diocese of Anagni; became a titular archbishop 1843; a cardinal in 1853; chamberlain of the Sacred College in 1877, and pope in 1878, having been elected Feb. 20 and crowned Mar. 3. See his *Life*, by B. O'Reilly (New York, 1887). Revised by S. M. Jackson.

Leo XIII., Encyclicals of: See the Appendix.

Leo, lā'ō, Heinrich: historian; b. at Rudolstadt, Mar. 19, 1799. Having settled in 1828 as Professor in History at the University of Halle, he developed a great productivity, following more or less closely the tracks of Hegel's ideas in his *Handbuch der Geschichte des Mittelalters* (1830); *Geschichte der italienischen Staaten* (5 vols., 1829); *Zwölf Bücher niederländischer Geschichten* (2 vols., 1832–35). Having changed in favor of ultra-reactionary tendencies, he wrote *Lehrbuch de Universalgeschichte* (6 vols., 1835–44), and *Leitfaden für den Unterricht in der Universalgeschichte* (4 vols., 1838–40), and a number of articles in the *Evangelische Kirchenzeitung*. He was long editor of the *Hallesche Cochenblatt*. D. Apr. 24, 1878.

Le'o Africa'nus [Lat., liter., Leo the African], Joannes, originally named Al Hassan Ibn Mohammed: geographer; b. at Granada, Spain, about 1485, of Moorish parents, who emigrated to Fez in Morocco after the capture of Granada by the Spaniards. At sixteen he accompanied an uncle on an embassy to Timbuctoo, and afterward traveled through several countries of Northern and Central Africa, penetrating Bornu to Nubia, descending the Nile, and extending his explorations into Persia. Returning from Constantinople by sea in 1517, he was captured by corsairs and taken to Rome, where he became a Christian, was patronized by Pope Leo X., whose name he took, learned Italian and Latin, and taught Arabic. D. at Tunis in 1526 (?). His great work, the *Description of Africa*, was written in Arabic, published in Italian by Ramusio (1550), and in Latin by Elzevir (1632).

Leo Allatius: See Allatius.

Leoch'ares [in Gr. Λεωχάρης]: an Athenian sculptor (350 B. C.), who co-operated with Scopas, Bryaxis, and Timotheus in the sculptures on the sides of the Mausoleum at Halicarnassus. Besides statues of the gods (Zeus, Apollo, Ares, etc.), he made portrait-statues also (Isocrates, Alexander the Great, etc.); he assisted Lysippus in his group representing Alexander in the lion-chase. He made in bronze a group representing the rape of Ganymede by the eagle of Zeus, a marble copy of which is in the Vatican. Pliny (34–79) speaks of the group with enthusiasm. J. R. S. Sterrett.

Leo Diac'onus [Gr., liter., Leo the Deacon]: Byzantine historian; b. about 950; d. about 995. He saw the deposition of Nicephorus II. Phocas (969), and accompanied Basil II. in the war against the Bulgarians (981). His history of the events which took place from 959 to 975 is badly written, but contains valuable information. This work was first published by Hase (Paris, 1819), and reissued in the *Corpus Historiæ Byzantinæ* (Bonn, 1828). E. A. G.

Leominster, lem'ster: town; in the county of Hereford, England, on the Lugg, 13 miles N. of Hereford (see map of England, ref. 10–F). It is the center of the most celebrated cattle-breeding district of England, and has some manufactures of leather and woolens, of iron and brass ware, of gloves and hats, and a trade in hops and cider. Pop. (1891) 5,675.

Leominster: town; Worcester co., Mass. (for location of county, see map of Massachusetts, ref. 3–F); on the Nashua river, and the Fitchburg and the Old Colony railways; 18 miles N. of Worcester, 40 miles N. W. of Boston. It has water-works which cost $150,000, gas and electric light plants, electric street-railway, public library (1852) containing over 13,000 volumes, and a weekly newspaper, and manufactures of horn jewelry, and other goods, furniture, pianos, paper, woolen goods, tanned and curried leather, children's carriages, and leather-board. Pop. (1880) 5,772; (1890) 7,269; (1900) 12,392. Editor of "Enterprise."

Le'on, Span. pron. lā-ōn': province of Northern Spain, comprising an area of 6,167 sq. miles. It is covered with mountain ranges, which, especially in the northern part, inclose beautiful, well-watered, and fertile valleys, while the eastern parts are more level and afford excellent pasturage. Large flocks of merino sheep are reared; flax, hemp, maize, and fruits are raised, and many medicinal herbs gathered. Together with the provinces of Salamanca and Zamora it formed the former kingdom of Leon, founded about 750 by Alfonzo the Catholic, who conquered it from the Saracens, and was united to Castile by Ferdinand III. in 1230. Pop. (1887) 380,229.

Leon: the capital of the province of Leon, Spain; at the confluence of the Bernesga and the Torio, 256 miles by rail N. W. of Madrid (see map of Spain, ref. 13–D). Since the annexation of the old kingdom of Leon to Castile the city has lost its importance, and is, in general, in a state of decay. Its cathedral, built in the fourteenth century, and restored 1878–92, is one of the most elegant specimens of Gothic architecture extant. Pop. (1887) 13,446.

Leon (sometimes called Latacunga, from the capital): a central province of Ecuador, immediately S. of Quito, and almost entirely in the Andean plateau. Area, 2,595 sq. miles; estimated population (1890) 109,600. Cotopaxi lies on the northern boundary; the streams flow eastward, forming the Pastaza, an affluent of the Napo. Agriculture and grazing are the only industries. H. H. S.

Leon, or Leon de los Aldamas: a city in the western part of the state of Guanajuato, Mexico, near the western extremity of the alluvial plain or *bajio* of Guanajuato; 5,862 feet above the sea (see map of Mexico, ref. 6–G). The Mexican Central Railway runs close to the town, the distance from Mexico city being 258 miles. The plain mentioned is one of the richest cereal belts in the republic, and to it Leon owes most of its importance; but it is subject to destructive floods from the overflowing of streams; one of these floods in 1889 overwhelmed the city, and more than 3,000 persons were drowned. Leon is noted for its manufactures of saddlery and leather-work, said to be the finest produced in Mexico; it also makes coarse woolen and cotton goods, soap, and cutlery. There is a fine square, with several large public buildings and a cathedral. The place was founded in 1576, but its importance dates from 1836, when it was raised to the rank of a city. Pop. (1895) 90,978. In wealth and importance it is much behind Guadalajara and Puebla. Herbert H. Smith.

Leon: a city in the western part of Nicaragua; 50 miles W. N. W. of Lake Managua, and about the same distance from the Pacific coast at Corinto; on the railway from Corinto to Managua and Granada (see map of Central America, ref. 6–G). The city is built on a fine plain, about 200 feet above sea-level. The most notable building is the cathedral, an immense ugly structure, built 1746–74 at an expense of $5,000,000. Connected with it is the college of San Roman, founded in 1678, and long one of the most celebrated institutions of learning in America. The bishop's palace and the Government buildings are also worthy of note; several former monasteries are used for schools, a hospital, etc. Leon was originally founded (1523) by Francisco Hernandez de Cordoba, on the western side of Lake Managua, and changed to the present site in 1610. It was the capital of the colonial province and of the republic until 1870, and was formerly much more populous. It is still the largest city of Nicaragua, and the seat of the bishopric; but it has suffered greatly in the civil wars. Estimated population (1891) 31,000. This includes the Indian suburb of Subtiabá, which is really the original town, having existed before the

conquest; according to early accounts, it had 100,000 inhabitants when the whites arrived, and was the site of a renowned temple. Leon is the capital of a department of the same name, having 3,136 sq. miles of area and 65,000 inhabitants. HERBERT H. SMITH.

Leon: town (laid out in 1853); capital of Decatur co., Ia. (for location of county, see map of Iowa, ref. 7–G); on the Chi., Burl. and Quincy and the Des M. and Kan. City railways; 65 miles S. of Des Moines. It is in an agricultural region, and is a shipping-point for cattle, hogs, horses, and sheep. Pop. (1880) 1,367; (1890) 1,422; (1900) 1,905.
EDITOR OF "DECATUR COUNTY JOURNAL."

Leon, JUAN PONCE DE: See PONCE DE LEON.

Leon, Maestro Fray LUIS PONCE, de: theologian and poet; b. at Belmonte, New Castile, Spain, in 1527; d. at Madrigal, Old Castile, Aug. 23, 1591, and was buried in the Augustinian monastery at Salamanca. His boyhood was passed in Madrid; at the age of fourteen he went to the university at Salamanca, where after four or five years he took his degree in theology, and became an Augustinian friar. His great attainments gave him at once a place as teacher, and in 1561 he obtained by competition the university chair known as that of St. Thomas Aquinas; to this he later added in the same way that in the Sacred Scriptures. His successes and learning made him enemies in the university, and in Dec., 1571, he was charged before the Inquisition with having circulated a Spanish translation of the Song of Solomon, and with having criticised the Vulgate as an imperfect rendering of the text of the Bible. Though he was able to explain away the first of these charges, and to deny the imputation of heresy contained in the second, he could not clear himself from the calumnies of his rivals, and in Mar., 1572, he was arrested, and his case carried before the tribunal of the Inquisition at Valladolid. For nearly five years he was kept in confinement, his health breaking under the strain; and all the ingenuity of his enemies was exerted to prove him guilty. In 1576 judgment was pronounced in doubtful terms, but essentially against him, by a majority of the tribunal. When the case came to be reviewed by the supreme council of the Inquisition at Madrid, however, the finding of the tribunal was entirely set aside, and the accused was set free Dec. 7, 1576. The complete documents in this famous case have been published by Salvá and Sainz de Baranda in their *Colección de Documentos inéditos para la historia de España*, vols. x. and xi. (Madrid, 1847–48); also copious extracts in Rivadeneyra's *Biblioteca de Autores Españoles*, vol. xxxvii. (Madrid, 1872). Immediately upon his release, Luis de Leon returned to his work as teacher in the University of Salamanca, which had remained true to him through all his sufferings. Here, in spite of his physical weakness, he exercised a profound influence, by reason of his learning and character. In truth, no Spaniard of his time approached him in scholarship. He knew Hebrew and Greek, as well as Latin; and his studies in the text of the Bible were almost those of a modern scholar. He was, however, a devoted Roman Catholic, and it is a mistake to see in him a Spanish reformer and Protestant. Most of the works we have from him were written before or during his imprisonment. These are: 1. His *Poems*, sacred and profane, written mainly in his youth, and often singularly fresh and charming. 2. The prose treatise *De los nombres de Cristo*, written in prison, but never finished—an eloquent work of Spanish devoutness. 3. *La perfecta casada* (Perfect Wife), addressed to a newly married lady, and written in the form of a commentary on portions of the book of Proverbs. 4. A Latin exposition of the *Song of Solomon*, published after the author's release from prison. A beautiful Spanish version of the *Song* in octaves, which was intended for publication with a Spanish commentary did not see the light until 1806 (the commentary, however, appearing in 1798). 5. *Exposición del libro de Job*. The complete works of Fray Luis de Leon were published in six volumes in Madrid 1804–16. The most important are to be found in vol. xxxvii. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1872). A. R. MARSH.

Leonard, ALBERT: See the Appendix.

Leonard, DANIEL: jurist; b. at Norton, Mass., May 29, 1740; graduated at Harvard College in 1760; became a prominent lawyer; was frequently chosen to the Legislature, and at first supported the Whig cause energetically, but at the outbreak of hostilities adhered to the royal cause. He undertook to reply to John Adams's arguments against the colonial measures of Lord North, and his letters signed *Massachusettensis*, have been pronounced the best defense of the British Government that appeared in America. Leonard left Boston with the British forces (1776); resided for a time in London; was many years chief justice of Bermuda. D. at London, June 27, 1829. The polemic against Adams was reprinted in 1819, with a preface by the former, who employed the pseudonym of *Novanglus*.

Leonardo da Pisa, lā-ō-naar'dō-daa-pee'sǎă, **Leonardo Bonacci**, -bō-naat'cheĕ, often **Fibonacci** (filius Bonacci): mathematician; b. at Pisa, about 1175. He traveled extensively in the East in order to study different arithmetical systems, and was the first to introduce algebra into Europe, where he made the Arabic system of arithmetic better understood. He wrote *Practica Geometriæ* (1220) and a treatise on the squares of numbers which is lost. In 1202 he composed his great work, *Liber Abbaci*; the latter word originally denoted an instrument of calculation, and is employed by him as a general designation of arithmetics. This work is doubtless based upon the Arabic algebra of Mohammed ben Musa, written toward the middle of the ninth century. It goes as far as equations of the second degree, and shows how algebra may be applied to geometry. It was published in a splendid edition by Boncompagni (Rome, 1857). EDWIN A. GROSVENOR.

Leonardo da Vinci, veen'cheĕ: painter, sculptor, architect, engineer, inventor, and man of science; b. at Vinci, near Empoli, in the Val d'Arno, in 1452. He was the natural son of one Piero, an obscure notary of Florence, and a woman named Catarina. His father took him home, and gave him a good education. The boy showed such an aptitude for the arts that Piero placed him with Verrocchio, a distinguished Florentine painter and sculptor, with whom he remained from his fourteenth to his twentieth year. In 1480 or 1483 he went to Milan, having offered his services to the Duke Lodovico il Moro in a remarkable letter, of which an autograph copy exists in the Ambrosian Library at Milan. In this letter Leonardo appears less as an artist than as a military engineer; he declares himself prepared to undertake any work that may be required for military offense or defense—to make bridges, scaling-ladders, cannon, batteries; and after long detail of his skill in such matters, only at the end of his letter refers to his accomplishments as a sculptor, architect, and painter. In the service of Lodovico he executed several important works—the model for the equestrian statue of Lodovico Sforza, the duke's father, the plans for the Martesana Canal, and the famous *Last Supper*, a fresco in oils painted on the wall of the refectory of the convent of Sta. Maria delle Grazie. The model for the statue has disappeared; it was probably destroyed in the course of the war between France and Milan. The fresco, owing partly to ill treatment and partly to the process by which it was painted, is so damaged that it can not be said to exist. In 1499 Leonardo returned to Florence, but after a short stay he entered the service of Cæsar Borgia, who made him his chief engineer and employed him in studying various plans for the improvement of the territory of the Romagna and Urbino. At this time he was invited by the seigniory of Florence to paint the walls of the council-hall of the Palazzo Vecchio in conjunction with Michelangelo. He began the work, but wearied of it, and abandoned it on the invitation of Charles d'Amboise, who called him to Milan, where he governed as the lieutenant of Louis XII. of France. Leonardo remained in Milan till it was abandoned by the French, when he went to Rome in the company of Giulian de' Medici, who was to assist in the consecration of his brother, Leo X., as pope. He found no employment under Leo, and hearing that Francis I. had entered Lombardy, he hastened to join that monarch, who had already in 1507 desired to attach him to his service, and had named him his court painter. He was welcomed by the king, whom he accompanied to France in 1516, and who gave him a house at Cloux, near his château of Amboise, with a pension of 700 gold crowns. Leonardo's health failed after his arrival in France, and beyond some engineering projects he accomplished nothing during the three years and a half that elapsed between his coming and his death in 1519 (May 2). The authentic existing paintings of Leonardo are few in number, and of these the Louvre possesses the finest. These are the *Virgin of the Rocks*, the *Portrait of Madonna Lisa del Giocondo* (called *Monna Lisa* or *La Joconde*), the *Virgin on the Knees of Saint Anna*, and the *John the Baptist*. It is impossible in the space at command to give an account of Leonardo's scientific labors. He made perhaps no distinct discovery, but his curiosity

and his ingenuity led him to investigate in every direction, and had he not been of so unstable and discursive a mind his speculations might have produced some fruit. No doubt much more would have come of them if they had been made common property by being printed, but they were only committed to writing, and remain to this day in manuscript. See Vasari, *Lives of Painters, Sculptors, and Architects*; Charles Clément, *Michel-Ange, Léonard de Vinci, Raphael* (Paris, 1866); Arsène Houssaye, *Histoire de Léonard de Vinci*; de Stendhal, *Histoire de la Peinture en Italie*; *Leonardo da Vinci and his Works*, consisting of the *Life*, by Mrs. Charles Heaton, and an *Essay on his Scientific and Literary Works*, by C. C. Black, illustrated by twenty permanent photographs (London, 1875). Valuable aids in the study of da Vinci's drawings will be found in several works. The *Saggio delle opere di Leonardo da Vinci* (Milan, 1872), published in commemoration of Leonardo's second centenary, contains specimens copied by photo-lithography from the largest of the thirteen volumes of manuscript left by Leonardo, called, from its size, the *Codice Atlantico*, which is preserved in the Ambrosian Library at Milan. More extensive and valuable publications are *Les Manuscrits de Léonard de Vinci, Le MS. A.*, by M. Charles Ravaisson-Mollieu (1881), the first part of a contemplated republication of the manuscripts of Leonardo in the National Library of France, and *The Literary Works of Leonardo da Vinci*, edited from the original manuscripts by S. P. Richter (1883).

Leoncavallo, Ruggiero: See the Appendix.

Leon'idas (in Gr. Λεωνίδας): King of Sparta; succeeded his half-brother, Cleomenes, about 490 B. C., and was sent in the spring of 480, when the Persians had conquered Macedonia, to defend the defiles of Thermopylæ, between Mt. Œta and the Maliac Gulf. With the co-operation of a fleet in the gulf, the defiles could be defended by a comparatively small army, but the Greek fleet was unfit for battle at the moment the Persian attack began, and, what was still worse, the Greeks had forgotten to occupy a practicable pathway which led across Mt. Œta, and which was shown to the Persians by a traitor, Ephialtes. For two days the Greeks resisted the barbarian host with great valor; the Persian losses were enormous. At daybreak on the third day Leonidas learned that the Persians had found the pathway and were coming in masses across the mountain. There was still time to retreat; but, having sent away his auxiliary troops, Leonidas with his 300 Spartans remained in the defiles, and, occupying a small hill in the center of the position, they fought to the last man.

Leonidas: the name of two poets whose remains are preserved in the Greek *Anthology*. The former, a native of Tarentum, flourished about B. C. 276. He was a poverty-stricken wanderer, who composed dedicatory epigrams for the plain people. His poems, many of them in the Doric dialect, occupy 100 numbers in the Greek *Anthology*, and are interesting by reason of the humble sphere in which they move, their rich vocabulary, and the skillful management of the verse.—The other, of Alexandria, lived in the reign of Nero at Rome. In the *Anthology* there are forty-three epigrams ascribed to him. He was a jejune verse-wright and manufactured distichs in which the letters of certain words or lines taken together have equal numerical values. The poems of both are edited by Jacobs in the *Anthologia Græca*, and by Meineke (Leipzig, 1791).

B. L. Gildersleeve.

Le'onine Verse [named from *Leo*, Benedictine canon of St. Victor, Paris, in the twelfth century, who wrote largely in this measure]: the rhyming hexameter, pentameter, or elegiac verse, especially in Latin. Traces of this rhyming practice appear in Ovid, and even in earlier poets, but the custom prevailed extensively in the Middle Ages, the rhyme being often barbarously imperfect, and the meter not much better. A familiar example is—

> Dæmon languebat, monachus tunc esse volebat
> Ast ubi convaluit, mansit ut ante fuit.

Leon', Isla de: an island on the south coast of Spain, in the Atlantic, 10 miles long by 2 broad, on which is the city and port of Isla de Leon (also called San Fernando). The city was in 1810 the capital of Spain under the regency, and was the scene of the first constitutional movement of 1820. It is strongly fortified, has two hospitals, several convents, and an excellent observatory. Pop. 10,000.

Leonna'tus (in Gr. Λεόννατος): Macedonian general; b. at Pella, of princely stock; became one of the body-guard of Philip, and pursued and slew Philip's murderer. Afterward he became one of Alexander's generals and helped to save his life, besides distinguishing himself in India, both as general and civil governor. After his return from India, Alexander rewarded him with a golden crown. Along with Perdiccas he was appointed one of the guardians of the child with which Roxana was pregnant. On the division of the empire he received Phrygia Parva as his share. During the Lamian War (*q. v.*) he marched from Phrygia to the aid of Antipater, and was killed in the battle near Lamia.

J. R. S. Sterrett.

Leon Pinelo, Antonio, de: See Pinelo.

Leontini: See Lentini.

Leonzio Pilato, lā-on'tsi-ō-pĕē-laa'tō (Leo Pilatus): classical scholar; a native of Saloniki, according to Hody, but Hallam makes him (on the authority of Petrarch's letters) a Calabrian; went to Florence about 1360 A. D., and was employed by the republic at the request of Boccaccio to teach his native language. He was the first who publicly lectured on Homer in Western Europe, and the first modern to translate that poet into Latin. This version was, like that of Livius Andronicus, uncouth to an extreme and almost verbatim (*Iram cane Dea Pelidæ Achillis, Corruptibilem quæ innumerabiles Græcis dolores posuit.—Virum mihi pande, Musa, multimodum qui valde multum Erravit postquam sacram civitatem Troiæ deprædatus fuit*). Leaving Florence, he visited Venice, where he met Petrarch, who had studied Greek under Barlaam. Thence he went to Constantinople. Returning to Italy soon after, he was killed by lightning within sight of the Adriatic (1366). Gibbon describes his appearance and manners as repulsive. (*Decline and Fall*, vol. viii., p. 148.) From him Boccaccio unfortunately collected the materials for his treatise on the genealogy of the heathen gods. See Gibbon, *l. c.*; Hody, *De Græcis illustribus*, pp. 1–11; Voigt, *Wiederbelebung des class. Alterthums*, ii., pp. 110–113.

Revised by Alfred Gudeman.

Leopard [viâ O. Fr. from Lat. *leopar'dus* = Gr. λεόπαρδος, liter., lion-panther; λέων, lion + πάρδος, panther, pard. The name *leopardus* was originally applied to the cheetah, from the belief that it was the offspring of the lion and panther. The name has been transferred from the cheetah (*Cynælurus jubatus*) to the animal now bearing it, while pard has become obsolete]: a large, spotted member of the cat family, the *Felis pardus* of Linnæus, found throughout the greater part of Africa, Southern Asia, and the islands of Ceylon, Java, Sumatra, and Borneo. The color varies, according to the nature of the region, from pale fawn to deep buff, fading into white on the under side of the body and inner portions of the limbs. The coat is thickly marked with spots

Leopard.

of black, or deep brown, arranged on the back and sides in rosettes. These rosettes have no central spot, such as is found in the jaguar. Totally black individuals, cases of melanism, sometimes occur in Southern Asia. The body of the leopard is about 4 feet long, the tail 3. It is exceeded in size by the lion and tiger of the Old World, and by the jaguar and largest specimens of the puma in the New. The leopard inhabits wooded districts, and is a good climber. While preying principally on small animals, the leopard is very destructive to cattle in some localities, and also to man, 800 men and 15,000 cattle having been destroyed in India in a single year.

F. A. Lucas.

Leopardi, Giacomo: poet; b. June 29, 1798, at Recanati, in the mark of Ancona, Italy, of a noble but not rich family. By his twentieth year, chiefly by his own efforts, he had, unaided, learned French, Spanish, English, Hebrew, and Greek, had read all the classics and Church Fathers within his reach, and had become complete master of his own language. In accomplishing this he, however, hopelessly shattered a constitution never robust, and so seriously impaired his eyesight that for the rest of his life he was almost blind. To this period of his life belong a great number of works of a philological character, translations, essays in Italian and Latin, and annotations, of which part long remained unpublished, while others appeared in learned periodicals (the essay on Moschus and the translation of the *Idyls* as early as 1815). Bunsen, the Prussian minister to Rome, offered in 1822 to find him a place in a German university, an offer which Leopardi was obliged to decline on the ground of delicate health.

The faith in which Leopardi had been brought up did not satisfy him, and he gradually came to look on man as but a part—and an inconsiderable part—in the great scheme of creation—a view that carried with it the denial that human happiness is any part of that scheme, disbelief in the immortality of the soul and the direct action of a personal God, and contempt for the vain efforts and childish illusions of man. His belief is perhaps best expressed in his poem *La Ginestra*, but it appears constantly in his other poems and in his dialogues.

In 1818, at the age of twenty, Leopardi published at Rome the two poems *Sull' Italia* and *Sul monumento di Dante*, followed in 1820 by the poem to Angelo Mai, which revealed to Italy a new genius, and gave Leopardi a place among the greatest of Italian poets. In these poems and those that follow them he shows an amazing mastery of the language, and breaking with all Italian traditions turns to the Greeks for his models, but it is the true Hellenic spirit that breathes in his poems the love of absolute purity of form, and not mere imitation or pedantic recollection. By the use of harmonious rhythms and a most intricate system of rhymes, the Italian language is made to show a vigor and masculine strength unknown in its literature since the days of Dante. In 1824 the *Canzoni* appeared at Bologna, containing the three poems before mentioned and seven others. More were added from time to time, so that in the edition published soon after his death there are found forty-two poems that the poet thought worthy of publication.

Encouraged by the favor which his early works met from men of letters, Leopardi went in 1822 to Rome. Here he found work for a time in a library; but all efforts to secure a position failed, as, in spite of the entreaties of family and friends, he could not take holy orders, which were an almost necessary prerequisite for any place which he could fill. He returned home, but in 1825 again ventured into the world, and for six years in Milan, Bologna, and especially in Florence he tried to win an independent place for himself, now and then being obliged to return to Recanati. In Florence he wrote for Vieusseux's *Antologia*, published two selections of Italian writers and his admirable commentary on Petrarch (his most lasting philological work), and in 1827 appeared the *Operette morali*. These are philosophical essays, chiefly in the form of dialogues. The climate of Northern Italy, however, was too severe for his failing health. In 1831 he went to Rome, and thence to Naples, where he died June 14, 1837.

After his death appeared the *Paralipomeni della Batracomiomachia*, a satirical poem in ottava rima (Paris, 1842); an edition of his collected works by his friend Rainieri (Florence, 1845), which, as the Naples edition of 1836 was suppressed by the Government, is accepted as the poet's final revision; the *Studii filologici*, edited by Pellegrini and Giordano (1845); the essay on the popular errors of the ancients, and the *Epistolario*, edited by P. Viani (1849); and the *Opere inedite* (mainly youthful productions), edited by Cugnoni (Halle, 1878). His works, especially the poems, have been frequently reprinted. A very full bibliography of Leopardi and of works about him was compiled by L. Cappelletti, *Bibliografia Leopardiana* (Parma, 1882). The most complete biography is by A. Bouché-Leclercq (Paris, 1874); other lives or biographical articles are by Montanari (1838); C. Rosa (1880); Piergili (1882); in French by Sainte-Beuve, *Portraits contemporains* (vol. iv., 1844); Marc-Monnier in *L'Italie, est-elle la terre des morts?* (1860), and E. Rod (1888); in German by G. Brandes (1869); in English by W. E. Gladstone, *Quarterly Review* (Mar., 1850), and H. T. Tuckerman in his *Essays*. His works have been translated in whole or in part into French and German; there is a translation of the essays and dialogues into English by C. Edwardes (London, 1882). George Bendelari.

Leopold I.: Prince of Anhalt-Dessau, generally known as the Old Dessauer; b. at Dessau, June 3, 1676. He evinced even as a boy a strong passion for military affairs. In 1688 the Emperor Leopold I. made him a colonel and chief of a regiment of horse, but in 1693, at the death of his father, who was a Prussian general-field-marshal, he entered the Prussian service and received his father's regiment. He was at once passionate and shrewd, domineering and kind, rough in his manners, but lofty in his feelings. In his youth he fell in love with Anna Luise Föse, the daughter of a druggist, and, in spite of all remonstrances, as soon as he was of age (in 1698) he married her, induced the emperor to raise her to princely rank, and led a happy married life with her. He served from 1698 to 1713 with great distinction and in high and responsible positions under Eugene and Marlborough in the Netherlands, on the Rhine, and in Italy, and on the accession of Frederick William I. to the Prussian throne he became the head of the Prussian army. He was a master in military training. He invented the equal step, as well as the iron ramrod, and formed the armies with which Frederick II. founded the political power of Prussia. He was at once despotic and inspiring, and that spirit—a spirit of discipline—before which the Austrians broke down at Sadowa and the French at Sedan, descends from the Old Dessauer. He was, however, not simply a drill-sergeant, like his royal friend, Frederick William I.; he was also a general. His conquest of Rügen and the capture of Stralsund in 1715 in the war against the Swedes were brilliant exploits. Frederick II., who disliked him because of some of his antiquated peculiarities, valued his capacities as a commander. In the first Silesian war he placed him in command of the army on the Hanoverian frontier, and in the second he sent him to invade Saxony, where he won the brilliant victory at Kesselsdorf which ended the war. After the death of his wife, in 1745, he retired from all participation in public life, and died on his estate at Dessau, Apr. 7, 1747. In Carlyle's *Life of Frederick the Great* the descriptions of the "Old Dessauer" are among the most picturesque passages. Revised by C. K. Adams.

Leopold I.: King of Belgium (1831–65); b. Dec. 16, 1790; the youngest son of Duke Francis of Saxe-Coburg; received a very careful education; was made a general in the Russian army after the marriage of his sister to the Grand Duke Constantine; accompanied Alexander I. to Vienna and Paris in 1814; and was married in 1816 to the Princess Charlotte Augusta, heir-apparent of Great Britain. After her death in 1817 he lived in retirement in London or traveling. In 1830 he refused the crown of Greece, but in 1831 he accepted that of Belgium, and married in 1832 a daughter of Louis Philippe, who bore him three children. His reign was calm and undisturbed. He was firm, discriminating, and progressive in his interior policy, and he represented his people with tact and dignity among other sovereigns. D. at Laeken, Dec. 10, 1865.

Leopold II.: King of Belgium; b. Apr. 9, 1835; a son of King Leopold I. and Queen Louisa, a daughter of Louis Philippe of France; was married (Aug. 22, 1853) to Marie Henriette, a daughter of the Archduke Joseph of Austria, and ascended the throne Dec. 10, 1865. He became sovereign of the Independent State of the Congo in 1885.

Leopold I.: Emperor of Germany (1658–1705); b. in Vienna, June 9, 1640; the second son of Ferdinand III. and Maria Anna of Spain. He was educated for the Church, but at the death of his elder brother in 1655 he became King of Hungary, and in 1658 he succeeded his father as King of Bohemia and Emperor of Germany. Of his three wars with France, the two first, which ended by the Peace of Nymwegen in 1678 and of Ryswick in 1697, are described in the articles on Louis XIV. and William of Orange, and the last one, the Spanish war of succession, in a separate article. (See Succession Wars.) The point at issue between Austria and Turkey was Transylvania. The Turks held it, and the Hungarians demanded it. In 1662 the war began, and the Turks broke into Hungary. In 1663 Leopold received troops from the German empire, Sweden, and France, and money from the pope and the Italian states, and Aug. 1, 1664, Montecuccoli succeeded in routing the Turkish army at St. Gothard, on the Raab. On Aug. 10 an armistice of ten years was concluded, in which, however, the

Turks retained Transylvania, to the great indignation of the Hungarians. Soon after disturbances arose in Hungary from the contest between the national Protestant and the Austrian Catholic parties. Leopold treated his political adversaries with the utmost harshness, and the result was a formidable insurrection under the leadership of Tökölyi in 1682. The Hungarians solicited Turkish aid, and on July 14, 1683, an army of 200,000 men laid siege to Vienna. Leopold had fled, and in spite of the valorous resistance of the citizens and the garrison the city would have fallen, and with it the power of the house of Hapsburg, if the Polish king, John Sobieski, had not arrived before its walls (Sept. 12), and completely routed the besieging army. The Hungarians submitted, and at the Diet of Pressburg (1687) the Hungarian crown was declared hereditary in the family of Hapsburg. Leopold died in Vienna, May 5, 1705.

Leopold II.: Emperor of Germany (1790–92); b. at Vienna, May 5, 1747; the second son of Francis I. and Maria Theresa. In 1765 he succeeded his father as Grand Duke of Tuscany, and proved himself a liberal and enlightened ruler; but, like his brother, Joseph II., and like Pombal in Portugal and Struensee in Denmark, he was a despotic reformer, and his reforms caused great annoyances and disturbances. In 1790 he succeeded his brother in Austria and Germany, and found on his ascension to the throne the vast empire in a critical state. With great tact, however, he managed the difficult situation. He pacified Hungary, quelled the insurrection in Belgium, concluded peace with Turkey at Sistova in 1791, and re-established the friendly relations with Prussia by the congress at Reichenbach in 1790. Just as he had confederated with Prussia and Saxony for the support of Louis XVI. against his rebellious subjects, he died suddenly in Vienna, Mar. 1, 1792.

Leopold II.: Grand Duke of Tuscany (1824–59); b. Oct. 3, 1797; a son of the Grand Duke Ferdinand III. He ruled in the same spirit as his grandfather, Leopold I., Emperor of Germany, under the name of Leopold II. In 1847 he granted a free constitution, and although in 1849 he had to flee to Naples, he was recalled shortly after by his own subjects. Thus he weathered the liberal storm, but the national, which soon followed, was too powerful for him. In 1859 he fled with his family to Vienna. No regard was paid to his abdication in favor of his son. His dominions were incorporated with the kingdom of Italy in consequence of a popular vote, and he died an exile at Brandeis, in Bohemia, Jan. 29, 1870. He edited *Opere di Lorenzo de Medici* (4 vols., 1825). See the *Life* by Baldasseroni (1871).

Leopold, Christian Gerhard, M. D.: obstetrician; b. at Meerane, Saxony, Feb. 24, 1846; studied medicine at the University of Leipzig, graduating M. D. in 1870; established himself in Leipzig in 1874; was instructor in the Leipzig Obstetrical Institute in 1881; in 1883 became professor extraordinary and director of the Dresden Obstetrical Institute. He has made special investigations in the histology and pathology of the uterus and ovaries. His most important work is *Das skoliotisch- und kyphoscholiotisch-rachitische Becken* (Leipzig, 1879). S. T. Armstrong.

Leopoldville: the chief station of the Congo Free State on the upper Congo. It was founded by Henry M. Stanley (Dec., 1881) on the left bank of the river, just above the first of the 235 miles of cataracts in the lower Congo, and near the outlet of the wide expansion of the river known as Stanley Pool (see map of Africa, ref. 6–E). About thirty steamboats have been transported overland to Leopoldville, where the sections were put together and the boats launched on the upper Congo with 8,000 miles of navigable waters before them. Until the railway is completed to Stanley Pool Leopoldville will continue to be the starting-point of the caravan trade to the coast, and is likely always to be the western terminus of the steamboat service on the upper Congo.
C. C. Adams.

Leos'thenes [= Gr. Λεωσθένης; λεώς. people + σθένος, strength]: an Athenian general of whose earlier life nothing is known. In 324, when Alexander the Great ordered all the Greek states to recall those citizens who had been exiled for political reasons, several of the states rose in rebellion. Alexander having died shortly after, a league was formed for the purpose of driving the Macedonians out of Greece, and Leosthenes was placed at the head of the confederate army. His career was short but brilliant. He routed the Bœotians, who sided with the Macedonians, and then defeated Antipater, the Macedonian general, and shut him up in Lamia (323 B. C.). While besieging this city he was wounded by a stone thrown from the ramparts, and died two days after, 322 B. C.

Leotychides, -tik'- (in Gr. Λεωτυχίδης): a prince of the Eurypontidæ (Εὐρυπωντίδαι), one of the reigning houses of Sparta. At the instigation of Cleomenes he conspired against his hated kinsman, the King Demaratus, whose title to legitimacy was disputed, and in 491 B. C. became king in his stead. In 479 B. C. he commanded the Greek navy which won the battle off Mycale. In 470 B. C. he was sent to reduce the Aleuadæ, who by Persian influence had once more become masters of Thessaly, but he was bribed to return home, and fearing condemnation to a traitor's death he fled to Tegea, where he died. He was succeeded by his grandson Archidamus. J. R. S. Sterrett.

Lepan'to, Gulf of, also called the **Gulf of Corinth**: an inlet of the Mediterranean; 75 miles long and about 16 miles wide; between Peloponnesus and the mainland of Greece. It terminates to the E. in the Gulf of Patras, connected with it by the Strait of Lepanto, not more than a mile wide. In this gulf was fought (Oct. 7, 1571) the celebrated battle between Don John of Austria, commanding the allied Spanish, Venetian, and papal fleet, and Ali Pasha, commander of the Turkish fleet. From that battle may be dated the decline of the Turkish power in Europe. See the elaborate and very impressive description in Prescott's *History of Philip II. of Spain.*

Lep'idine [from Gr. λεπίς, λεπίδος. scale, bark]: $C_{10}H_9N$, a volatile, oily base, homologous with quinoline, obtained with that and other bases on distilling cinchonine with oxide of lead. Its sp. gr. is 1·072, boiling-point 264° C. The isomeric base iridoline, formerly supposed to be identical with lepidine, is found in the oil of coal-tar.

Lepidoden'dron [Mod. Lat., liter., scale-tree; Gr. λεπίς, λεπίδος, scale + δένδρον, tree]: a genus of fossil cryptogamic trees, usually referred to the *Lycopodiaceæ.* Their remains are found in the Devonian rocks and throughout the Carboniferous, and are believed to have contributed largely to the production of coal. The surface of their trunks is covered with rhomboidal meshes, within which are scale-shaped spaces, which are the scars of fallen leaves. Many of them were of great size—40 to 80 feet high and 3 to 6 feet through. Remains of many species are known, partly American, partly European, and partly common to both continents. See Plants, Fossil. Revised by G. K. Gilbert.

Lepidop'tera [Gr. λεπίς, λεπίδος, scale + πτερόν, wing]: a group or order of insects (see Entomology) embracing the butterflies and moths. The scientific name of the group is in allusion to the fact that the wings are covered with minute scales, which in reality are flattened hairs. This, however, is a point of secondary importance, the Lepidoptera being marked off from all other insects by many other features. Thus the Lepidoptera pass, in their life-history, through a complete metamorphosis, the three stages of growth being sharply marked off from each other. From

Caterpillar, chrysalis, and butterfly, male and female, of the gypsy moth (*Ocneria dispar*).

the egg there hatches out a larva (frequently called a caterpillar), which is voracious, feeding, in the different species, either on animal or vegetable matter. The larvæ have biting mouth-parts, the mandibles being especially strongly de-

veloped, three pairs of true feet upon the three (thoracic) segments just behind the head, while on the abdominal segments there are from two to five pairs of fleshy false feet. Especially characteristic of the larvæ is a pair of silk-glands which open upon the under lip, the secretion of which hardens to silk upon contact with the air. When the period of active growth is past the larva begins to make preparation for the next stage—the pupal stage. In most forms a case or cocoon is formed by spinning silk from the silk-glands, and inside this protective covering the larva sheds its skin and takes the pupal condition. Now the body is shorter and in its walls can be traced eyes, tongue, legs, and wings of the adult, all firmly joined together. In many of the butterflies the cocoon is not formed, and the pupal condition is assumed without such protection. In these cases the pupa is known as a chrysalis, the name being given from the fact that many chrysalides are ornamented with golden spots (Gr. *χρυσός*, gold). The pupal stage is one of apparent rest; in many cases it lasts through the winter. At last the pupal skin splits, and through the opening the butterfly or moth comes out. At first its legs are weak, its wings small and limp. Soon the wings expand to their normal size, and they dry in the air until they become firm organs of flight.

The perfect butterfly or moth is almost totally different from the larva and pupa. Especially marked are the changes in the mouth parts. The mandibles are rudimentary and can not be used for biting, while the accessory jaws (maxillæ) are converted into a long sucking tube (the so-called tongue), which is of use only to suck the nectar of flowers, and which when not in use is coiled beneath the head like a watch-spring. The wings are large and strong, and are supported by stiffening ribs or veins, and on their surfaces are the scales so characteristic of these forms. It is only in the perfect state (imago) that the sexual organs are developed, and hence it is that only butterflies and moths lay eggs. Most species live but a short time as perfect insects, although there are some which pass the winter in this condition.

Formerly the Lepidoptera were divided into two great groups—the *Heterocera* (see HETEROCERA) and the *Rhopalocera*—embracing the moths and the butterflies respectively. Later views make more divisions, as follows:

Sub-order I. *Microlepidoptera.*—Small inconspicuous moths, which when at rest carry the wings folded in a horizontal position, and which have a small tongue. Here belong the *Tineidæ*, which include among other pests that terror of the housewife, the clothes-moth; and the *Tortricidæ*, vegetable-feeding forms which form their cocoons by rolling leaves together.

Sub-order II. *Geometrina.*—Larger moths with more conspicuously marked wings, which, however, are carried horizontally. The larvæ are especially noticeable from their method of progression. They have the normal thoracic feet and, besides, two or three false feet at the tip of the body. When they move it is by arching the body, so that the hinder feet are enabled to grasp the support near the thoracic feet. Then the body is extended, the thoracic feet obtain a new hold, and then the same operation is repeated as before. This process has given rise to the common name span-worms for these larvæ; the scientific name of the group is similar in origin, and means earth-measurer.

Sub-order III. *Noctuina.*—Moths with the fore wings, with usually a gray ground color, marked with two spots and zigzag lines. In many cases the hinder wings, which are hidden when at rest, are brightly colored. There are numerous species of this group.

Sub-order IV. *Bombycina.*—This group contains the various types of silk-worms, all of its members spinning a strong silken cocoon. They have large bodies and prettily marked, often brightly colored wings, our most beautiful moths belonging to this sub-order. All of the larvæ are vegetable-feeders, most living upon trees, and sometimes so abundant as to form pests. The silk-worm of commerce (*Bombyx mori*) is a native of China, but there are several American forms which furnish an even stronger textile fiber. There are, however, numerous obstacles to their use upon a commercial scale.

Sub-order V. *Sphingidæ.*—In these moths the body is large and stout, the wings long and narrow, the hinder wings being short. They have a long tongue, and in most cases the larvæ are furnished with a strong spine on the posterior end of the body. Familiar examples of these larvæ may be found in the large green "worms" which feed upon potatoes, tomatoes, and tobacco. Here, too, belong the delicate "humming-bird moths," with delicate gauzy wings, and the peach-tree borers, which in their general appearance and mode of flight recall the wasps and hornets.

Sub-order VI. *Rhopalocera.*—Here are included the butterflies, day-flying forms with slender bodies and usually brightly colored wings, the latter when at rest being folded above the back. The name of the sub-order is derived from the fact that the antennæ or feelers terminate in a club, a condition which occurs in none of the moths.

From their number, their beauty, and the many interesting facts of structure and life-history, the Lepidoptera are favorites with entomologists, and the literature concerning them is enormous. Some 30,000 to 40,000 species are supposed to exist in the world. All of the larger groups occur in rocks of Tertiary age, while Sphingids occur in the beds of Solenhofen, Bavaria. In the fossil leaves of the Cretaceous of Nebraska occur mines which are attributed to the larvæ of Tineid moths.

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Lepidosi'ren [Gr. *λεπίς, λεπίδος*, scale + *σειρήν*, siren]: a genus of lung-fishes (DIPNOI, *q. v.*) containing but the single species from the Amazon and its tributaries. Of this but six specimens have ever come into the hands of naturalists. The term is often extended to include the Protopterus of West Africa, a form which is much better known. The differences between Protopterus and Lepidosiren are slight. In each the scaly body is eel-shaped, the body behind having a fin in which no distinction can be drawn between dorsal, anal, and caudal. The limbs are long and slender, and possess but a single series of bones. The mouth is armed with a few large teeth, and the double air-bladder serves, at least in the African form, as a lung. J. S. KINGSLEY.


Lepidosiren.

Lepidoste'idæ [Mod. Lat., liter., belonging to the Lepidosteus family; *Lepidosteus*, the typical genus (from Gr. *λεπίς, λεπίδος*, scale + *ὀστέον*, bone) + Gr. patronymic ending *-ίδαι*, plur. of *-ίδης*, descended from]: the only existing family of the order *Rhomboganoidea*, distinguished by the elongated and sub-cylindrical body covered with rhomboidal scales; the head elongated, and terminating forward in a long beak-like snout; the upper jaw projecting beyond the lower, and with the nostrils near the end of the snout; the fins are provided with fulcra; the short dorsal situated far behind, and just above the anal fin; the stomach is simple in form, but with numerous pyloric appendages; the intestine has a rudimentary spiral valve. This family, although the only living type of the order to which it belongs, had numerous relations in the Mesozoic and Palæozoic epochs. The skeleton has many peculiarities, among which is the composite structure of the upper jaw, as well as the character of the vertebræ, which are convex in front and concave behind. There are but few representatives, all belonging to the genus *Lepidosteus*, or rather *Lepisosteus*, that being the original orthography of the word. The species are found chiefly in the waters of Northern America, but representatives descend as far southward as Central America and Cuba; a species has also been recently discovered in China. In the Tertiary epoch the family was represented by forms closely related to the living American species in Europe. Revised by D. S. JORDAN.

Lep'idus: the name of an ancient patrician family of Rome belonging to the gens Æmilia. The most conspicuous member of the family was Marcus Æmilius Lepidus,

the triumvir. At the breaking out of the civil war in 49 B. C. he joined the party of Cæsar, who, as dictator, made him his *magister equitum*, and in the year 46 procured his election to the consulship. At the time of Cæsar's assassination he was on the point of going to his province (Gallia Narbonensis), and thus was in possession of a proconsular army, the only armed force in the city at the time. He acquired in this way a prominence in the events of the period to which neither his ability nor influence could have otherwise raised him. He shared in the reconciliation which followed between Antony and the senate, but did not remain loyal to the latter longer than Antony himself, whom he received in Gaul after the defeat at Mutina. In the following summer (43 B. C.) Octavian, who had hitherto been the stanchest supporter of the senatorial party, abandoned it, and entered into negotiations with Antony, to which Lepidus, as a useful but subordinate third, was admitted. This coalition was the famous second triumvirate. In the year 42 Lepidus was left to guard Italy, while Octavian and Antony proceeded against Brutus and Cassius. In the division of provinces after Philippi Lepidus was not consulted, but in the year 40 he finally received the province of Africa, which had at first been withheld, He continued to play this insignificant *rôle* until the year 36, in spite of the fact that he had been included in the renewal of the triumvirate in the preceding year. At this time he made an effort to assert his equality of position, but being deserted in a critical moment by the soldiers on whom he had depended, he was compelled to throw himself upon the mercy of Octavian. He was deprived of his province, but was allowed to retain his fortune and the office of pontifix maximus to which he had been elected in the year 44. He died in 13 B. C. at Circeii. G. L. HENDRICKSON.

Lepor'idæ [Mod. Lat., liter., belonging to the hare family; Lat. *le'pus*, *le'poris*, hare + Gr. patronymic ending *-ίδαι*, plur. of *-ίδης*, descended from]: a family of rodent mammals including the hares and rabbits; characterized externally by long ears, long hind legs, short upturned tail, rounded muzzle, and nostrils converging toward the median slit which divides the upper lip, and has given rise to the familiar term hare-lip. The skull is high and compressed, and the upper incisors are arranged in a peculiar manner—two smaller incisors lying back of the two usually present in rodents. The grinders are wider than long, and nearly all deeply groved on the inner and outer sides. Some forty species are recognized, most of them inhabitants of the north temperate zone.

There is a remarkable difference in habits between the hares and rabbits. The hares never burrow, but simply compose a form or nest, in which they rest and bring forth their young, which are born covered with hair and with the eyes open. The rabbits, on the contrary, burrow in the ground, and often make extensive tunnels, and in these burrows they live and bring forth their broods; the young are brought into the world naked and blind. Notwithstanding such differences, however, there are no corresponding structural characters, and the different animals are closely related. All the American species are hares in the sense thus understood. Revised by F. A. LUCAS.

Lepo'rius: a native of Gaul, probably of Treves; entered in the beginning of the fifth century a monastery in the vicinity of Marseilles, and acqnired a great reputation for learning and holiness. He afterward fell into the heresy of Pelagius, and maintained that man has no need of the grace of God, and that Christ was born with a human nature only. He went to Africa under ecclesiastical censure, and there met with St. Augustine, who convinced him of his errors. so that he retracted, and was ordained a presbyter by Augustine about 425. His retraction was addressed to Proculus, Bishop of Marseilles, and Cyllinnius, Bishop of Aix, and was first published in 1630 under the title *Libellus emendationis sive satisfactionis ad episcopos Galliæ* (cf. Migne, xxxi.). It was much appreciated by the old Church. Revised by S. M. JACKSON.

Lepra: See LEPROSY.

Leprosy [deriv. of *leprous*, deriv. of *leper*, from Lat. *le'pra*, leprosy]: a disease which is endemic in certain countries and met with occasionally in nearly every large seaport city. In India, China, Syria, Egypt, Norway, West Indies, and the Sandwich islands the disease abounds. In New Brunswick and Nova Scotia, Minnesota and Louisiana small colonies of lepers are to be found, and in the city of New York there are usually a few cases, occurring chiefly among those who have contracted the disease in countries where it prevails.

The modern leprosy is the same in character in whatever region or climate it occurs, and corresponds with the description of the disease given by early Greek medical writers. There is no doubt that leprosy existed in Egypt in the time of Moses, but the description found in the book of Leviticus is quite unintelligible to the physician of the present day, and doubtless included with leprosy many contagious affections having no relation to this disease. The cases of leprosy reported in the New Testament as being cured were not cases of genuine leprosy (which was called *elephantiasis* by the Greek writers), but according to St. Mark they were cases of λέπρα or *psoriasis*, a very common disease of the present day, and characterized now as then by the formation of white scaly patches upon the skin.

Leprosy spread throughout Europe after the crusades, but was by no means as prevalent as has been imagined, since it was doubtless confounded with syphilis and numerous other diseases which were indistinguishable from leprosy by the physicians of that period.

The symptoms of leprosy are nodules and brownish spots which appear upon the face and other portions of the body. The eyebrows, ears, and air-passages are especially apt to become affected, and the victim of the disease usually presents a peculiar and characteristic expression. Loss of sensation in the hands and feet usually occurs, and as the disease progresses ulcers are frequently formed and occasion loss of the fingers and toes. According to the predominance of certain of the above-mentioned symptoms, three forms of leprosy are described in medical works, viz.: the macular, tubercular, and anæsthetic forms.

Leprosy is contagious, but in a much slighter degree than is commonly believed—often the husband or wife of a leper remains perfectly free. The disease is doubtless hereditary, and the children of lepers, though not necessarily affected, often manifest symptoms of the disease at an early age.

The cause of leprosy has given rise to much discussion, some eminent authorities laying great stress upon a fish diet as an ætiological factor. The microscope has revealed a bacillus which can be found in all cases of the tubercular form, and the disease is undoubtedly spread by the inoculation or transmission of this germ.

Although the disease usually proves fatal (the tubercular form running the most rapid course), there are cases in which a cure has apparently been effected. A change of climate appears to have been more beneficial in these cases than the remedies employed. Many have urged the enaction of laws by the U. S. and other governments for the purpose of segregating all lepers, in order to prevent the spread of the disease. Others claim that leprosy is no more contagious than tuberculosis of the lungs, a far more common and equally fatal disease, and that, owing to this very slight contagiousness of the disease, there is no danger whatever of leprosy spreading in any intelligent community. Certainly the widespread dread of the disease is based upon ignorance of its nature. GEORGE HENRY FOX.

Lep'sius, KARL RICHARD, Ph. D.: philologist; b. at Naumburg, Prussian Saxony, Dec. 23, 1813; the son of K. P. Lepsius (1775–1853), an able archæologist; studied at Leipzig and Göttingen, and at Berlin under Bopp's instruction; graduating at Berlin with a thesis on the Eugubian Tables; went to Paris in 1833, where under the influence of Bunsen his attention was first directed toward Egyptology; in 1835 made researches in the libraries of Italy; devoted his attention to languages, especially to Egyptology, and wrote *Letter to M. Rosellini on the Hieroglyphic Alphabet* in 1837; went to England in 1838; projected an expedition to Egypt, which left England in 1842, and with success returned to Germany in 1846; became professor at Berlin in 1846; visited Egypt again in 1866; was appointed chief librarian of the Royal Library at Berlin in 1873, where he remained till his death, July 10, 1884. All his work was animated by the most serious scientific purpose. He was the founder of scientific Egyptology. He also interested himself in the problem of uniform transliteration for all languages, and his *Standard Alphabet* (1855 and 1863) has been of great practical as well as scientific advantage. Among his works are *Das Todtenbuch der Aegypter* (1842); *Die Chronologie der Aegypter* (1849); *Denkmäler aus Aegypten und Aethiopien* (1849–59); *Ueber den ersten ägyptischen Götterkreis* (1851); *Die altägyptische Elle und ihre*

Eintheilung (1865); *Ueber einige ägyptische Kunstformen* (1871); *Die Längenmasse der Alten* (1884).

Revised by BENJ. IDE WHEELER.

Leptan'dra [Mod. Lat., liter., having fine stamens; Gr. λεπτός, thin, fine + ἀνήρ, ἀνδρός, man, male (in mod. botany), stamen]: the pharmaceutical name of the Culver's physic (*Veronica virginica*, order *Scrophulariaceæ*), a tall perennial herb of the Eastern U. S. which has decided cathartic powers. Its impure resinoid is extracted and sold as *leptandrin*.

Lep'tis [= Lat. = Gr. Λέπτις, from Phœn. name, liter., naval station. Cf. the mod. name *Lebida*]: the name of two cities in Africa both founded by the Phœnicians. (1) *Greater Leptis*, situated on the coast of Tripoli midway between the Greater and the Lesser Syrtis. It had a fine roadstead and artificial harbor, long since choked with sand. The site is still called *Lebida* (a corruption of Leptis). The ruins are extensive, but are in part covered with sand. Leptis once had a large trade, but is now almost without inhabitants. It was one of the three cities which gave the name of Tripoli to this region. (2) *Lesser Leptis*, in the Carthaginian province Byzacium, on the coast S. E. of Hadrumetum. Its ruins are now called *Lempta* (also a corruption of Leptis). J. R. S. STERRETT.

Leptocar'dii [Mod. Lat.; Gr. λεπτός, slender + καρδία, heart]: a class of animals, containing two genera, but of the greatest interest to naturalists on account of the many primitive features which they possess. Formerly they were considered as the lowest vertebrates, but from the fact that they possess no backbone (vertebral column) they must be regarded as distinct. To accommodate these and other forms as well as the vertebrates proper a group, CHORDATA (*q. v.*), has been established. The *Leptocardii* are small transparent fish-like forms occurring in the warmer seas of the globe, where they live buried, except the anterior end of the body, in the sand. The body is flattened, and posteriorly is provided with a fin varying in shape in the different species. The mouth, an oval slit, is surrounded by a cartilaginous ring from which extend a number of stiff processes fringed with tentacles, the whole forming a funnel to convey water and food to the mouth. The water passes to a pharynx the sides of which are perforated by numbers of complicated gill-slits, and after passing through these it enters an "atrial chamber," formed by a down-growth of the sides of the body, from which it passes to the exterior through a single posterior "atriopore." The pharynx behind opens into the alimentary canal proper, which almost immediately receives the duct of a blind sac, frequently regarded as a liver. The vent is below, near the end of the tail, but it is remarkable in that it is always to one side of the median line. The nervous system consists of a spinal cord which tapers toward either end. Its anterior extremity or brain is less in diameter than the cord farther back. Closely connected with this brain are an extremely rudimentary eye-spot and a ciliated olfactory groove. The spinal nerves, unlike those of the true vertebrates, are given off alternately to right and left. The skeleton is represented, aside from the cartilages supporting the mouth, etc., by a slender rod, the notochord, which extends from one end of the body to the other. In spite of the name *Leptocardii* a true heart is lacking, but several of the larger blood-vessels, notably those of the gills, pulsate. The arrangement of the vessels (arteries and veins) reminds one strongly of those of the annelids. The blood lacks colored corpuscles. The reproductive organs project into the atrium, and the eggs and milt are carried thence by the water from the gills.

Naturally the development of the *Leptocardii* has been carefully studied, and it reveals some very interesting primitive features, for details of which reference must be made to the embryological text-books. A peculiar feature is the lack of symmetry possessed by the young, exhibited by the mouth, gill-slits, vent, olfactory organ, and the like.

Forms like Amphioxus must have occurred in abundance in past times, but owing to the total absence of all hard parts they have left no traces in the rocks. To-day but half a dozen species are known from the whole globe, and they occur in all the warmer parts of both oceans. These are divided among two genera, *Amphioxus* (*Branchiostoma* of systematic purists) and *Asymmetron*. The latter genus (discovered since the article CHORDATA was written) occurs in the West Indies, and is remarkable for having the reproductive organs developed upon but one side of the body. The species of both genera are small, the largest hardly exceeding 3 inches in length.

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Leptos'traca [Gr. λεπτός, slender + ὄστρακον, shell of a testacean]: an order of Crustacea characterized by the possession of a two-valved carapax, provided in front with a movable rostrum. The thoracic and abdominal regions have each eight segments, and the body is terminated either by a caudal spine (telson) or two furcal processes. The thoracic limbs are leaflike, there are but three pairs of mouth-parts, and the eyes are stalked. Formerly these forms were included among the Phyllopods, but they are rather a connecting link between these primitive Crustacea and the more highly organized Decapoda. The principal living genus is Nebalia, which is found in all seas. The fossil members of the order (*Ceratiocaris*, *Hymenocaris*, etc.) flourished in the Cambrian and Silurian seas, some of them attaining a considerable size. J. S. KINGSLEY.

Lequesne, le-ken', EUGÈNE LOUIS: sculptor; b. in Paris, Feb. 15, 1815; studied law, and was admitted to the bar in 1839, but entered in 1841 the School of Fine Arts; became a pupil of Pradier at Rome, and began to exhibit in 1845. His most prominent works are the *Dancing Faun* in the garden of the Luxembourg, the *Victory* on the tomb of Napoleon, and the *Pegasus* on the front of the new opera house; he also made a number of excellent busts. D. June 4, 1887.

Lerdo de Tejada y Correal, lar'dō-dā-tā-haa'daă-ee-kōr-rā-aal', SEBASTIAN: statesman; b. at Jalapa, Mexico, Apr. 25, 1825. He studied law at the College of San Ildefonso, Mexico, was admitted to the bar in 1851, and in the following year was elected rector of his college; in 1855 he became a judge of the Supreme Court. Adhering to the liberal party, he was Comonfort's Minister of Foreign Affairs, June, 1857, to Jan., 1858; and from 1861 was prominent in Congress, strongly upholding Juarez in his resistance to the French invasion. When Juarez was driven from the capital (June, 1863), Lerdo accompanied him, and from Sept., 1863, was his Minister of Foreign Affairs, remaining faithful even when the empire of Maximilian seemed triumphant and the republican government was driven over the frontier into the U. S. In the subsequent advance which resulted in the downfall and death of Maximilian, Lerdo was one of the most active political leaders. In 1867, after the reoccupation of Mexico, he was elected president of the Supreme Court. At the same time he retained the Ministry of Foreign Affairs (until Jan. 17, 1871), and has been credited with many important measures of the Juarez administration. In 1871 he was a candidate for the presidency, but Juarez was re-elected; on the death of the latter (July 18, 1872), Lerdo succeeded him by virtue of his presidency of the Supreme Court, which made him the constitutional successor; and new elections being held, he was regularly chosen president of the republic for four years. He began his term under very favorable auspices, but gradually lost support, owing to his infringements of the rights of the states, and his evident desire to centralize the government. In Oct., 1876, he was a candidate for re-election, and Congress pronounced the partial and irregular vote cast to be in his favor. His opponents declared that the election was fraudulent and void; and Iglesias, president of the Supreme Court, assumed the presidency of the republic in Guanajuato. Diaz, who had long been in revolt, advanced on Mexico: Lerdo's army was defeated, Nov. 15, and on Nov. 20 Lerdo fled to Acapulco, and thence to the U. S. Subsequently he resided in New York city, where he died Apr. 21, 1889.—His elder brother, MIGUEL, b. in Vera Cruz in 1814, was a prominent liberal politician, Minister of the Treasury under Comonfort 1856, and Juarez 1859; candidate for the presidency 1858 and 1861; and judge of the Supreme Court; he was the author of *Apuntes históricos de Vera Cruz* (3 vols., 1850–58) and various other works. D. in Mexico, Mar. 22, 1861. HERBERT H. SMITH.

Lerida, lā'rĕe-dăa: province of Spain, bounded N. by the Pyrenees and E. by Barcelona; area, 4,775 sq. miles. The northern portion is covered with spurs of the Pyrenees, and rich in iron, copper, lead, zinc, marble, jasper, and gypsum. The southern portion is an extensive plain, which produces wheat, fruits, and vegetables. Pop. (1887) 285,417.

Lerida: capital of the province of Lerida, Spain: on the Segre, 84 miles W. N. W. of Barcelona (see map of Spain, ref.

14–J). It is surrounded by walls and strongly fortified, as it is the key of Aragon and Catalonia, and consequently a point of great military importance. It has two remarkable cathedrals, one of the thirteenth, the other of the eighteenth century; a lyceum, and several other educational institutions; its university, founded in 1300, was suppressed by Philip V. Pop. (1887) 21,885.

Lérins, lā′răn, **The**: several small islands off Antibes, and in the department of Var, France. The largest, Ste.-Marguerite, was the place of imprisonment of the "Man in the Iron Mask" from 1686 to 1698. Its fortress, Monterey, is now a prison for military convicts and Algerines, and Bazaine was here confined (1874). It was the *Leron* of the ancients. The next smaller island, St.-Honorat (*Planaria Lérina*), is named from St. Honoratus, Archbishop of Arles, who founded here in the fourth century the convent of Lérins, which became a famous school of theology, and passed into the Benedictine order. After 1650 the monastery lost its importance, and is now in ruins. There are some smaller uninhabited islands in the vicinity.

Ler′ma, Francisco de Roxas de Sandoval, Duke of: administrator; b. in Spain about 1550; was made a duke and Prime Minister of Spain immediately on the accession of Philip III. in 1598, and governed the empire till 1618, during which period the exhausted and distracted state of the country became more and more apparent. His foreign policy was marked by defeats, his internal by cruelty and vacillation. In spite of extraordinary exertions, he was compelled to conclude peace with England in 1604 and with the United Provinces in 1609, practically acknowledging their independence. In 1609 he issued the decree of proscription by which several thousand Moorish families, forming one of the richest and most industrious elements of the Spanish population, were driven out of Spain, and their property, in many cases, confiscated. In 1618 he was appointed cardinal, but soon afterward lost the royal favor. Under Philip IV. the animosity against the fallen minister became so strong that an examination was made of his administration, and he was compelled to return a large sum of money to the treasury. D. shortly after, in 1625.

Ler′montov, Mikhail Ĭurevich: poet; b. in Moscow, Russia, Oct. 3, 1814; the son of an obscure officer of Scotch descent (Learmont). He spent his childhood on the estate of his grandmother, and in his eleventh year made his first journey to the Caucasus, the grand scenery of which left an indelible impression on his mind. In 1826 he was sent to school at Moscow, where he grew up plain, clumsy, shy, and addicted to biting remarks that made him generally disliked. In 1832, with others, he was dismissed from the University of Moscow for some student disorders, and went to St. Petersburg to prepare for the army. He soon became known merely as the writer of clever but indecent verse, for though he had already composed several important poems, he kept them studiously secret. Only one of them, *Hadzhi Abrek*, was published, and that without the knowledge of the author. In 1837, excited by the circumstances attending the death of Pushkin, he wrote a powerful and violent piece on the subject, in punishment for which he was sent to serve in the Caucasus. A few months later he was reinstated in the guard, and now his reputation increased rapidly, as each new poem that he gave out was hailed with increasing delight by the public. His triumph, however, was soon cut short by a duel with the son of the French ambassador and historian de Barante. For this he was again sent to the Caucasus, and only made one more short visit to St. Petersburg before his death. He was killed in a duel July 15, 1841, by a comrade who fancied himself caricatured in one of Lermontov's works. Russians usually regard him as their greatest poet after Pushkin, by whose style he was much influenced, but he is less objective and serene, more passionate, more truly unhappy, and in rebellion against society. If he had had a longer life instead of being cut off before he was twenty-seven years old, he would probably have outgrown his intense Byronism, and might have left one of the great names in the history of literature. As it was, the precocity of his genius was extraordinary. He was fifteen when he began, and only twenty when he finished his most famous poem, *The Demon* (English translation by A. Condic-Stephen, 1886). *Hadzhi Abrek*, *Mtsiri* (The Novice), *Izmail Bey*, and *The Song of the Tsar Ivan Vasilevich* are also fine longer pieces, while some of his shorter lyrics are gems. He was too indolent and wayward to be a prolific writer, and he has left but one prose work, almost his last production, *Geroĭ Nashego Vremeni* (A Hero of our Time), a story notable for its strong characterization, the author often depicting himself in the principal character, and for its fine description of the scenery and life of the Caucasus (there have been three English translations, the last in 1883.) Many of Lermontov's works have been rendered into other languages, and he has been written about by foreigners as well as by Belinskiĭ and other Russian critics. In English, see *Studies in Russian Literature*, by C. E. Turner (1882), and, for poetical translations of some of his lyrics, *Rhymes from the Russian*, by John Pollen (1891) and *Blackwood's Magazine*, Aug., 1884. A. C. Coolidge.

Ler′na (in Gr. Λέρνη): in Greek mythology, the swamp S. of Argos, where Heracles killed the Lernæan Hydra. See Hydra.

Lernæans: a group of Copepod crustaceans (see Copepoda), in which degeneration from parasitism has reached a great extreme, especially in the females. The males retain much of the appearance of normal crustaceans, but the females have lost the eyes, jointed feet, etc., and have become converted into mere organs of feeding and reproduction. The mouth is converted into a sucking-tube which is inserted in the flesh of fishes, from which they suck mucus and blood, while the rest of the body is largely composed of egg-sacs. The young, when they hatch from the egg, are normally formed, with eyes, swimming feet, and the like, but after becoming attached to the host retrogression sets in, until in the adult not a crustacean feature can be traced.

J. S. Kingsley.

Chondracanthus, a Lernæan.

Lernæoi′dea [Mod. Lat., from *Lernæ′a*, one of the genera, liter., fem. of *Lernæ′us*, pertaining to Lerna, *q. v.*]: an order, or, according to other authorities, only a family (*Lernæidæ*), of parasitic crustaceans, belonging to the order *Siphonostoma*. They are assigned to the subclass Entomostraca. The mouth is for suction, the thorax not jointed, the organs very small. The males are totally unlike the females. All are parasites of very degraded type. They are often much more completely organized when young than when mature. In the latter stage they lose the power and organs of locomotion and of sight. There are many diverse and strange forms referred to this order, most of which would never be recognized as crustaceans but for their larval forms. They are found attached to fishes and other aquatic animals. Revised by F. A. Lucas.

Lerolle, le-rōl′, Henri: figure and landscape painter; b. in Paris in 1848; was a pupil of Lamothe; received a first-class medal in the Salon of 1880; decoration of the Legion of Honor in 1889. A painter whose work is principally valued for its subtle interpretation of nature in evening effects. *At the Organ* (1885) is in the Metropolitan Museum, New York; *In the Country* (1880) in the Luxembourg Gallery, Paris. W. A. C.

Le′ros (in Gr. Λέρος): one of the Ionian islands of Asia Minor, lying S. of Samos and separated from the northern end of Calymna by a narrow strait (Diapori). It is 6 miles long and 4 miles wide, is very fertile, and has many good harbors, of which the one on the eastern side is the best. Here are the ruins of the old town of Leros. The island was colonized by Miletus, which held the suzerainty over it down to Roman times. Its inhabitants had the reputation of being ill-natured. The temple of Artemis (ruins at Partheni) was known in connection with the story of the sisters of Meleager. J. R. S. Sterrett.

Lerot: a name for *Eliomys nitela*. See Dormouse.

Leroux, le-roo′, Pierre: journalist and philosopher; b. in Paris, Apr. 17, 1797; studied at the Lyceum Charlemagne; founded the *Globe* newspaper in 1824, as organ of the philosophers; adhered to the Saint-Simonians in 1831, converting his paper into the organ of their socialistic policy; withdrew after the promulgation of the new doctrines of Enfantin. He became in 1832 editor of the *Revue Encyclopédique*, and, in connection with Jean Reynaud, established in 1838 the *Encyclopédie nouvelle*, which was a continuation of the *Encyclopédie* of the eighteenth century. His capital

work, *De l'Humanité, de son Principe et de son Avenir*, appeared in 1839, containing his philosophical and theological ideas, consisting in a continued progress of man and nature toward perfection through changing forms. He founded in 1841 the *Revue Indépendante*, with Viardot and George Sand, and in 1848 was elected a representative of the National Assembly as an ultra radical. After the *coup d'état* of 1851 he emigrated to the island of Jersey, and afterward to Lausanne, Switzerland. Pierre Leroux was a kind of modern and secular Zwingli, the representative of pure and honest radicalism in philosophy. He wrote also *Du christianisme et de ses origines démocratiques* (1848); *Malthus et les Economistes, ou Y aura-t-il toujours des pauvres?* (1848); *Job*, a drama (1865); *La Grève de Samarez*, a philosophic poem (1863); *De la Plutocratie ou du gouvernement des riches* (1848) etc. He returned to France after the amnesty of Aug. 15, 1869, and died in Paris, Apr. 12, 1871.

Revised by A. G. Canfield.

Le Roy: village; Genesee co., N. Y. (for location of county, see map of New York, ref. 4–D); on Oatka creek, and the Erie, the N. Y. Cent. and Hud. River, and Buffalo, Roch. and Pitts. railways; 25 miles S. W. of Rochester; 46 miles E. of Buffalo. It is in a salt and limestone region, derives good water-power from the creek, and has salt-works, lime-kilns, stone quarries, and flour, planing, gypsum, plaster, and saw mills. It was the seat of Ingham University (Presbyterian), first opened in 1835 as Le Roy Female Seminary, closed 1894; was for many years one of the most noted institutions for the higher instruction of women in the U. S. The village has a union school, art conservatory, public library, State bank with capital of $100,000. and three weekly newspapers. Pop. (1890) 2,743; (1900) 3,144. Editor of "Times."

Leroy-Beaulieu, le-rwȧ́'bō'li-ü', Pierre Paul: writer on economics; b. at Saumur, Maine-et-Loire, France, Dec. 9, 1843; studied at the Lycée Bonaparte in Paris and at the École de Droit in the same city; also at the universities of Bonn and Berlin; on his return to Paris, did journalistic work on several newspapers and reviews; published in 1868 *De l'état moral et intellectuel des populations ouvrières et de son influence sur le taux des salaires*, for which he was crowned by the Academy of Moral Science; in 1870 was awarded three prizes by the same body for papers entitled *De la colonisation chez les peuples modernes*: *De l'Administration locale en France et en Angleterre*; and *De l'Impôt foncier et de ses conséquences économiques*. In 1872 he was appointed Professor of Finance in the Free School of Political Science at Paris, of which he was a founder; in 1873 he founded *L'Economiste Français*, and still edits that journal; in 1878 he was elected a member of the Academy of Moral and Political Science; in 1880 he succeeded his father-in-law, Michel Chevalier, as Professor of Political Economy in the College of France. He has made several attempts to enter political life. Among his numerous works, besides those already mentioned, are *Les Guerres contemporaines* (2 series, 1853–66; 1868–69); *La Question ouvrière au XIX^e siècle* (1871); *Traité de la science des finances* (1877; 5th ed. 1891); *Essai sur la Répartition des richesses* (1882; 3d ed. 1887); *L'Algérie et la Tunisie* (1888); *Précis d'économie politique* (1888; 3d ed. 1891); *L'état moderne et ses fonctions* (1890; 2d ed. 1891).

Leroy de Saint-Arnaud, le-rwȧ' de-sȧ̆n'tȧ̆r'nō', Jacques Achille: soldier; b. in Paris, Aug. 20, 1801; enlisted in 1816 in the body-guard of Louis XVIII., but left the military service in 1820, and led for several years a rather adventurous life in France and England. In 1831 he again entered the army; served at Blaye, where the Duchess of Berry was detained; became in 1837 captain in the foreign legion in Algeria, and greatly distinguished himself during the following years at the taking of Constantine, by the capture of Bou-Maza, as commander of the province of Constantine, and by his campaign against the Kabyles. In 1851 he was made a general and commander of one of the military divisions of Paris. In the same year he became Minister of War, and in this position he rendered great services to Napoleon in the *coup d'état* of Dec. 2, 1851, and received the title of marshal in the following year. In 1854 he commanded the French army in the Crimean war, and won the battle of Alma, Sept. 20, but he had to give up his command on account of sickness, and died on board the Berthollet, Sept. 29, 1854.

Leroy d'Étiolles, -dā'ti-ōl', Jean Jacques Joseph, M. D.: surgeon; b. at Paris, Apr. 5, 1798; studied medicine, and took his degree in 1824. In 1822 he presented to the Academy of Surgery a set of instruments which he had invented for the operation of lithotrity. The invention was disputed by Civiale and Amussat, who also claimed it, but after close examination of the case the prize was awarded to d'Étiolles. He also invented a number of other surgical instruments to perform very delicate and complicated operations. The most prominent of his writings are: *De la Lithotripsie* (Paris, 1836); *Sur la cystotomie épipubienne* (Paris, 1837); *Histoire de la Lithotritie* (1839); *Considérations anatomiques et chirurgicales sur le Prostate* (Paris, 1840); *Urologie* (Paris, 1845), etc. D. in Paris, Aug. 25, 1860.

Revised by S. T. Armstrong.

Léry, lā'ree', Jean, de: Protestant missionary and author; b. at La Margelle, Burgundy, 1534. He early embraced the reformed religion, studied under Calvin at Geneva, and in 1555 went with other Genevois to join the French Protestant colony of Durand de Villegaignon in Brazil. This colony had been established on the island still called Ilha de Villegaignon, in the harbor of Rio de Janeiro, though the territory had long been claimed by the Portuguese. It does not appear that Léry at this time was an ordained minister, and he expressly states that the pastors who accompanied the Genevois were named Richier and Chartier. Villegaignon, a strange and headstrong character, brought about quarrels in the little community; some of Léry's companions were executed, and with the remainder he returned to Europe in 1558. He was soon after ordained pastor at Geneva, and subsequently was settled at Belleville, near Lyons (1560–62), where, in the civil wars, he labored vainly to check the excesses of the Protestants. Later he lived at various places in the south of France, and in 1572 was settled at La Charité. In the massacre of St. Bartholomew twenty-two of his flock were killed, and he himself narrowly escaped, taking refuge in Sancerre, where the Protestants were closely besieged, and finally capitulated. After 1573 he resided in Geneva and Berne. Léry published *Histoire d'un voyage faict en la terre du Brésil* (La Rochelle, 1578; various later editions and translations); *Relation du Siége de Sancerre* (1574), etc. D. in Berne in 1611. Herbert H. Smith.

Lesage, le-sȧ̆zh', Alain René: novelist and dramatist; b. at Sarzeau, department of Morbihan, France, May 8, 1668. At the age of fourteen he was left an orphan, and the property of his father, who had been a well-to-do notary, was appropriated by two uncles, his guardians. He was sent to the College of Vannes, and about 1690 went to Paris to study law. There he remained. He married in 1694, and soon abandoned the practice of law for letters. He fortunately gained the support of the Abbé de Lyonne, who gave him a pension of 600 livres. His first work was mainly translation from Spanish authors, and had no particular success: *Théâtre espagnol* (1700); *Les Nouvelles Aventures de don Quichotte*, of Avellaneda (1704); and the plays *Le Traître puni*, *Dom Félix de Mendoce*, *Le Point d'Honneur*, and *Don César Ursin*. His marked success began with the comedy *Crispin rival de son maître* (1707), and the novel *Le Diable boiteux* (1707), founded upon *El Diabolo cojuelo* (1641) of Guevara, and borrowing also somewhat from other sources. Even greater was the success of *Turcaret* (1709), a comedy directed against the financiers, full of realistic satiric portraiture. Troubles about the production of this work involved him in a feud with the actors of the Théâtre Français, and all his later dramatic work was for the Théâtre de la Foire, for which he wrote a vast number of farces and comic operas. His great work is *Gil Blas*, after the model of the Spanish picaroon novel, in which the adventures are allied to a depth and accuracy of observation and a sanity of view that give to its pictures of the life of all classes a striking realism. This realism makes it an important date in the history of the novel, and its influence was especially great in England. Two volumes (books i.–vi.) appeared in 1715, the third volume (books vii.–ix.) in 1724, and the fourth (books x.–xii.) in 1735. A revised edition came out in 1747. It passed at one time for the translation of a lost Spanish work, but Lesage's essential originality can not be disputed, though he borrowed from the *Marcos de Obregon* of Vicente Espinel, and other sources. *L'Histoire de Guzman d'Alfarache* (1732) and *Estabanille Gonzalès* (1734) follow Spanish originals more or less closely. The *Aventures du flibustier Beauchêne* (1732) are founded on contemporary memoirs; in *Le Bachelier de Salamanque* (1736) he has drawn upon his own *Gil Blas*. D. Nov. 17, 1747. His *Œuvres complètes* (12 vols.) were published in Paris in 1828. Cf. E. Lintilhac, *Lesage* (Paris, 1893).

A. G. Canfield.

Lesbic Dialect: a dialect of the Greek language spoken in the island of Lesbos in the Northeastern Ægean, and on the adjacent coast of Asia Minor. It is known to us through fragments of the lyric poets Sappho and Alcæus, the inscriptions, the reports of grammarians, and the scattered glosses of the lexicographers. It is closely related to the dialect of Northern Thessaly, and more remotely to that of Bœotia. The name Æolic is sometimes applied to the whole group, and in antiquity had an even wider application, but it is also used in a limited sense of the Lesbic. The substratum of the Homeric dialect was apparently an Æolic idiom closely akin to, if not identical with, prehistoric Lesbic. It is probable that some of the earlier parts of the *Iliad* were actually composed first in Æolic, and afterward readapted, so far as the meter allowed, to the Ionic form, but, however that may be, it must now be regarded as proven beyond doubt that those earliest productions of the rhapsodizing bards, which gave the first impulse to the development of the conventional epic idiom were composed in an Æolic dialect. Æolic forms, especially such as had no metrical equivalents in Ionic, remained inextricably fastened in the epic; thus ὔμμε, ἄμμε, ἔμμεν, ἐννῆμαρ, ἀργεννός. Striking features of the Lesbic dialect are the absence of rough breathing; the retraction of accent; the change of *-ανς*, *-ονς* final, or medial with secondary sigma, to *-αις*, *-οις*, as μέλαις (Attic μέλᾶς), μοῖσα (Attic μοῦσα); the development of double liquid or nasal from the combinations *-sl-*, *-ls-*, *-sn-*, *-ns-*, *-nj-*, *-nμ-*, etc.; the transfer of verbs in *-αω*, *-εω*, *-νω* to the *μι-* verbs, as γέλαιμι; the change of digamma before rho to beta, as βρίσδα (Attic ῥίζα). See Hoffmann, *Griechische Dialekte* (vol. ii., 1893); Meister, *Griechische Dialekte* (vol. i., 1882). See GREEK LANGUAGE.

BENJ. IDE WHEELER.

Lesbo'nax (in Gr. Λεσβῶναξ): a native of Mitylene, in Lesbos, who lived in the time of Augustus; wrote a number of orations in imitation of the Attic orators, of which two have come down to us, an exhortation of the Athenians to fight the Thebans, and a rhetorical exercise in the form of a speech on bravery. See *Oratores Græci*, ed. Ahrens (Paris, 1868).

Revised by ALFRED GUDEMAN.

Les'bos [= Gr. Λέσβος], or **Mityle'ne** [= Gr. Μιτυλήνη, orig. restricted to name of a town on the island], now **Mytilini**: the largest of the islands of the Ægean Sea; now belonging to Turkey. After the Trojan war it became the chief seat of the Asiatic Æolians. Its five cities (Pentapolis), Mytilene, Methymna, Antissa, Cressus, and Pyrrha, produced a number of philosophers and poets distinguished throughout Greece and the world: Pittacus, Alcæus, Sappho, Hellanicus, Arion, Theophrastus, Phanias, Terpander, and Erinna. The island is mountainous, and in places very fertile, producing excellent olive oil, figs, grapes, and pine timber; its wine, famous in antiquity, is now inferior. Its chief town is Mytilene. See Tozer, *Islands of the Ægean* (Oxford, 1890); Couze, *Reise auf der Insel Lesbos*; Cichorius, *Rom und Mytilene* (Leipzig, 1888); Koldewey, *Die antiken Baureste der Insel Lesbos* (Berlin, 1890); Kiepert and Koldewey, *Itinerare auf der Insel Lesbos* (Berlin, 1890).

J. R. S. STERRETT.

Lescarbot, lȧ'kȧr'bō', MARC, Seigneur de St.-Audebert: explorer; b. at Vervins, France, about 1570; became a lawyer; was associated with de Monts in the colonization of Acadia (Nova Scotia) in 1605, and was engaged with Poutrincourt in the settlement of Port Royal (now Annapolis) until its abandonment in 1607, when he returned to France. He published in 1609 a *Histoire de la Nouvelle France*, giving an account of Cartier's voyages to Canada, of Laudonnière's failures in Florida, and of the enterprise with which he was personally connected, the first attempt at settlement having been made on what is now Boon island on the coast of Maine. The description of the country and the accounts of the Indians are spirited, and probably faithful. The volume attracted the attention of Hakluyt, and under his auspices an English translation of the greater part was published the same year, under the title *Nova Francia, or the Description of that Part of New France which is One Continent with Virginia* (1609). A second edition, enlarged, of the original work appeared in 1611, and a third in 1618, with the addition of two smaller treatises, *La Conversion des Sauvages* and *Relation dernière de ce qui c'est passé au voyage du Sieur de Poutrincourt*, the former having been first printed in 1610 and the latter about 1612. An account is given therein of the disputes between Poutrincourt and the Jesuits, in which Lescarbot sided with the former. He also published in 1613 a poetical description of Switzerland, *Le Tableau de la Suisse*, and in 1629 an account of the repulse of the English from the Isle of Rhé. D. about 1630.

Les Cayes, lā-kā', or **Aux Cayes**, ō-kā': a town and port on the southern coast of Haiti; about 80 miles W. of Jacmel (see map of West Indies, ref. 6–F). Pop. about 8,000. It is situated on a bay which forms the finest harbor of the southern coast, is poorly built, badly drained, and unhealthful, and is subject to disastrous floods from a mountain torrent which empties into the bay. Les Cayes is the capital of the Département du Sud, and in colonial times was much more populous.

H. H. S.

Les'ches, les'kēez (in Gr. Λέσχης): poet; b. at Pyrrha, in Lesbos, about 660 B. C. He was the author of the Μικρὰ Ἰλιάς (Little Iliad), one of the Cyclic poems, whose order is this: (1) the *Cypria* (by Stasinus), or the events preceding the *Iliad*; (2) the *Iliad* (by Homer), ending with the burial of Hector; (3) the *Æthiopis* (by Arctinus), or the tale of the Amazons, of Memnon, and the death of Achilles; (4) the *Little Iliad* (by Lesches), or the story of the madness and death of Ajax, of Philoctetes's coming from Lemnos, of the Palladium of Troy, and of the wooden horse; (5) the *Sack of Troy* (Ἰλίου Πέρσις) (by Arctinus); (6) the various *Returns* (Νόστοι) of the heroes from Troy, including the *Oresteia* (by Hagias); (7) the *Odysseia* (by Homer); and lastly the *Telegonia* (by Engammon).

Leschetizki, THEODORE: See the Appendix.

Les'ghians: a people of the Caucasus, Asiatic Russia, numbering, according to various estimates, from 460,000 to 680,000, and speaking many languages. Under the influence of Shamyl they united into a single political body, and for many years carried on a brave resistance to Russia. Since 1859 they have been peaceable. Their religion, called Muradism, is a form of Mohammedanism taught by a native prophet, who began his religious career about 1830. They inhabit the mountains of Western Daghestan, where each village is a fortress.

Lesley, JOHN: prelate and historian; b. in Scotland, Sept. 29, 1527; graduated at King's College, Aberdeen; studied at several continental universities, and in 1554 was appointed Professor of Canon Law at Aberdeen. He attached himself to the fortunes of Mary Queen of Scots, by whom he was made Bishop of Ross; became her diplomatic agent; interceded for her with Elizabeth in 1568; was implicated in the project for her marriage to the Duke of Norfolk, and the consequent rebellion in the north of England, and was arrested and imprisoned in the Tower, where he wrote *Piæ Consolationes* for the Scottish queen in her captivity. Released in 1573, he went to the Netherlands, and for several years tried to rouse the Roman Catholic princes of Europe to take some action in Mary's behalf. He afterward lived chiefly in France, where, in spite of occasional persecutions, he received ecclesiastical appointments, becoming in 1593 Bishop of Coutances in Normandy. He afterward retired to a monastery near Brussels, where he died May 31, 1596. He wrote much in defense of his royal mistress, and published at Rome a history of Scotland, *De Origine, Moribus et Rebus Gestis Scotorum* (1578) in 10 books, seven in Latin and the last three in the Scottish dialect. See Anderson's *Collections relating to the History of Queen Mary*, and Jebb, *De Vita Mariæ Reg. Scotorum*.

Lesley, PETER, Jr.: geologist; b. in Philadelphia, Sept. 17, 1819; graduated at the University of Pennsylvania in 1838, and at Princeton Theological Seminary in 1844; was assistant geologist on the first survey of Pennsylvania in 1839–41, and prepared the maps and illustrations for the final report in 1842; after traveling on foot around France, heard lectures in the University of Halle through the winter of 1844; returned home in 1845, and was authorized by the American Tract Society to establish its colportage system in the northern and middle counties of Pennsylvania; became pastor of the Congregational church at Milton, Mass., in 1847, but left the ministry in 1850 to settle at Philadelphia as a professional geologist; was appointed secretary of the American Iron Association in 1855, secretary and librarian of the American Philosophical Society in 1858, Professor of Geology and Mining Engineering in the scientific department of the University of Pennsylvania in 1873, and State geologist of Pennsylvania in 1874; examined the Bessemer iron-works of Europe in 1863; was U. S. Senate commissioner to the Paris Exposition of 1867, and spent the following winter in Egypt; was chosen one of the corporate members of the National Academy of Sciences

in 1864; was president of the American Association for the Advancement of Science in 1884; published a *Manual of Coal and its Topography* (1856), a *Guide to the Iron-works of the U. S.* (1858), a *Dictionary of the Fossils of Pennsylvania* (1889), and a *Summary of Final Reports* of the second geological survey of Pennsylvania (1892), besides many shorter works. His usual signature is J. P. Lesley.

Revised by G. K. Gilbert.

Leslie: village; Ingham co., Mich. (for location of county, see map of Michigan, ref. 7–I); on the Mich. Cent. Railroad; 16 miles N. of Jackson, 23 miles S. of Lansing. It is in an agricultural region, and has electric lights, 5 churches, union public school, 14 magnetic artesian wells, iron-foundry, stave and barrel factory, and 2 weekly newspapers. Pop. (1880) 1,113; (1890) 1.058; (1900) 1,114.

Editor of "Local."

Leslie, Charles: controversial writer; b. in Dublin, Ireland, July 17, 1650. His father, Rev. Dr. John Leslie, was successively Bishop of the Orkneys, of Raphoe, and of Clogher for more than fifty years, and died in 1671, at the age of 100 years. Charles was educated at Trinity College, Dublin; studied law at the Temple, London, for several years subsequent to 1671; took orders in the Church of England in 1680, and was chancellor of the Cathedral of Connor in 1687, but by refusing to take the oath of allegiance to William and Mary cut off all prospect of ecclesiastical preferment. He then devoted himself to religious and political controversy, for both of which he was well fitted by extensive studies in English history and law and in theological literature. For thirty-three years he was the leading literary champion of the Jacobites. His works against Jews, Socinians, Presbyterians, Quakers, and Roman Catholics once enjoyed great fame, but the only work of Leslie which has exercised any influence in the nineteenth century is the *Short Method with the Deists* (1694), the argument of which rests principally upon the Christian miracles. Though still esteemed by evangelical theologians, it is regarded as inadequate to modern wants, and is now little read. The publication of an edition of this tractate in Boston in 1723 by John Checkley, to which was added *A Discourse concerning Episcopacy*, assailing the validity of the ministerial orders of the Congregationalists, occasioned a bitter controversy in New England, and led to the persecution of Checkley in the courts. He was condemned for libel and fined by the court. Leslie was for some years at the court of the Pretender on the Continent, then resided in Italy, returned to England in 1721, and died at Glaslough, Ireland, Apr. 13, 1722.

Revised by W. S. Perry.

Leslie, Charles Robert: painter; b. at Clerkenwell, London, Oct. 19, 1794; son of a watchmaker, a native of Philadelphia. The boy returned with his parents to Philadelphia in 1800; in 1811 went to England; studied with West and Allston; was elected associate of the Academy in 1821, and member in 1826. His first attempts at painting were of historical subjects on a large scale, but he soon abandoned this style for another, in which he became famous. In 1833 he was appointed Professor of Drawing at West Point, but held the position for five months only. In 1845 appeared his *Life of Constable*. In 1847 he was chosen Professor of Painting at the Royal Academy, held the office four years, and delivered lectures which were published under the title of *A Handbook for Young Painters*. His pictures found great favor in England, partly from the character of his subjects, which were taken chiefly from English literature, and partly from the artist's sympathy with English scenery and manners. His best known pictures are in the South Kensington Museum, as the *Widow Wadman and Uncle Toby* (of which subject another picture is in the National Gallery), *The Dinner at Mr. Page's House*, *Autolycus*, and other pictures taken from Shakspeare; *Le Bourgeois Gentilhomme*, and other subjects from Molière. He died in London, May 5, 1859.

Revised by Russell Sturgis.

Leslie, Eliza: author; b. in Philadelphia, Pa., Nov. 15, 1787, sister of Charles R. Leslie; accompanied her parents to England in 1793, returning in 1800; made her first appearance as an authoress in 1827 with her *Seventy-five Receipts for Pastry, Cakes, and Sweetmeats*, the popularity of which led to other successful works of the same class. In 1831 she published the *American Girls' Book*, and having won a prize offered by Mr. Godey of the *Lady's Book* by her story *Mrs. Washington Potts*, she thereafter devoted herself chiefly to writing works for the young, acquiring great popularity. Her *Domestic Cookery Book*, published in 1837, went through fifty or sixty editions, while the *House Book* (1840) and *Lady's Receipt Book* (1846) were also widely circulated. Her only novel was *Amelia, or a Young Lady's Vicissitudes* (1848). D. at Gloucester, N. J., Jan. 2, 1858.

Revised by H. A. Beers.

Leslie, George Dunlop: painter; b. in London, England, July 2, 1835, son of Charles R. Leslie; was educated at the Mercers' School, received artistic training from his father and at a school of art at Bloomsbury, and was in 1854 admitted as a student of the Royal Academy. He began to exhibit pictures at the Academy in 1857, was elected an associate of that institution in 1868, and has attained considerable popularity as an artist.

Leslie, Henry David: composer and conductor; b. in London, June 18, 1822; studied music entirely there. In 1855 formed the celebrated Henry Leslie's choir, which he conducted till 1880. It was broken up, but reorganized under Alberto Randegger. Leslie resumed the direction in 1885, and in 1887 it was again and finally disbanded. He conducted the Herefordshire Philharmonic Society in 1863, and in 1874 was the director and conductor of the Guild of Amateur Musicians. D. Feb. 4, 1896. His compositions are numerous, including a Te Deum and Jubilate in B (1846); *Immanuel*, oratorio (1854); *Bold Dick Turpin*, operetta (1857); *Judith*, oratorio (1858); *Holyrood*, cantata (1860); *Daughter of the Isles*, cantata (1861); *Ida*, opera (1864); much instrumental music, many songs, part-songs, anthems, and other church music.

D. E. Hervey.

Leslie, Sir John: natural philosopher; b. at Largo, Fifeshire, Scotland, Apr. 16, 1766; was educated at the Universities of St. Andrews and Edinburgh; spent two years (1788–89) in Virginia as tutor in one of the Randolph families; settled in London in 1790, and applied himself to science. He translated Buffon's *Natural History of Birds* (9 vols., 1793), traveled on the Continent as tutor, and was an unsuccessful candidate for professorships at St. Andrews and Glasgow. In 1805 he was elected by the town council of Edinburgh Professor of Mathematics in the universities of that city, after a vigorous opposition by the clergy on the score of dangerously liberal opinions both in politics and religion. In 1819 he succeeded Prof. Playfair in the chair of Natural Philosophy, which he held through life. He was knighted a few months before his death, which occurred Nov. 3, 1832. He early took high rank as a scientific investigator and discoverer. His *Experimental Inquiry into the Nature and Propagation of Heat* (1804) gained the Rumford medal of the Royal Society. From 1809 to 1822 he published a series of text-books in geometry and the higher mathematics, and from 1822 to his death a similar series on natural philosophy. In 1810 he discovered the process of artificial congelation. He was the author of a large number of scientific articles in the *Encyclopædia Britannica*.

Lesquereux, lā′ke-rü′, Leo: palæontologist; b. at Fleurier, Neuchâtel, Switzerland, Nov. 18, 1806; was educated at the Academy of Neuchâtel, and at Weimar and the University of Berlin; was principal of the academy at Chaux-de-Fonds, Switzerland (1829–34), resigning on account of deafness; in 1844 was awarded a gold medal by the government of Neuchâtel for a memoir entitled *Directions for the Exploration of Peat Bogs*; emigrated to the U. S. in 1848, and after assisting Agassiz at Cambridge removed to Columbus, O., to assist William T. Sullivant in the study of American bryology; made special studies of the coal formations of the U. S.; in 1864 was elected a member of the National Academy of Sciences. Among his numerous publications are *Catalogue of the Mosses of Switzerland and Mennirs* (Neuchâtel, 1840); with Sullivant, *Musci Americani Exsiccati* (1856; 2d ed. 1865); and *Icones Muscarum* (Cambridge, 1864); *Catalogue of the Fossil Plants which have been Named or Described from the Coal Measures of North America*, in reports of Henry D. Rogers (1858); *On Land Plants in the Lower Silurian* (1874); *The Tertiary Flora* (1877); for the second Pennsylvania geological survey, *The Coal Flora*, 3 vols. with atlas (1880–84); with Thomas P. James, *Manual of the Mosses of North America* (Boston, 1884). D. at Columbus, O., Oct. 25, 1889.

Lesseps, Fr. pron. lā sep′, Ferdinand, de, Vicomte, LL. D.: diplomat; promoter of the ship-canals of Suez, of Corinth, and of Panama; b. at Versailles, France, Nov. 19, 1805;

entered public life as consular *attaché* at Lisbon in 1828, and held various consular offices. When vice-consul at Alexandria his conduct during the cholera, which carried off one-third of the population, won for him the cross of the Legion of Honor. He was consul at Barcelona in 1842, and during the bombardment of that place his wise measures for the protection of the foreign residents obtained for him promotion to officer of the Legion of Honor. He was made consul-general, and received felicitations and decorations from many foreign governments. He visited Egypt in 1854 by invitation of the viceroy, conceived the project of the Suez Canal, and in 1856 published a report upon it. The project was approved by Said Pacha, but the distrust of the Porte and the opposition of the English Government suspended its execution. (See *Suez Canal* in SHIP-CANALS.) In 1882, by his firmness and his vigorous action to secure the neutrality of the canal, he excited the hostility of *The Times* and part of the English press, which demanded that vigorous measures be taken against him.

He also promoted the construction of the Corinth Canal. At the height of his reputation and glory he undertook the construction of the Panama Canal. Believing himself master of public opinion, and better informed than others, he decided upon insufficient plans that the canal should be at sea-level. The cost of such a canal had been estimated at $300,000,000, but confiding in his own good fortune he reduced the estimate to $120,000,000. A total of $280,000,000 was expended, and but a trifling portion of the work had been done when, in 1889, the company was dissolved. In Nov., 1892, the French Government determined to prosecute de Lesseps and the other officials of the company on the charges of fraudulent dealing and bribery, especially of members of the legislature. A sentence of imprisonment was passed, but in the case of de Lesseps it was not carried into effect. He was made member of the Academy of Sciences in 1875, and of the French Academy in 1884; in 1869 was promoted Grand Cross of the Legion of Honor without passing through the grade of grand officer. D. Dec. 7, 1894.

His chief publications are *Ma Mission à Rome* (1849); *Mémoire à l'Académie des Sciences sur le Nil Blanc et le Soudan*; *Principaux faits de l'histoire d'Abyssinie*; *Lettres, journal et documents pour servir à l'histoire de l'Isthme de Suez* (1875–81), which was crowned by the French Academy; *Origines du Canal de Suez* (1890); *Souvenirs de quarante ans* (1887). See the *Life* by Barnett Smith (London, 1893). WILLIAM R. HUTTON.

Lessing, GOTTHOLD EPHRAIM: poet and dramatist; b. at Camenz, Silesia, Jan. 22, 1729; was educated at the Fürstenschule of Meissen, where he devoted himself especially to the ancient languages and to mathematics, and where he planned his first comedy, *Der junge Gelehrte*. In 1746 he went to Leipzig for the purpose of studying theology according to the wishes of his father, an orthodox clergyman. Though he increased his theological and philological knowledge, he turned his attention chiefly to the theater, and soon after the performance of his first comedy on the Leipzig stage chose the literary career. In 1748 he went to Berlin, attracted by the cultured atmosphere that surrounded the capital of Prussia's young king, Frederick II. Here Lessing had to do the drudgery work of a poor young journalist, but he also developed the independence of character and the many-sided knowledge of men and affairs which are among his chief characteristics. He wrote several comedies, and also produced a number of reviews which already showed the fearless and witty critic. In order to complete his academic studies he went in 1752 to Wittenberg, but returned to Berlin in the following year, resuming his occupation as a journalist and critic. Again he wrote several dramas, of which *Miss Sara Sampson* (1755) met with unusual success on the German stage. After a sojourn at Leipzig of two years we find Lessing again in Berlin (1758), where he published with Nicolai, the bookseller, the *Briefe, die neueste Literatur betreffend*. These letters, in which Lessing mercilessly demolishes the literary idols of his time, and in opposition to dull French classicism points to Shakspeare as a poetic model, may be considered as the beginning of a new literary era in Germany. In 1760 Lessing became secretary to Gen. von Tauenzien, who resided in Breslau. While here, in the midst of the Seven Years' war, Lessing wrote his *Minna von Barnhelm*, the first national drama of Germany, a masterly comedy in regard to the development of the plot as well as in regard to the delineation of the characters and the handling of the dialogue with its pure classic language. While this drama was creating a sensation throughout Germany, Lessing was again busy at another work which was also destined to revolutionize literature—his *Laokoon*. He had already touched the main thought of this book in his famous treatise *Ueber das Wesen der Fabel* (1760). Attempting now in the *Laokoon* to define the distinction between the plastic arts and poetry he arrives at the conclusion that Art represents bodies in space, while Poetry represents actions in time. Form and color are the means of representation in Art, while sound is the means of representation in Poetry. The effect of Lessing's investigations upon the poetic productions of Germany, especially in the field of the epos and of lyric poetry, was very great; but he was to extend his positive criticism also on the domain of the drama. In 1767 he became official playwright and artistic director of the Hamburg theater, and while there he wrote his famous *Hamburgische Dramaturgie*, a series of theatrical reviews in which he freed the German drama from the ascendency of French classicism, and gave an analysis of the essence of the tragedy and comedy which remains unsurpassed to the present day. The Hamburg theater being a failure, Lessing accepted in 1770 an appointment as librarian of the ducal library at Wolfenbüttel, a position which he occupied the rest of his life. D. in Brunswick, Feb. 15, 1781. In Wolfenbüttel, a quiet, remote town, he found time to finish *Emilia Galotti*, his best tragedy from a technical point of view. Being a perfect practical example of the dramatic principles which Lessing had laid down in his critical writings, this tragedy, by its relentless exposure of the wickedness of the small courts of the eighteenth century, also had great influence upon the social and political ideas of the time. Like *Miss Sara Sampson* and *Minna von Barnhelm*, it was a drama of ordinary life such as had been introduced in England by Lillo in his *Merchant of London* (1731). With the publication of the *Wolfenbüttler Fragmente*, a number of treatises concerning the origin of Christianity by H. Samuel Reimarus, Lessing aroused the wrath of the orthodox clergy, and the rest of his life was more or less filled with unpleasant controversies. Again he proved himself a critic far superior to his opponents, and also in the field of theology he was to become a pathfinder for future generations. Many of the principles of the later critical school in theology were anticipated by Lessing in his writings of this period, his famous treatise *Ueber die Erziehung des Menschengeschlechts* being the embodiment of the final results of his theological and philosophical studies. To these theological controversies we also owe the last and most celebrated of Lessing's dramas—*Nathan der Weise* (1778). This drama culminates in the story of the three rings, as told by Boccaccio, demonstrating the truth that true religion is tested by deeds of love and not by creeds and dogmas.

The principal characteristic of Lessing's mind was his pure and passionate love for truth. By his heroic struggle for the possession of truth he became the greatest critic of modern times, the reformer in literature, one of the foremost liberators of the human mind not only for the eighteenth century, but for all times. The stamp of a strong, fearless manliness is impressed upon all of his writings, and he well deserved the praise of Goethe, who said of him, "There may be as shrewd and intelligent men, but where is such a character?"

BIBLIOGRAPHY.—K. G. Lessing, *G. E. Lessings Leben* (1793); Fr. Schlegel, *Lessings Geist aus seinen Schriften* (1804); Danzel and Guhrauer, *G. E. Lessing, sein Leben und seine Werke* (1850–54); Erich Schmidt, *Lessing* (1892); Schwarz, *Lessing als Theologe* (1854); D. F. Strauss, H. S. Reimarus (1862), H. Blümner, *Lessings Laokoon* (1880); Schröter and Thiele, *Lessings Hamburgische Dramaturgie* (1877); D. F. Strauss, *Lessings Nathan der Weise* (1864); Pabst, *Vorlesungen über Nathan der Weise* (1881); J. Goebel, *Ueber tragische Schuld und Sühne* (1884).

JULIUS GOEBEL.

Lessing, KARL FRIEDRICH: artist; b. at Wartenberg, Silesia, Feb. 15, 1808; received his first artistic instruction at the school of architecture at Berlin; studied then for several years at Düsseldorf under Schadow, and was appointed director of the gallery of paintings at Carlsruhe in 1858. His paintings are partly landscapes, partly historical, and among the latter his *Hussites* (1830), *Huss before the Council* (1842), *The Martyrdom of Huss* (1850), and others, excited great admiration by the strength and richness of their characterization. A pupil of the school of Düsseldorf, and laboring in many points under its unfortunate influence, he

nevertheless contributed much to elevate and ennoble it. D. at Carlsruhe, June 6, 1880.

Lester, Charles Edwards: author; b. at Griswold, Conn., July 15, 1815. He was a descendant of Jonathan Edwards; resided for a time in the South and West; eame to the bar in Mississippi, and was afterward ordained to the Presbyterian ministry; was U. S. consul at Genoa, Italy, 1842–47, and attained distinetion as a journalist and political lecturer. Among other works he published *The Glory and Shame of England* (New York, 1841); *Condition and Fate of England* (1842); *Life of Vespucius* (1846); *The Napoleon Dynasty* (1852); *Life of Charles Sumner* (1874); *Our First Hundred Years* (1874–75); and several translations of standard Italian authors. D. at Detroit, Mieh., Jan. 29, 1890.

Lestocq', Jean Herman: Freneh adventurer; b. at Celle, Hanover, Apr. 29, 1692. His father, a French emigrant, was a surgeon, and the son chose the same profession. In 1713 he went to St. Petersburg, and was appointed surgeon in the service of Peter the Great, but was banished to Kazan in 1718 on aeeount of his dissolute habits. In 1725 Catharine I. recalled and appointed him surgeon in the serviee of the Princess Elizabeth. He soon acquired eomplete eontrol over the mind of the prineess, and it was by his instigation and by his aid that she undertook the revolution of Nov. 25, 1741, whieh made her Empress of Russia. The King of Poland now made Lestocq a count, the empress gave him a pension of 7,000 roubles annually, and for several years his influenee in Russian politics was very great; but in 1748 the viee-chaneellor, Bestoozhef, suceeeded in rousing the empress's suspicion against him. He was arrested, put to the torture, and banished to Oogliteh. In 1761 Peter III. recalled him to the eourt, and Catharine II. gave him an estate in Livonia, where he died June 12, 1767.

L'Estrange', Sir Roger: journalist; b. at Hunstanton Hall, Norfolk, England, in 1616; was probably educated at Cambridge; accompanied King Charles I. in 1639 in his expedition against the Seots, and being a zealous royalist during the eivil war, was eaptured in an attaek on Lynn (1644), and eondemned to death by the Roundheads. He was, however, reprieved, and kept eaptive several years, until in 1648 he eseaped and unsueeessfully tried to stir up a rebellion in Kent, after whieh he fled to the Continent. He returned to England on the dissolution of the Long Parliament in 1653, and made terms with Cromwell. At the Restoration he was appointed censor or lieenser of the press; established *The Intelligencer* newspaper in 1663, and *The Observator* in 1681, in both of whieh sheets and in a multitude of pamphlets he showed himself a most energetie supporter of the erown. He made translations of Josephus, Cieero's *Offices*, Æsop's *Fables*, Erasmus's *Colloquies*, Quevedo's *Visions*, and other works, ancient and modern, some of whieh possessed considerable merit, thongh unfaithful and disfigured by flippant phrases. He was knighted on the accession of James II., elected to the Parliament of 1685, and dismissed from his office of censor at the revolution of 1688. D. in London, Dee. 11, 1704.

Le Sueur, le-soor': eity (settled in 1852); Le Sueur co., Minn. (for location of county, see map of Minnesota, ref. 10–E); on the Minnesota river, and the Chi., St. P., Minn. and Omaha Railway; 60 miles S. W. of St. Paul. It is in an agrieultural and stock-raising region, produeing eorn, wheat, eattle, pork, and sheep, and has 10 churches, 2 public-school buildings, Roman Catholic school, 3 grist-mills, and 2 weekly newspapers. Pop. (1880) 1,414; (1890) 1,763; (1900) 1,937.
Editor of "News."

Lesueur, le-sü'ér', Eustache: painter; b. in Paris in 1617. He was called the French Raphael, beeause of the suavity and graee of his style. He studied in the school of Simon Vouet at the same time as Lebrun. He was elected member of the Academy of St. Luke, for which he painted a picture of St. Paul laying hands on the sick, whieh was much admired by Poussin, who counseled him as to his studies. Commissions failing, he designed frontispieces for books, and medallions of Madonnas for the nuns—anything that eame to hand. The queen-mother chose him for her painter. He painted at her order twenty-two pictures for the cloister of the Chartreuse in Paris, from the history of St. Bruno. In 1648, when the Academy of Painting was founded, Lesueur was among the twelve original members. His works are in the principal churches of Paris, and are distinguished by their religious sentiment, while his treatment of mythologieal subjects in the Hôtel Lambert is masterly. He also produced many easel-pictures. Notwithstanding his great talent, the envy and jealousy of courtiers brought him into discredit with Louis XIV., and when he became a widower he went and lived with the monks of the Chartreuse, and died among them at the age of thirty-eight, in 1655. The Louvre contains many of his pictures. W. J. Stillman.

Lesueur, Jean François: b. Jan. 15, 1763, at Drucat-Plessiel, near Abbeville, France; was appointed direetor of music at the Cathedral of Seez in 1779, and in 1786 at the Church of Notre Dame in Paris. The innovations which his compositions introduced into the style of sacred music attracted the public, but were not approved of by eonnoisseurs and the clergy, and in 1788 he gave up his position, and lived for some years in retirement in the country. In 1793 his opera *La Caverne* made a great sueeess. From 1795 to 1802 he was professor at the conservatory of musie in Paris. Losing this position on account of dissensions with his eolleagues, Napoleon made him direetor of the imperial orehestra in 1804. The mass and Te Deum whieh he composed for the coronation of the emperor were reeeived with great praise, and his opera *Les Bardes* even exeited enthusiasm. *La Mort d'Adam*, however, was more eoldly reeeived in 1809, and his later works failed to make mueh impression. In 1817 he again became professor at the conservatory, and had among his pupils Berlioz, Ambroise Thomas, Gounod, and Dietsch. D. in Paris, Oet. 6, 1837.

Leszczynski, Stanislaus: See Stanislas Leszczynski.

Lethbridge: town of Southern Alberta, Canada; on the Belly river, near the mouth of the St. Mary's, and on a braneh railway from Medieine Hat to Crow's Nest Pass, 110 miles W. of the former (see map of Canada, ref. 9–F). A railway also runs southward to Great Falls, Mon. Excellent coal-beds (lignite) are worked in the vieinity. The region is pieturesque, suitable for farming and grazing, and abounds in wild animals and fish. M. W. H.

Le'the [= Lat. = Gr. Λήθη, liter., forgetfulness, oblivion]: in Greek mythology, 1, a daughter of Eris, and the personification of forgetfulness. 2. A river in the lower world, of whieh the departed souls drank before entering the Elysian Fields, thereby entirely forgetting all about their life on earth. The shadows who had erossed its waters seemed to the Greeks the most miserable ereatures imaginable.

Le'to [in Gr. Λητώ = Lat. *Latona*]: in Greek mythology, a Titan, the daughter of Cœus and Phœbe. She was a goddess of great antiquity and dignity, the wife of Zeus before his marriage to Hera, and after severe labor bare to the god of heaven Apollo and Artemis, both light-gods. Aeeording to the Homeric hymn to the Delian Apollo, Leto was the mistress of Zeus, and was therefore hated by the jealous Hera, who pursued her over the whole earth, whieh, in eomplianee with an oath exaeted by Hera, and in fear of the great god whom Leto was to bear, everywhere repulsed her. Finally the floating island of Delos, not being bound by the oath of Earth, offered Leto a place of refnge, on condition that her glorious son should never remove his worship from the island. She was always intimately assoeiated with her children, in whose temples she was worshiped.
J. R. S. Sterrett.

L'Étoile, lā'twaăl', Claude, de, Seigneur de Saussay: poet and dramatist; son of the memoir-writer Pierre de l'Étoile; b. in France in 1597. He was one of the five writers whom Riehelieu drew around him and charged with working his dramatie plans into proper form. So he had a share in the comedy *La Comédie des Tuileries* (1635) and in the tragi-comedy *L'Aveugle de Smyrne* (1638). His own independent dramas *La belle Esclave* (1643), tragi-comedy, and *La Comédie des filous* (1647) are insignificant. He wrote some lyrical poetry, most of whieh, not published during his life-time, was destroyed by a puritanieal literary exeeutor. He was one of the first members of the Freneh Academy. D. in 1652. A. G. Canfield.

Letronne, le-tron', Jean Antoine: historian and archæologist; b. at Paris, Jan. 2, 1787; studied the art of painting under David, but felt himself more strongly drawn toward science; worked for several years under Mentelle, professor in geography; traveled from 1810 to 1812 through France, Italy, and Switzerland; wrote in 1814 his *Cours élémentaire de Géographie, ancienne et moderne*, which was often republished; beeame in 1831 director of the Royal Library, Professor in History and Arehæology at the Collège de Franee, and in 1840 keeper of the archives of

the kingdom. D. in Paris, Dec. 14, 1848. His principal works are *Recherches pour servir à l'Histoire de l'Egypte* (1823); *Sur l'emploie de la peinture murale chez les Grecs et les Romains* (1837); *Recueil des Inscriptions grecques et latines de l'Egypte* (1842–48); and *Diplomes et Chartres de l'époque Mérovingienne sur papyrus et sur vélin* (1844). Noteworthy among his minor works is his *La Statue vocale de Memnon* (1833). His collected works in six volumes have been published (Paris, 1885). See Egger, *Sur la vie et les travaux de Letronne* (*Journal d'instruction publique*, 1848). Revised by ALFRED GUDEMAN.

Letters: See PALÆOGRAPHY.

Letters of Credit: written instruments requesting a person to sustain a detriment, usually to part with property or to incur an obligation, on the credit of the writer. The following was held not to be such an instrument, because it contained only a promise by the writer to do an act, and did not pledge his credit: "A. P. Kenyon wants a little money. If you want any one on the note, I will fix it when I come in." (*Scribner* vs. *Rutherford*, 65 Iowa 551.) A special letter of credit is addressed to a specified person or persons. If addressed to the world at large, it is a general letter of credit. In either form it is a mere offer, so far as the addressee is concerned, and the latter by accepting the offer concludes a contract to which the writer of the letter and he are immediate parties. It follows that he is not affected by any equities between the writer and the holder of the letter. *In re Agra and Masterman's Bank*, 2 *Chancery Appeals* (Eng.) 391.

The law does not require any prescribed form for letters of credit, and their provisions vary greatly in fact. It is not strange, therefore, that courts experience difficulty in interpreting these instruments. Sometimes they require the existence of specified facts or the performance of prescribed acts as conditions of the writer's becoming bound to the addressee: as where the writer agrees to accept drafts drawn upon him for the invoice price of described goods, to be shipped by a named vessel. In such cases the person drawing must show that the specified facts existed or the prescribed acts had been performed. (*Bank of Montreal* vs. *Recknagel*, 109 N. Y. 482.) Sometimes the letter of credit takes the form of a circular note largely used by travelers, by which the writer requests any of his correspondents in specified places to pay money to a named person upon his complying with certain requirements, such as identifying himself. In many jurisdictions one who promises to accept a bill incurs the liability of an acceptor of such bill. Under this doctrine the writer of a letter of credit may, by virtue of the letter, become a party to a bill of exchange drawn in accordance with its provisions (*Birckhead* vs. *Brown*, 5 Hill (N. Y.) 634); but the letter itself is not a negotiable instrument. In case the writer authorizes another to draw upon a third person, and the third person refuses to accept a draft so drawn, the writer is liable on the letter of credit to an action by the person whose draft has been dishonored. (*La Forgue* vs. *Harrison*, 70 California 380.) This liability, however, is not that of a drawer of a bill, for the writer of the letter of credit is not entitled to prompt notice of the refusal to accept. See Story *On Bills*, §§ 459–463; Daniels *On Negotiable Instruments* (ed. 1891), §§ 1790–1799. FRANCIS M. BURDICK.

Letters of Marque: See MARQUE, PRIVATEERING, and WAR.

Letters Patent: See PATENTS.

Letters Rogatory: a writ or instrument issued in the name and by the authority of a judge or court to another in a different country or state, requesting that the deposition of a witness be taken who is within the jurisdiction of the foreign tribunal, to be used as testimony in a cause pending before the judge or court from which the letters are sent. This instrument informs the court abroad of the pendency of the action, the names of the foreign witnesses, and is ordinarily accompanied by written interrogatories, prepared by the litigating parties, upon which the witness is to be examined. It also contains an offer on the part of the court issuing the letters to perform a similar service for the foreign tribunal whenever required. The witness is examined either before the judge receiving the letters or before a commissioner appointed for the purpose, and the answers, signed and sworn to by the deponent, and duly authenticated, are then returned to the court from which the letters issued. See DEPOSITION and WITNESS.
Revised by F. STURGES ALLEN.

Letters Testamentary: an instrument in writing granted by a surrogate or other judicial officer having jurisdiction of the probate of wills to an executor as evidence of his authority, and empowering him to administer the estate of the deceased. When a person dies intestate, letters of a similar character, termed letters of administration, are granted to the person who is appointed administrator. Under common-law rules executors can perform most of the acts pertaining to their office, except engaging in suits in relation to the estate, before obtaining letters testamentary, since an executor's authority and title is deemed at common law to be derived from the will, and only to be evidenced by the letters granted. In the U. S. this rule has generally been changed by statute, and it is usually required that letters testamentary must be obtained before an executor will be authorized to perform any of his usual duties in the settlement of the estate except those of minor importance, but his appointment will be held to relate back so as to absolve him for liability for acts committed without strict authority. An administrator, however, even under common-law rules, has no authority to act until letters of administration are granted to him, though after the grant is made his title and authority will, by fiction of law, relate back to the death of the intestate. Letters granted are valid only within the limits of the State in which they are issued. If there are assets of the deceased within a foreign state or country, letters must be issued there to a subordinate or ancillary administrator, or ancillary letters must be issued to the principal executor or administrator, who otherwise will have no authority to administer such assets, unless they are remitted to him from the foreign jurisdiction. See WILL, ADMINISTRATION, EXECUTOR, and SURROGATE. Revised by F. STURGES ALLEN.

Letter-wood, or **Snake-wood**: a rare and costly ornamental wood used for inlaying and venecring; the product of *Brosimum aubletii*; an artocarpaceous tree of South America. It is so hard that axes of extraordinary temper are required to fell the tree. Its rich brown wood has somewhat letter-shaped marks, which are nearly black. It is one of the most beautiful kinds of wood.

Lettic, or **Lettish, Language and Literature**: the folk-speech and the written and printed productions of the people inhabiting Courland, of Livland from the northern boundary of the district of Wolmar toward the S., of the western district of the province of Witepsk (the so-called Polish Livland), of the villages situated directly by the sea between Polangen and Memel, and in general of the Kurische Nehrung, where, however, the language is rapidly yielding to the German and Lithuanian. Lettic is a younger sister of the Lithuanian, and is distinguished from the latter especially by the greater departure of its phonology from the Indo-European standard, and also by its accent, which has become fixed upon the first syllable of the word. Like the Lithuanian, it presents a rich dialectal development. It is divided into the following chief dialects: (1) The East Lettic; (2) the dialect of the standard literary language spoken in the neighborhood of Mitau; (3) the North Lettic, spoken in Northwestern and Northern Courland and in the Livland districts bordering the Gulf of Riga.

Until recently the Lettic received attention almost exclusively from the German clergy, and some of these have rendered great service in investigating and describing the language, notably G. F. Stender (died 1796), who prepared a grammar as well as a compendious dictionary of this language, and August Bielenstein, whose work *Die lettische Sprache nach ihren Lauten und Formen erklärend und vergleichend dargestellt* (Berlin, 1863) is justly regarded as a classic. Among others who have rendered service to the philology of the language are to be especially mentioned H. Adolphi, the author of the first grammar of practical value (Mitau, 1685), and C. Ulmann, from whom we have the best Lettic dictionary (Riga, 1872). Another dictionary was published by Kurschat (Halle, 1870, 1883), and grammars were edited by Schleicher (Prague, 1856) and Kurschat (Halle, 1876).

It is only quite recently that the Lettic people have turned their own attention to their language, and it is noticeable that the Lettic literature as a consequence has acquired a certain degree of vigor. There may now be found an abundance of Lettic poems, novels, romances, etc., whereas the older Lettic productions were almost exclusively religious or didactic in character, and in part mere translations from the German. An enumeration of these

down to the year 1830 is given by Napiersky in the *Magazin der lettisch-litterarischen Gesellschaft*, iii. (parts ii. and iii.). The oldest Lettic text dates from the year 1586, and is a translation of Luther's *Enchiridion* (printed in Königsberg). The folk-songs of the Letts are numerous, and often of extraordinary beauty, though mostly of limited compass. A complete collection of them (*Latweeschu tautas dfeesmas*, Leipzig, 1874, 1875) has unfortunately gone no further than a beginning. A collection of tales, proverbs, and riddles was published at Weimar in 1857 by Schleicher.

A. Bezzenberger.

Lettic Race, The: a subdivision of the Balto-Slavic group, belonging to the Indo-European family, and itself divided into three branches—the Lithuanians, the Letts, and the Old Prussians. The Old Prussians inhabited the region between the Deime, the Alle, and the Vistula, but were completely Germanized in the seventeenth century. The few remains of their language were collected by Nesselmann, and published at Berlin (1846). The Letts, numbering more than 1,000,000, inhabit Courland, Southern Livonia, and the adjacent districts of the governments of Vitebsk, Kovno, and Pskov. Their language was not reduced to writing until the sixteenth century, on the introduction of the Reformation; the first book printed in Lettish was the greater catechism by Luther, which appeared in 1586. Since that time the language has been cultivated with steadily increasing care. Religious books, and books of fiction, were translated; lyrical poetry, and even plays, were produced by native authors; and at present Lettish newspapers and periodicals are issued. The Lithuanians comprise the Russian Lithuanians proper, numbering about 800,000, and inhabiting the governments of Vilna, Kovno, Suwalsi, and Grodno; the Samogitians or Shamaites, numbering about 500,000, and occupying the northwestern part of the government of Kovno; and the Lithuanians in Prussia, numbering about 100,000. The Lithuanian language is spoken in several dialects. Like the Lettish, it was not reduced to writing until the time of the introduction of the Reformation, but it is much more antiquarian than the Lettish, for which reason it is of peculiar interest to the student of the Indo-Germanic languages. The relation between Lettish and Lithuanian is about the same as that between Russian and Polnish. The New Testament has been translated into both languages.

A. Bezzenberger.

Lettres de Cachet: See Cachet, Lettres de.

Lettuce [from Lat. *lactu'ca*, lettuce]: an important salad-plant, *Lactuca sativa*; a composite herb, the native country of which is not known. There are many varieties, some of which form heads of leaves and others do not. It is easy of digestion, rather laxative, and gently soporific. From its juice the narcotic Lactucarium (*q. v.*) is prepared. There are several Asiatic, European, and American species of wild lettuce (*Lactuca*), most of which have an acrid-narcotic quality. About 120 varieties of lettuce are sold by seed-dealers in the U. S. Lettuce is easy of culture in the open air. The so-called Cos lettuces are noted for summer use, although they are much less popular in the U. S. than in Europe. Lettuce-forcing in greenhouses is an important industry.

Revised by L. H. Bailey.

Leucadia: See Santa Maura.

Leucadian Promontory: See Cape Ducato.

Leucæmia [Mod. Lat.; Gr. λευκός, white + αἷμα, blood], or **Leucocythæmia** [Gr. λευκός, white + κύτος, a hollow vessel, cell + αἷμα, blood]: one of the blood diseases, dependent upon some disturbance in the process of blood-making. It receives its name from the character of the blood, which contains a remarkable increase in the number of white corpuscles or leucocytes. These are present in normal blood in the proportion of one to about 300 or 500 of the red corpuscles, while in leucæmia the proportion becomes 1 : 10 or even 1 : 1. The red corpuscles are reduced somewhat in actual number, but the altered proportion is mainly due to the enormous increase of leucocytes. The disease is characterized by enlargement of the spleen and often of the lymphatic glands of the neck, axilla, or other regions. There is great pallor and weakness, as in other anæmic conditions, and the disease tends to a fatal termination in from six months to three years. Arsenic has some power to arrest the progress of the disease, but this power is slight and inconstant.

William Pepper.

Leucan'iline [from Gr. λευκός, white + Eng. *aniline*]: $C_{20}H_{21}N_3$, a base produced by the action of reducing agents on rosaniline, and related to it in the same manner as indigo-white to indigo-blue:

Rosaniline. Leucaniline.

$$C_{20}H_{21}N_3O + H_2 = C_{20}H_{21}N_3 + H_2O.$$

Leu'cine [from Gr. λευκός, white]: a crystalline substance which is among the products of incipient putrefaction of the albuminoid or proteid bodies. Proust was the discoverer of it in cheese, and Braconnot obtained it by treating animal substances with sulphuric acid. It occurs diffused widely throughout living animal tissues. Its composition is $C_6H_{13}NO_2$. Its scientific name is *amidocaproic acid*, and its constitution is represented thus: $C_6H_{11}(NH_2)O_2$; as derived from caproic acid, $C_6H_{12}O_2$, by replacement of H_2 by NH_2, amidogen. It was called by its earlier investigators *oxide of caseine* or *caseous oxide*. Another crystalline substance, called *tyrosine*, which is $C_9H_{11}NO_3$, always accompanies leucine in nature. Leucine is prepared by boiling horn-shavings with dilute sulphuric acid, removing the latter by chalk, evaporating, dissolving in alcohol, decolorizing with animal charcoal, and crystallizing. There are several other methods, however. Leucine may be sublimed like camphor. It dissolves in warm, not in cold, water.

The study of these immediate products of metamorphoses of the nitrogenous substances that form animal tissues is of the utmost importance in connection with physiology and the learning of the chemical laws of life and death, of health and disease. In this view, leucine and tyrosine, and their associates and congeners, are bodies of high importance.

Revised by Ira Remsen.

Leucicus: See Grazzini.

Leuckart, loi'kaart, Karl Georg Friedrich Rudolf: zoölogist and educator; b. at Helmstedt, in Brunswick, Oct. 7, 1823; studied medicine and natural science at Göttingen under Wagner, and was appointed Professor of Zoölogy and Comparative Anatomy at the University of Giessen in 1850. His *Beiträgen zur Kenntniss wirbelloser Thiere* (1848) and *Ueber den Polymorphismus der Individuen* (1851) attracted much attention, but it was more especially his helmintholog-ical researches, *Die Blasenbandwürmer* (1856) and *Trichina spiralis* (1861), which made his name celebrated. He also wrote *Die Parasiten des Menschen* (2 vols., 1861–66; 2d ed., 1 vol., 1889). For many years he compiled the record of invertebrate literature in the *Archiv für Naturgeschichte*. It is more as a teacher that Leuckart is celebrated, more naturalists of celebrity having received their education from him than from any other teacher in Europe. For many years he has been Professor of Zoölogy at Leipzig, and his laboratories are constantly thronged.

Leucocyte [from Gr. λευκός, white + κύτος, cell]: a collective name given to colorless migratory cells found in various parts of the body. They apparently arise in the lymphatic glands and other adenoid structures, and thence they find their way to all parts of the body. In the lymphatic vessels they are called lymph-corpuscles, in the blood white corpuscles, and when outside these vessels, if few in number, wandering cells, or if collected at some point of injury, pus-cells. Their function seems to be largely that of eating foreign matters in the body, and they engulf bacteria, etc., after the manner of an amœba. It was formerly thought that, losing the nucleus, they gave rise to the red blood-corpuscles, but this is not the case. They apparently break down, and it is supposed that the blood plaques (see Blood) arise from their disintegration.

J. S. Kingsley.

Leucocythæ'mia: See Leucæmia.

Leucorrhœ'a [Mod. Lat.; Gr. λευκός, white + ῥεῖν, flow (cf. ῥοή, a flowing, for ῥοίη]: the whites, a catarrhal flow from the vaginal or uterine mucous membranes. This disease is an exaggeration of the normal mucous secretion, and is often consequent upon a somewhat inflammatory condition of the mucous membranes. Rest, the use of iron and other tonics, and astringent washes are often highly beneficial. Sometimes the catamenia assume a leucorrhœal character, especially toward the close. The cervix uteri is often involved in a sub-acute or chronic inflammation, which not unfrequently is best treated by local caustic or other applications.

Leucothea: See Ino.

Leuc'tra (in Gr. τὰ Λεῦκτρα): village of Bœotia, between Platææ and Thespiæ; became famous as the place where the Thebans under Epaminondas defeated the Spartans under Cleombrotus in 371 B. C., thereby checking forever the

influence which Sparta had exercised over Greece for several centuries.

Leuret, lö'rā', François: physician; b. in Nancy, France, Dec. 3, 1797; studied medicine, and took his degree in 1826. Having applied himself with special interest to the study of mental diseases, he was appointed physician of the insane section of the Bicêtre, then director of a lunatic asylum in Paris, and at last director of the Bicêtre. His most prominent writings are *Fragments psychologiques sur la Folie* (1834); *Traitement moral de la Folie* (1840); and *Des Indications à suivre dans le Traitement moral de la Folie* (1846). D. in Nancy, Jan. 6, 1851.

Leutze, Emanuel: See the Appendix.

Levaillant, le-vā'yaăn', François: traveler and ornithologist; b. in 1753 at Paramaribo, in Dutch Guiana, of French parents; removed to Europe in 1763; was educated at different places in Germany, and in 1777 studied natural science in Paris; in 1780 proceeded to the Cape of Good Hope, whence he made two journeys to the interior of Africa, which he described on his return to Paris in 1785 in his *Voyage dans l'Intérieur de l'Afrique* (1790) and *Second Voyage* (1795). These books were read with great interest and ran through several editions, though they were much criticised by scientific authorities. Of unquestionable value were his collections, sold partly in France, partly in Holland, and his ornithological works, *Histoire naturelle des Oiseaux d'Afrique* (6 vols., 1798–1812); *Histoire naturelle des Perroquets* (2 vols., 1801–05). D. Nov. 22, 1824.

Levant, The [Levant is from Ital. *levante*, liter., rising, east, deriv. of *leva're*, rise. (Cf. *orient*, from Lat. *oriens*, rising)]: the countries bordering on the eastern part of the Mediterranean—Asia Minor, Syria, and Egypt. The term was brought into use in the early Middle Ages, when the Italian republics controlled the commerce of Europe.

Levasseur, Pierre E.: See the Appendix.

Lev'ees [= Fr., liter., a raising, deriv. of *lever*, lift, raise]: embankments on the margin of a river to prevent inundation. Levees, embankments, dikes, dams, were used by the ancients during the earliest historical periods. Probably the first to use them were the Egyptians in the Nile valley. The Assyrians and Babylonians also reclaimed by this means portions of the valley of the Euphrates and Tigris. The Chinese leveed their great rivers, the Yang-tse-kiang and the Hwang-ho. Egypt being a rainless country, or nearly so, except near the seacoast, the alluvial valley-lands of the Nile could not be cultivated without irrigation. During the flood season of the Nile—the greatest height being reached about the time of the autumnal equinox—water is drawn off through sluices in the levees, and conveyed through canals to where it is needed; it is there retained within leveed areas or basins as long as required. Variations of a few feet in the annual rise of the Nile are therefore of the utmost importance to the Egyptians, for low inundations cause dearths or famines, and excessive inundations destruction of property, disease, and loss of life. The Nile system is one of leveeing and irrigation, but the irrigation includes the inundation of the valley-lands throughout, leaving dry only the mounds on which the cities, towns, and villages are built, or the leveed areas from which the water is excluded. Near Cairo the river levees are from 12 to 15 feet in height, and but very little higher than the river flood-line. The annual overflow of the Nile lands through sluices—or graduated outlets—for many centuries has caused the gradual elevation of these lands—about 4 to 4½ inches in a century—and also the elevation of the river flood-line. Below Cairo, at the head of the Delta proper, there has been constructed since 1846 a masonry dam, or barrage, provided with numerous sluice-gates, across the branches of the Nile, for the purpose of facilitating irrigation during low water in the river. Navigation is provided for by means of a lock at the end of the barrage.

In Hindustan embankments, or bunds, are used to construct reservoirs for the purpose of irrigating the sterile hills and plains, which were barren only for want of irrigation during the protracted seasons of drought. In the Madras provinces alone, Capt. Smith informs us, there exist no less than 43,000 reservoir-tanks in repair, and 10,000 out of repair—all of native origin. He estimates the length of the levees or embankments which form these reservoirs at 30,000 miles.

In Italy the levee system has been in use for many centuries—for reclamation as well as to facilitate irrigation—and the old Italian engineers announced some truths which, though manifest and plain, are not even yet fully recognized among modern engineers, or those of to-day. They learned that the lower or alluvial portions of turbid or sedimentary rivers can be leveed safely, without elevation of their beds or surface as the result of the increased quantity of water confined within the channel by levees; that derivations, or outlets, will not permanently lower the flood-line in such portions of a sedimentary river; and that a division of the waters of such a river into more than one channel results in the elevation of the beds and high-water lines of the divided channels.

The levees of Holland, whereby immense areas of land, submerged from 5 to 15 feet below mean tide in the North Sea, have been reclaimed, drained, and cultivated, are the most wonderful of any. The levees and hydraulic works of Holland have cost fully $1,500,000,000. The whole country is an intricate network of rivers, water-channels, and canals bordered by levees, and the unconquerable perseverance and industry of the Dutch people have converted a desolate marsh and lakes into the richest farms and gardens in Europe. By means of steam machinery and windmills these lands are kept dry. To prevent their being overwhelmed again, the levees are placed under a careful system of inspection. One of the most stupendous undertakings of modern times in land reclamation by means of dikes or levees is the reclaiming of a large part of the Zuyder Zee in Holland. This body of water was formed in 1219 and 1282 by terrible storms, during which 10,000 people perished. A dam is now (1894) being built for the purpose of shutting out the North Sea from a large part of this area. The amount of land to be reclaimed is about 1,000,000 acres. The estimated cost of building the main dam and the interior dikes and pumping out the water is $95,000,000. The estimated value of the lands to be reclaimed is about $300,000,000. It will add about 10 per cent. to the area of Holland.

Levees as Applied to the Mississippi River.—The leveeing of the Mississippi river was begun at New Orleans in about the year 1720, the engineer Dumont de la Tour having, after locating the future city in 1717, ordered a front levee of 5,400 feet in length by 4 feet in height and 18 feet wide at top, as necessary to protect the city. In 1717 de la Tour's observations showed that the river flood-line was 3 feet higher than the river-bank in the bend where he located the proposed city, and he allowed for a levee a foot above the high-water line at that time. Little progress was made in levee construction from 1763, when France ceded Louisiana to Spain, until 1803, when it passed to the U. S. In 1805 the settlements and levees began about 40 miles below and extended nearly 120 miles above New Orleans; and the Pointe Coupée settlement above had a front of 24 miles on the river. In 1812 Louisiana was admitted into the Federal Union, and, according to Stoddard, the levees were continuous on "both sides of the river from the lowest settlements" to Baton Rouge, and on the right bank to Pointe Coupée. In 1861 levees extended almost continuously from Cape Girardeau in Missouri, with about 40 miles of openings in the aggregate above the Arkansas river, right bank, according to Prof. Forshey, down to near the forts below New Orleans.

As has already been stated, the process of levee construction on the Mississippi began at New Orleans. The portion below the last affluent, Red river—was first leveed; therefore the enlargement of the lower river by the closure of its outlets and the confinement of all the water to the channel, took place before the leveeing of the upper river. It was well that it so happened, for had the upper river been first leveed, before the enlargement of the lower river, the flood-height below would have been much increased and the inundations made more frequent and disastrous. In about 150 years' time the levee system had been extended, from New Orleans, about 70 miles below and about 1,000 miles above. Every bend, before levees were built around it, was a continuous outlet, for the river flood-line was several feet higher than the banks in the bends. Even the banks around the points were overflowed before they were leveed, for they were formed by alluvial deposits, while inundated, and were leveed because subject to overflow. The lower river was first accommodated to the leveeing up of outlets. The building of levees is nothing else than the closing up of outlets, and the retention between the river-banks and the levees of the waters which previously passed out laterally over the banks. No evidence exists that the flood-line of the lower Mississippi river is the fraction of an inch higher now than it was before the building of the first levee in front of New Orleans,

but the area of the river's channel has been increased undoubtedly. Every outlet, except the Bayou Lafourche—the high-water capacity of which is only about 12,000 cubic feet per second, or less than the one-hundredth part of the Mississippi—has been closed below Red river without adding to the height of the river flood-line in the lower river. Had the levee system been begun above and extended downward, the first effect would have been different.

It had been claimed (by U. S. engineers Humphreys and Abbot) that the blue-clay bed of the Mississippi river "resists the action of the strong current like marble," and that therefore "the bed of the Mississippi can not yield" and accommodate itself to the increased quantity of water confined to the channel by levees. It was therefore assumed by them that no enlargement of waterway occurs, and no allowance for it was made in calculating the effect of adding to the quantity of water by extending levees. It is well known that the action of running water slowly wears away even the hardest primitive and volcanic rocks—as, for instance, through the immense cañons of the Colorado river, and elsewhere all over the world—and that it dissolves and wears away clay, no matter how firm, can not be gainsaid with truth. Whenever a "cut-off" occurs in the Mississippi river, the clay bed of the river is rapidly excavated, and the cut-off soon becomes as large in section as the river elsewhere. Every bend of the river below a cut-off is excavated rapidly and lengthened, and the deepest water is always found nearest to the bank in the bend where the blue-clay bed has just been washed out. In 1874, for instance, the maximum horizontal range or extent of caving at Morganzia, below Red river, during that year was 550 feet; at Point Manoir, opposite Port Hudson, it was 1,100 feet; at Lobdell's, above Baton Rouge, it was 460 feet; near Bayou Goula it was 350 feet; at Landry's, in Ascension parish, it was 420 feet; in two places in St. Charles parish it was 300 feet; opposite New Orleans it was 200 feet in one place and 220 feet in another, while cavings of 220 feet, 160 feet, and 80 feet occurred between New Orleans and the forts below; all of which show that the clay bed of the Mississippi does yield and wear away from year to year, and far more rapidly than is necessary for the very slow, and in fact inappreciable, yearly increase due to levee extension. A comparison of river cross-sections opposite Jackson and St. Anne Streets, New Orleans, made about 1880 by Prof. Forshey, furnishes another proof that the area of the channel-way is enlarging by yielding of the clay bed. Sections were taken opposite the above-named streets in 1850 and in 1872, and the areas of section in 1872 were 54,000 and 56,000 sq. feet, respectively, greater than in 1850. Opposite Jackson Street the depth had increased 13 feet, and opposite St. Anne Street 15 feet. Opposite the lower portion of New Orleans a like increase of section and depth was manifest.

When the river was first leveed below Red river, embankments of from 4 to 5 feet high, with a crown of 4 feet and slopes of 2 to 1, were found sufficient around the bends, where now levees from 15 to 20 feet high, with a crown of 10 feet or more and slopes of 3 to 1, are needed, and are now built and maintained. A levee 15 feet high, of the crown and slopes last named, contains nearly twelve times as much earth, for a given length, as was required for the old levees; hence the largely increased cost of levee construction and maintenance now, with the river flood-line no higher than at first notwithstanding the effects of cut-offs.

Outlets temporarily lower the flood-line of a sedimentary river, but their final effect always must be an increased elevation of the bed and surface of such a river, and the contraction of its channel-way; for the law is that the less the quantity of water flowing, as the normal maximum, the greater must be the slopes of bed and surface. Outlets, therefore, can not be depended upon for lowering the flood-line of the lower Mississippi permanently, and they are not needed, because the extension and perfection of the levee system never has caused, and will not cause, any elevation of the river flood-line.

As an example of the action of an outlet or crevasse in causing a deposit in, and a contraction of, the channel below it, the following is given: In 1874, Apr. 11, a crevasse occurred in a large levee at Bonnet Carré, left bank of the Mississippi, 40 miles above New Orleans. It became 1,370 feet wide, with an area of discharge of about 32,000 sq. feet, or nearly a sixth that of the river opposite. The range of the river here from high to low water is about 21 feet, and the level of the land a fourth of a mile back of the line of levee which had given way was 15 feet below the river flood-line. On July 15, when the river had fallen 15 feet, the water ceased to run through the crevasse outlet opening. In the latter part of September, when the river had fallen 20 feet, sections of the river were carefully taken above and below this outlet. The results, briefly summed up, were as follows: Maximum depths above crevasse, 110 and 79 feet on two sections; maximum depths of sections below crevasse, 62 and 64 feet. Firm clay bottom above, soft, silty ooze bottom, indicating recent deposit, below crevasse. Low-water widths above, 2,886 and 3,014 feet; below, 2,406 and 2,452 feet, showing a reduction in mean width below of 521 feet. Low-water areas of upper sections, 184,653 and 164,167 sq. feet; of lower sections, 96,640 and 106,150 sq. feet, a reduction of channel section, means of upper and lower, of 73,015 sq. feet. The widths on the high-water lines averaged 3,165 feet for the upper sections, and 3,365 feet below; the width below being 200 feet, the greatest at high water. The mean high-water areas of sections were 75,000 sq. feet less below than above. It was estimated that this outlet or crevasse of the full dimensions measured would discharge at high water about a tenth of the river at flood. Below this crevasse there were, in the next bend as well as opposite, extensive deposits of sand and earth, reaching several feet above the low-water line, which were known to be new. All of these measurements and observations demonstrate unmistakably that the Bonnet Carré crevasse outlet of 1874 did cause a partial filling up and contraction of the river-channel below it.

In calculating the effects of adding to the quantity of water in the Mississippi river by closing outlets, or in perfecting the levee system, or of reducing the quantity by outlets, it will not do to assume that the sectional area of channel-way will be neither enlarged nor contracted. That certain determinate and determinable relations exist between the quantity of water flowing, the mean velocity of current, the sectional area of channel-way, and the slopes of bed and surface, can not be ignored or disregarded. They must be admitted to insure a reliable result. It is evident, therefore, that levees alone can be relied upon for the permanent reclamation of the Mississippi valley lands. Cut-offs should be prevented as long as possible. Outlets are worse than useless, even if it were possible to provide a separate and leveed channel to the sea for the water so drawn off; they overflow land when reclamation is the end in view. Artificial reservoirs are impracticable, and what natural swamp-reservoirs there are above Red river only add to the river-floods, and thereby increase the danger of inundation, by feeding the rise below them. As to the diversion of tributaries, it would be useless even if practicable. By means of levees, and afterward of interior drainage, every acre of land in the Mississippi valley, exclusive of drainage channels, may be reclaimed and cultivated.

The total lengths of levees required to protect the Mississippi front may be stated as follows: In Louisiana, below Red river, 500 miles; above Red river, 280 miles. In Mississippi, 380 miles. In Arkansas, 545 miles. In Missouri, 80 miles. Total, 1,785 miles. In Louisiana, the interior rivers, bayous, and old river lakes would require about 925 miles more.

In 1879 the Government appointed a mixed commission, composed of military engineers and civil engineers and scientists, to look into the improvement of the Mississippi river between St. Louis and New Orleans. The commission, fully equipped with funds, made a thorough and nearly exhaustive survey of the lower Mississippi river, and for several years carried on a series of observations at various points to ascertain the most important factors in the great problem before them. As a result of these surveys and examinations the commission agreed in recommending the confinement and concentration of discharge by restraining and contracting works, instead of its diffusion and waste through lateral channels and outlets, as the underlying principles of any correct system of improvement of the Mississippi river. They also stated that the standard elevation for levees should be sufficient to confine floods, with the intention of producing the maximum effect of channel improvement; and in order not to disturb the regimen of the river too greatly, but gradually to lead it to form a deeper channel, it was considered best in the process of levee-building to work from below upward, as it would by this process be less likely to produce a temporary increase of flood-height in the upper parts of the river below Cairo. During the examinations of the conditions and history of the river, the outlet system was thoroughly considered and studied, and

was condemned by the commission, and also rejected by several congressional committees, as a system wholly wrong in principle where the deepening of a channel is to be sought. One of the most important principles, established clearly by abundant facts, is that the slope of the river is found to be invariably increased as the volume is diminished. This increase of slope, caused by the loss of flood-waters through outlets, must naturally increase the flood-height of the river.

The Mississippi river commission, with the funds placed at its disposal by the U. S. Government, is carrying on a systematic improvement of the lower Mississippi river, based on the principles above stated. On the upper Mississippi leveeing, or embanking, against the flood-waters of the river has been carried on to a considerable extent, with the purpose, particularly, of reclaiming extensive tracts of bottom-lands. The most notable instance is the Sny-island levee, about 50 miles in length, along the banks of the Mississippi river in Illinois, opposite the cities of Hannibal, Louisiana, and Clarksville, reclaiming from the overflow of the river about 100,000 acres of extremely fertile lands. The incidental but very important effect of this work upon the channel of the river has been one of great benefit. Through the Sny-Cartee slough or bayou, which traverses nearly the whole length of this tract parallel with the river, there was abstracted at the flood-season about one-sixteenth of the whole volume of the river. Before the construction of the levee there were several bars forming serious obstructions to navigation, the principal one lying just below the head or the inlet of this slough. Others nearly as difficult of navigation at low water of the river were located at intervals along the front of the tract. The navigation of the river was always a very difficult undertaking, but since the construction of the levee the channel has generally been deepened and navigation made comparatively safe, easy, and unobstructed.

The work on the lower Mississippi has been carried on by the Mississippi river commission and the States generally on systematic plans laid down by the commission. The alluvial lands affected cover 29,790 sq. miles—19,065,600 acres of fertile soil as rich as any in the world. Only about one-sixth of this area is under cultivation. There has been expended since the close of the civil war—1866—about $40,000,000 by the U. S., the States, and districts. The present annual amount available from these sources is about $4,100,000, of which $1,500,000 is furnished by the U. S. Government and $2,600,000 by the States and districts. There is now a continuous line of levees on the east bank of the river from Memphis to near the mouth of the river. The west bank had in 1892 one break in Louisiana and several in Arkansas, but these are now closed. The total length of crevasses on both banks in the flood of 1892 was less than 2 miles, as against 4 miles in 1890, 106 miles in 1884, and 589 miles in 1882. The flood of 1882 caused damage to the amount of $27,000,000; the total loss since 1865 is $84,000,000—that of the flood of 1892 was $7,000,000. Wherever the levees were of the standard dimensions they withstood the flood of that year. Where the breaks occurred they were generally weakened by crawfish, and were of inadequate dimensions. E. L. Corthell.

Levelers: the name of an ultra-democratic political party in England during the period of the civil war. Dissatisfied with the form of government established after the triumph of the Parliamentarians, they clamored for a republic based on the absolute equality of all citizens before the law. They were a strong element in the parliamentary army, and in 1649 broke out into actual mutiny, but the movement was suppressed with severity. Throughout the earlier years of the Commonwealth their views were advanced in scores of political pamphlets, of which the most noteworthy are those of the fanatical John Lilburne (*q. v.*), whose violent language several times caused his arrest. From these pamphlets it appears that in political matters they recognized the supreme legislative authority of Parliament, and demanded the leveling of all ranks and the impartial administration of the law; while in religious matters they claimed complete freedom of conscience. F. M. C.

Levels and Leveling: instruments and operations for determining the difference in height between two points, or for ascertaining whether a surface is level. A level surface is one parallel with the surface of still water, and any line drawn in such a surface is a line of true level. A line of apparent level is a line contained in a plane tangent to a surface of true level.

Levels.—Levels are constructed on one of three principles: 1, a line of apparent level is perpendicular to a plumb-line freely suspended; 2, a line of apparent level is tangent to the free surface of a liquid in equilibrium; and 3, a ray of light which is perpendicular to a vertical mirror is a line of apparent level.

The level formerly much used by masons and brick-layers affords an example of the method of applying the first principle. In its simplest form, this kind of level consists of a T-shaped frame, the line corresponding to the top of the T being perfectly straight and at right angles to a second line drawn through the middle of the stem of the T. A plumb-line is attached at some point of the second line; and when the instrument is held so that the plumb-line corresponds to this second line, the first line is a line of apparent level. The cross line of the T may be turned downward, as is usually the case when used by mechanics.

The ordinary Y level is an example of the instruments constructed on the second principle. It consists essentially of a telescope mounted on two vertical supports, which from their shape are called Y's. The Y's themselves are attached to a solid bar, which turns about an axis at right angles to it. This bar and its axis are connected with a supporting tripod so arranged that the axis may be made vertical by the aid of leveling-screws. Suspended from the telescope is a delicate spirit-level, which, when in adjustment, is parallel to the line of collimation of the telescope. The line of collimation of the telescope is indicated by two cross hairs placed in the common focus of the field-lens and eye-piece. When the instrument is adjusted the attached level is parallel to the line of collimation of the telescope, and both are perpendicular to the axis. To use the instrument the tripod is set firmly in the ground, and by means of the leveling-screws the level-bubble is brought in such a position that it will remain in the middle of the tube during an entire revolution around the axis. The axis of the limb is then vertical, and consequently the line of collimation of the telescope in all its positions is a line of apparent level.

Levels constructed on the third principle are called reflecting levels. One form of this class of levels consists of a plate of glass suspended from a ring, and weighted so that the plane of the glass shall always be vertical. One half of the glass is silvered and the other half unsilvered, the line of division between the two portions being vertical. A line is ruled across the middle of the plate perpendicular to the one last mentioned, and is consequently horizontal. To use the instrument it is held by the ring, and raised or lowered until the observer sees the image of his eye reflected from the ruled horizontal line on the silvered portion; the plane through the eye in that position and the line on the unsilvered portion is a plane of apparent level. Instruments of this kind have been used for making reconnoissances, and also for contouring in topographical surveys, but they are not very accurate. See Hypsometry.

Leveling-rods are graduated rods of wood having the 0 of the scale at the bottom of the rod. One of the best consists of a staff of hard wood, capped with metal, usually about 12 feet in length. A sliding target can be moved up and down upon it. This rod is graduated to hundredths of a foot, and on one edge of the rectangular opening in the target is a vernier, by means of which the rod may be read to thousandths of a foot. A second form of leveling-rod is similar to that just described, except that the rod is constructed in two sections, one of which slides in a groove of the other. The arrangement of the graduation is modified to conform to the peculiar character of the sliding-joint. A third form of rod consists of a simple rod without a target, the divisions and numbers being so distinct that the readings may be read by the observer at the level.

The *difference of level* between two neighboring points may be determined by means of the Y level and a leveling-rod as follows: Let the level be set up at some convenient place, and so arranged as to indicate a surface of apparent level; place a leveling-rod at the first point and note the height at which it is intersected by the level surface; in like manner place a rod at the second point and note the height at which it is cut by the level surface; subtract the first of these heights from the second, and the remainder will be the difference of level of the two points. If the remainder is +, the second point is higher than the first; if the remainder is —, the second point is lower than the first. In the same manner we may determine the difference of level between the second point and a third point, between the third point and a fourth, and so on, as far as may be de-

sirable. The total difference of level between the first point and the last is then equal to the algebraic sum of all the partial differences of level.

Trigonometric leveling is the operation of determining differences of level by the help of vertical angles. For this purpose the horizontal distance between the points must be known, and this is usually found by triangulation. Then the angle of elevation of one point being observed at the other, the difference in height can be computed by the rules of trigonometry. This method is liable to error from the effect of the refraction of the atmosphere, which may often increase the true angle of elevation, and for the best work simultaneous angles are observed at both points, or corrections are applied to eliminate the effect of the refraction.

Other methods of leveling are by the barometer, and by noting the temperatures at which water boils at the two stations. These are far less accurate than the method of trigonometrical leveling, and are only used for rough reconnoissance. The highest precision in leveling is attained by the spirit-level instrument and leveling-rod, of which special forms are made for accurate work. The deviation in results of two lines of levels conducted in the same manner is found to increase as the square root of the distance. The limit of discrepancy allowable between two such lines varies with the character of the work. In the precise levels of the Mississippi river survey it was taken as 0·021 feet multiplied by the square root of the distance in miles; thus two duplicate lines of levels between points a mile apart were not allowed to differ more than 0·021 feet, between points 4 miles apart not more than 0·042 feet, and between points 100 miles apart not more than 0·21 feet. See the articles BAROMETER, COAST AND GEODETIC SURVEY, SURVEYING, and TOPOGRAPHY.

Revised by MANSFIELD MERRIMAN.

Lévêque, lā′vek′, JEAN CHARLES: professor of philosophy; b. at Bordeaux, France, Aug. 7, 1818; made extensive studies of the Greek and Alexandrian philosophers; resided in 1847–48 at Athens. After his return to France held professorships at Toulouse, Besançon, and Nancy; became Professor in Philosophy at the Collège de France in 1856; in 1865 member, and in 1873 vice-president, of the Academy of Moral and Political Sciences. He received the decoration of the Legion of Honor in 1860 and was made an officer in 1885. Besides articles in the *Revue des Deux Mondes*, remarkable for erudition, he published in 1860 *La Science du Beau* (2 vols., 2d ed. 1871), a work which received prizes from several French academies. His *Harmonies providentielles* (1872) passed to a third edition in 1877.

Lever: See MECHANICAL POWERS.

Le′ver, CHARLES JAMES: novelist; b. in Dublin, Ireland, Aug. 31, 1806; took the degree of M. B. at Dublin University 1831, and of M. D. at Göttingen; was medical superintendent in Londonderry during the cholera season of 1832; physician to the legation at Brussels; editor of *The Dublin University Magazine* 1842–45; vice-consul at Spezia 1858–67, and afterward consul at Trieste; attained great success as a writer of humorous novels, chiefly descriptive of Irish life and character, among which are *Harry Lorrequer* (1840); *Charles O'Malley* (1841); *Arthur O'Leary* (1844); *The O'Donoghue* (1845); *Horace Templeton* (1849); *Con Cregan* (1857); *The Bramleighs of Bishop's Folly* (1868); *Lord Kilgobbin* (1872), and many others. D. at Trieste, June 1, 1872. Revised by H. A. BEERS.

Leverrier, le-vā′ri-ā′, URBAIN JEAN JOSEPH: astronomer; b. at St.-Lo, France, Mar. 11, 1811; studied at the École Polytechnique, Paris; afterward turned his attention to chemistry. It was not until 1838 or 1839 that he commenced the investigations in celestial mechanics that made him famous. His first researches were on the secular variations of the planetary orbits, and in 1843 he published an extended work on the orbit of Mercury. In 1845–46 he made his famous discovery that the observed deviations in the motion of Uranus could be explained by the attraction of an unknown planet, and as the result of his calculations he was able to direct the attention of astronomers to the latter's place in the heavens, where, a few days afterward, the planet NEPTUNE (*q. v.*) was actually discovered by Galle at Berlin in Sept., 1846. This honor he shares with the English astronomer Adams. (See ADAMS, JOHN COUCH.) In 1854 he succeeded Arago as director of the observatory of Paris, an office which, except for an interval of three years (1870–73), he held till his death; became a senator, an Academician, and a grand officer of the Legion of Honor. As director of the observatory he investigated the orbits of the eight major planets in a series of researches, forming the greater part of volumes i. to xiv. of the *Annales de l'observatoire de Paris—Mémoires*. D. in Paris, Sept. 23, 1877.

Revised by S. NEWCOMB.

Le Vert, le-vert′, OCTAVIA (*Walton*): author; b. at Bellevue, near Augusta, Ga., about 1810; granddaughter of Col. George Walton, a signer of the Declaration of Independence. She married in 1836 Dr. Henry S. Le Vert, a physician of Mobile, and passed several winters in Washington, where she enjoyed the friendship of Clay, Webster, Calhoun, and Washington Irving, and acquired distinction for the precision of the reports she wrote of the famous congressional debates on the removal of the deposits from the U. S. bank. In 1853–54, and again in 1855, Mrs. Le Vert traveled in Europe, and recorded her observations in the interesting volumes called *Souvenirs of Travel* (2 vols., 1857). She rendered good service in behalf of the Mt. Vernon Association, and was noted for offices of charity during the civil war. She also prepared for publication *Souvenirs of Distinguished People* and *Souvenirs of the War*, and was noted as a linguist and as a leader of society. D. Mar. 13, 1877.

Le′vi [Heb., wreathed]: in biblical history the third son of Jacob and Leah; b. in Padan-aram about B. C. 1917, and the ancestor of one of the twelve tribes of Israel, called by his name. (See LEVITES.) Of his personal history the only trait which has been recorded is the massacre which, with his brother Simeon, he perpetrated upon the inhabitants of Shechem to avenge the wrong done his sister Dinah (Gen. xxxiv.). Levi went into Egypt with his father and brothers after the elevation of Joseph, and died there. Moses and Aaron were his descendants, apparently in the fourth generation (b. about 1749 B. C., Ussher).

Levi, HERMANN: See the Appendix.

Levi, lā′vĕĕ, LEONE: economist; b. at Ancona, Italy, of Jewish parents, July 6, 1821; removed in 1844 to Liverpool; was naturalized in 1847; was one of the founders of the Liverpool chamber of commerce 1849; became in 1852 Professor of Commercial Law, etc., in University College, London; became a barrister in 1859; received the doctorate from Tübingen 1861. He did much for the reform of commercial law and practice, the utilization of statistics, etc. He was the author of *Commercial Law* (4 vols., 1850–52); *Mercantile Law* (1854); *On Taxation* (1860); *International Commercial Law* (1864), and other works, besides many valuable papers on statistical and commercial science. D. in London, May 9, 1888.

Levi′athan [from Heb. *liwyāthān*, wreathed monster, liter., a wreathed something]: a name which in the Old Testament usually designates the crocodile, but Talmudical writers apply it to the whale, the fabulous dragon, and other creatures of monstrous size. The name is also used figuratively for gigantic animals as well as other objects.

Levigation [from Lat. *leviga′tio*, a smoothing, deriv. of *leviga′re*, make smooth, deriv. of *lēvis*, smooth]: a special manipulation of the laboratory, devised for the purpose of converting substances to a smooth, uniform powder. A flat surface, called the slab, is used to place the substance upon, composed of stone, glass, or metal; and a muller, having a flat surface below, is propelled round and round with an eccentric motion over the mass. A liquid is always added, usually oil or water, to assist the operation. The process of levigation passed, probably hundreds of years ago, from the laboratory into the arts, and paints, printing-inks, and often drugs, are communicated by a process of levigation, on the manufacturing scale, in so-called eccentric mills. Porphyrization is another name formerly applied, from slabs of porphyry being employed. A spatula is an essential adjunct in the small laboratory operation to collect together readily and heap up the mass when spread by the muller.

Lev′irate Marriage [*levirate* is from Lat. *le′vir*, a husband's brother]: the marriage of a widow by the brother of the deceased husband. This custom (common among the ancient Hebrews) was perpetuated by the Mosaic law (Deut. xxv. 5–10). It is, however, practically obsolete among the Jews. The canon law expressly forbids such marriage, and in Great Britain it is still unlawful. In the U. S. it is generally permitted to marry the brother of a deceased husband. The true levirate marriage was compulsory, or at least obligatory (except on certain conditions), but only in case the

deceased husband left no male issue. The first-born son of the new marriage succeeded to the deceased brother's name, property, and privileges. In Abyssinia and parts of Asia the levirate law is still in force. It seems to have prevailed in ancient Italy also. Revised by S. M. JACKSON.

Levis, lā′vee′, or lev′is (formerly POINT LEVI): an important suburb of Quebec, Canada, in Levis County; opposite the city, on the south bank of the St. Lawrence (here a mile wide), and on the Grand Trunk Railway (see map of Quebec, ref. 4–D). It has a larger trade than any town in Canada except Quebec and Montreal. It is the seat of a convent, and has a board of trade. The river is crossed by a ferry. Pop. (1891) 7,301.

Le′vite: one of the tribe of Levi, a descendant of Levi, one of the sons of Jacob, but in a more limited sense one of those members of that tribe who did not belong to the priestly families of the ancient Hebrews. The Levites constituted a kind of inferior priesthood. They had no inheritance except certain cities on either side of the river Jordan; in which, however, they were not compelled to reside. There are at the present day some Jewish families who claim a lineage, more or less pure, from the Levitical stock. Revised by S. M. JACKSON.

Levit′icus [= Lat. = Gr. Λευϊτικός, liter., pertaining to Levites, deriv. of Λευΐτης, Levite. See LEVITE; so named in the Vulgate because it is largely occupied with directions for the Levitical service]: the third book of the Pentateuch and of the Old Testament. It contains the Mosaic law of sacrifices, the laws regarding ceremonial uncleanness, the laws with regard to intercourse between Israelites and foreigners, together with brief historical accounts, admonitions, and the like. Its direct Mosaic origin has usually been taken for granted, but several recent German, Dutch, and English commentators refer it to the period of Ezra. See HEXATEUCH.

Levuka: a town of the Fiji islands; on the northeast end of the small island of Ovalao; lat. 17° 41′ S., lon. 178° 51′ E. It was the capital of the archipelago, but lost this title in 1881 when the capital was transferred to Suva on Viti Leva, though its climate is much more healthful than that of Suva and it is more centrally placed. It is now in decadence. M. W. H.

Lev′ulose: See SUGAR.

Levy, lā′vee′, MAURICE: civil engineer, member of the Institute; b. at Ribeauville, France, Feb. 28, 1838; was educated at the Polytechnic School and at the École de Ponts et Chaussées, where he graduated in 1861; became engineer-in-chief in 1880. He was at first attached to the works of Paris, afterward became director of the navigation of the Marne, member of the commission on the general levels of France, and Professor of Applied Mechanics at the École Centrale and the Collège de France, and in 1885 of Méeanique Celeste. In 1883 he was elected a member of the Academy in place of Bresse. He is an officer of the Legion of Honor. He has published many memoirs in the *Comptes Rendus* on hydraulics, hydrodynamics, elasticity, heat, etc. His most important work is *La Statique Graphique et ses applications aux constructions*. Levy invented a system of overhead cable towage for canals. This method, although original with him, had been proposed in a crude form in 1870 by a boatman on the Chesapeake and Ohio Canal (U. S.). The canal company was without means to apply the somewhat primitive invention, and the matter was forgotten. W. R. HUTTON.

Lewald, lā′vaălt, FANNY: novelist; b. at Königsberg, Prussia, Mar. 24, 1811, of Jewish parents, but became in her childhood a convert to Christianity. After several years of travel she began to write for the public about 1840, and from that time lived chiefly in Berlin. In 1855 she married Adolf Stahr, the literary critic. She was a leader in the movement for the advancement of women, and favored the opening to them of new fields of employment. D. in Dresden, Aug. 5, 1889. Among her writings are *Diogena* (1847), in which she burlesqued the sentimentalism of the Countess von Hahn-Hahn's books; *Wandlungen* (1853); *Die Kammerjungfer* (1856); *Neue Romane* (1858); *Von Geschlecht zu Geschlecht* (1864), which is regarded by some as her best work; *Benedikt* (1874); *Stella* (1883), translated into English, and many others. She published a sketch of the earlier years of her life in 1861, under the title of *Meine Lebengeschichte*. F. M. COLBY.

Lew-Chew: an archipelago belonging to Japan. See LOO-CHOO.

Lew′es: town; in the county of Sussex, England; picturesquely situated on the Ouse, on a declivity of the South Downs, 50 miles S. of London (see map of England, ref. 13–J) It has a school of science and art, and a free library, and carries on a considerable trade in grain, malt, coal, and lime. Here was arranged the submission of Henry III. to Simon of Montfort, May 14, 1264. Pop. (1891) 10,997.

Lewes: town; Sussex co., Del. (for location of county, see map of Delaware, ref. 6–O); on Delaware Bay, and the Phila., Wil. and Balto. Railroad; 2 miles S. W. of Cape Henlopen, 12 miles S. W. of Cape May, N. J. It has a notable artificial harbor of refuge formed by a breakwater constructed by the U. S. Government on the plans of the breakwaters at Cherbourg, France, and Plymouth, England. The work was begun in 1829 and completed in 1869, and cost $2,123,000. About 892,528 tons of stone were used in construction. The town is very old, is a stopping-place of the Old Dominion line of steamships, and has a large trade in peaches and early vegetables. Pop. (1900) 2,259.

Lewes, GEORGE HENRY: b. in London, England, Apr. 18, 1817; was in youth a clerk in a commercial house; began the study of medicine, but abandoned it for that of philosophy and psychology, to which he devoted two years in Germany; returned to London in 1840; devoted himself to literature, and speedily became known as a deep thinker and a writer of uncommon attainments, especially by his articles in the magazines and quarterly reviews. His earliest important work was the *Biographical History of Philosophy from Thales to Comte*, published in 1847, which treated philosophy as an ever-renewed attempt to solve problems that are by their nature beyond the reach of human faculties. This work became popular, and has been enlarged from time to time as new editions were called for. From 1849 to 1854 Lewes was literary editor of *The Leader*, wrote a compendium of *Comte's Philosophy of the Sciences* (1853), *Life* of Robespierre (1850), *Life* of Goethe (1855), *Seaside Studies* (1858), *Physiology of Common Life* (1859), *Studies in Animal Life* (1862), and *Aristotle, a Chapter from the History of Science* (1864), besides one or two novels and dramas of minor importance. His *History of Philosophy* and his *Life* of Goethe have been more extensively read than any other books on those topics. Through the former he has exercised a wide influence on the thinking of scientific men, turning them off from earnest study of the systems of speculative philosophy as fruitless labor. From 1854 he was extensively engaged in physiological and anatomical researches, some of the results of which were embodied in papers communicated to the British Association for the Advancement of Science—*On the Spinal Cord as a Center of Sensation and Volition* (1858) and *On the Nervous System* (1859). He was the first editor of *The Fortnightly Review*, but in Dec., 1866, was compelled by ill-health to retire. His most ambitious work, that in which he purposed to embody his whole system of philosophy, bears the title *Problems of Life and Mind*. Vol. i., *The Foundation of a Creed*, was published in 1873; vol. ii. in 1875. D. Nov. 30, 1878. Revised by W. T. HARRIS.

Lew′in, THOMAS, F. S. A.: author; b. at Ifield, Sussex, England, Apr. 19, 1805; educated at the Merchant Taylors' School, London, and at Trinity College, Oxford, taking high honors in classics; was called to the bar in 1833, and in 1852 became conveyancing counsel to the court of chancery. He wrote a treatise on *The Law of Trusts and Trustees* (London, 1842; 9th ed. 1891); *The Life and Epistles of St. Paul* (1851); an *Essay on the Chronology of the New Testament* (1854); *Jerusalem, a Sketch of the City and Temple from the Earliest Times to the Siege by Titus* (1861); *Cæsar's Invasion of Britain* (1862); *Siege of Jerusalem by Titus* (1863); and *Fasti Sacri, or a Key to the Chronology of the New Testament* (1865). For over twenty years after the publication of his early work on St. Paul, Mr. Lewin was engaged in the study of the apostle's missionary journeys, visiting nearly every place named in the New Testament in connection with Paul, collecting the geographical data of antiquity, and illustrating his materials by accurate modern plans of the localities in question. As the result, a third and revised edition of his work on St. Paul appeared in 1874 in two large volumes, splendidly illustrated. Mr. Lewin's views upon the sacred localities in Jerusalem have given rise to much controversy in connection with the rival theories of Robinson, Williams, and Fergusson. D. in London, Jan. 5, 1877. Revised by S. M. JACKSON.

Lewis, or **Lewisson** [said to have been invented by Louis XIV., though known long before his time]: a clamp by which to raise blocks of stone. Three iron keys, suspended from a cross-bolt, are let into a fish-tail-shaped hole in the stone. The three keys together fill this hole, and the stone can be lifted by means of the cross-bolt. When the stone is in place the bolt is withdrawn, the middle key, which is straight, is slipped out, and the lateral wedge-shaped keys are then readily removed. There is also a cloth-shearing apparatus called the lewis.

Lewis, Abram Herbert: See the Appendix.

Lewis, Gen. Andrew: soldier; b. in Ulster, Ireland, about 1730; was taken to Virginia in 1732 by his father, who settled at Bellefonte, Augusta co., and was the first white resident of that county. Andrew was a volunteer in the campaign to the Ohio in 1754; was a major in Braddock's expedition, and according to some authorities was present at the great defeat on the Monongahela; commanded the Sandy Creek expedition in 1756; was taken prisoner by the French in 1758 near Fort Duquesne, and taken to Montreal; was the Virginian commissioner in the treaty made with the Iroquois at Fort Stanwix in 1768; was made brigadier-general in 1774, and commanded the Virginia troops in the victory over the Shawnee confederacy at Point Pleasant at the mouth of the Great Kanawha river, Oct. 10, 1774, probably the severest engagement with the Indians in American annals up to that time. He was for several years a member of the House of Burgesses, took part in the convention of 1775, was appointed a brigadier-general by Congress at Washington's request in 1776, and was engaged in military operations against Lord Dunmore. He resigned on account of ill-health in 1777, and died in Bedford co., Va., in 1780. Gen. Lewis was distinguished for athletic powers and an imposing presence, and was highly esteemed by Washington. His statue occupies one of the pedestals of the Washington monument at Richmond.

Lewis, Dio, M. D.: physician and author: b. at Auburn, N. Y., Mar. 3, 1823; studied at the Harvard Medical School in Boston, and practiced for a time at Port Byron, N. Y., and at Buffalo. In 1863 he founded in Boston an institution for training teachers, and established in the following year at Lexington, Mass., an academy for young ladies. He published *The New Gymnastics* (1862); *Weak Lungs, and How to Make them Strong* (1863); *Talks about People's Stomachs* (1870); *Our Girls* (1871); and *Chats with Young Women* (1874). He removed to Yonkers, N. Y., in 1882; died there May 21, 1886. Revised by S. T. Armstrong.

Lewis, Francis: one of the signers of the Declaration of Independence; b. at Llandaff, Wales, in Mar., 1713; was educated at Westminster; became a merchant of New York, and in the French and Indian war was captured at Oswego and sent to France; received a grant of 5,000 acres from the British; was 1775–79 a member of Congress, and was afterward exceedingly useful to the country, especially as an importer of military stores. His wife and himself were long imprisoned by the enemy, and the greater part of his estates was destroyed. D. in New York in Dec., 1803.

Lewis, Sir George Cornewall: statesman and author; b. in Radnorshire, Wales, Oct. 21, 1806; graduated at Oxford in 1828; was called to the bar in 1831 at the Middle Temple; entered Parliament in 1847; was an Under Secretary of State 1848; Secretary of the Treasury 1850–52; Chancellor of the Exchequor 1855–58; Secretary of State for the Home Department 1859; for War 1861; and was one of the translators of Müller's *History and Antiquities of the Doric Race* (1830); author of *Origin of Romance Languages* (1835); *Influence of Authority in Matters of Opinion* (1849); *Methods of Observation and Reasoning in Politics* (1852); *Inquiry into the Credibility of Early Roman History* (1855); editor of the *Edinburgh Review* (1854–55); wrote *Astronomy of the Ancients* (1861); *A Dialogue on the Best Form of Government* (1863). He also translated a part of Müller's *History of the Literature of Ancient Greece.* D. in Herefordshire, Apr. 13, 1863.

Lewis, John Frederick, R. A.: painter; b. in London, England, July 14, 1805; first attracted attention by a series of studies from wild animals which were engraved by himself; was next engaged in making sketches of manners and costumes in Spain, of which lithographic copies were published in 1833–34 in 2 vols.; resided on the Continent, chiefly in Italy, from 1838 to 1851, making long visits to Greece, Turkey, and Egypt; exhibited in 1853 a series of sixty-four copies in water-colors of the most famous pictures of the Venetian and Spanish schools, which was purchased by the Scottish Academy; was president of the Society of Water-colors from 1855 to 1858; elected associate in 1859, and member of the Royal Academy in 1865. D. in Aug., 1876.

Lewis, John Travers, D. D., LL. D: archbishop; b. in Garrygloyne Castle, Cork, Ireland, Jan. 20, 1825; was educated at Trinity College, Dublin; was gold medallist in 1846; was ordained a deacon of the Church of England in 1847. He was curate of Newton Butler 1847–49; missionary at Hawksbury, Ontario, 1849–54; rector of Brockville from 1854 to 1861, when he was elected the first Bishop of Ontario. He became Metropolitan Bishop of Canada Jan. 25, 1893, and Archbishop of Ontario, Sept. 19, 1893, being the first to hold that rank in the Church of England in Canada. Archbishop Lewis was the author and promoter of the Lambeth Conference of all bishops of the Church of England at home and abroad with those of the Protestant Episcopal Church of the U. S., and was mainly instrumental in inducing the British Association for the Advancement of Science to meet in Montreal in 1884. As an expression of appreciation of his important services in the cause of literature and science, the archbishop was presented with the bronze medal of Confederation in 1885. He is the author of many published sermons, lectures, and articles.

Neil Macdonald.

Lewis, Meriwether: explorer; b. near Charlottesville, Va., Aug. 18, 1774; the son of W. F. Lewis, a wealthy citizen; volunteered in the Whisky Insurrection of 1794; became an ensign in the regular army 1795, and captain in 1800. Soon afterward he was Jefferson's private secretary, and in 1803–06 he, with Capt. William Clarke, was sent upon a famous expedition to the Pacific Ocean. In 1807 Lewis was made Governor of Louisiana Territory. He was subject to depression of spirits, and took his own life near Nashville, Tenn., Oct. 8, 1809. His memoir was written by Mr. Jefferson, and published with Biddle and Allen's *Narrative of the Lewis and Clarke Expedition* (1814).

Lewis, Morgan: jurist and soldier; b. in New York city, Oct. 16, 1754, son of Francis Lewis, signer of the Declaration of Independence; graduated at Princeton in 1773; studied law in the office of John Jay; joined Washington's army at Cambridge in June, 1775; was made captain of a rifle company in August, major of Second New York Regiment in November, colonel and chief of staff to Gen. Gates in June, 1776; was at the battle of Saratoga, and was distinguished in Gen. Clinton's campaign against Sir John Johnson in the Mohawk valley, especially at the battle of Stone Arabia. After the war he was admitted to the bar in Dutchess County, became a judge in common pleas, was elected attorney-general in 1791, made judge of the Supreme Court of the State in 1792, and chief justice in 1801. He was Governor of New York 1805–06; member of the Legislature 1808–11; quartermaster-general, with the rank of brigadier-general, in 1812; promoted to major-general in 1813; was engaged in the operations on the Niagara frontier in Apr., 1813, and was in command of the defenses of New York city in 1814. Subsequently he devoted himself to literature and agrieulture; delivered an address before the authorities of New York city on the centenary anniversary of Washington's birth, Feb. 22, 1832; was president of the New York Historical Society in 1835. D. in New York, Apr. 7, 1844.

Lewis, William Bevan, L. S. A.: physician and author; b. at Cardigan, South Wales, May 21, 1847. He was educated at Guy's Hospital, London, and is a licentiate of the Royal College of Physicians of London. He has been connected with the West Riding Asylum at Wakefield, of which he is medical superintendent and director, in various capacities since 1871; is lecturer on Mental Diseases at the Yorkshire College and Leeds School of Medicine, and examiner in Mental Diseases to the Victoria University. His principal works are: *Calorimetric Observations on the Effect of Alkaloids on the Generation of Animal Heat* (West Riding Asylum Reports); *Student's Manual of Examination of the Human Brain* (1882); *A Text-book of Mental Diseases* (1889); *Histology of the Great Sciatic Nerve in General Paralysis* (W. R. A. Reports, vol. v.); *Relationships of Nerve-cells of Cortex to Lymphatic System of Brain* (*Proceedings* Royal Society, 1877); *Cortical Lamination of Motor Area of Brain* (*Proceedings* Royal Society, 1878); *Comparative Structure of the Cortex Cerebri* (*Transactions* Royal Society, 1879); *Com-*

parative Structure of Brain in Rodents (*Transactions* Royal Society, 1882); *Reaction Time in Insanity and Psychometric Measurements* (Tuke's *Dictionary of Psych. Medicine*, 1893); *A New Reaction Time Instrument* (*Journal of Mental Science*, 1893); *A New Freezing Microtome for Sections of Brain and Spinal Cord* (*Journal of Anatomy and Physiology*, vol. xi.); *Physiological Action of Alcohol* (*Journal of Mental Science*, 1880); *Thermal Changes in Epilepsy and the Epileptic Status* (*Medical Times and Gazette*, 1876); *The Sphygmograph in Insanity* (*Journal of Mental Science*); *The Origins of Crime* (*The Fortnightly Review*, Sept., 1893). J. MARK BALDWIN.

Lewisburg: borough; capital of Union co., Pa. (for location of county, see map of Pennsylvania, ref. 4–F); on the Susquehanna river, and the Penn. and the Phila. and Reading railways; 68 miles N. of Harrisburg. It contains 7 churches, 3 public schools, 2 banks, 3 hotels, gas and electric, water, and fire services, and 3 newspapers; and manufactures woolen goods, hosiery, nails, furniture, boats, bedsprings, foundry products, flour, and carriages. It is the seat of Bucknell University (non-sectarian, organized 1846), for both sexes, which in 1900 had 32 professors and instructors, 426 students, 20 scholarships of $1,000 each, scientific apparatus valued at $75,000, grounds and buildings valued at $350,000, productive funds aggregating $400,000, volumes in library 20,000, a college for young men and young women, an academy for boys, an institute for young women, music and art schools, gymnasium, natural history museum, chemical and physical laboratories, and an observatory with a Clark equatorial telescope. Pop. (1880) 3,080; (1890) 3,248; (1900) 3,457. EDITOR OF "CHRONICLE."

Lewisburg: town (incorporated in 1782); capital of Greenbrier co., W. Va. (for location of county, see map of West Virginia, ref. 10–H); 4 miles N. of the Chesapeake and Ohio Railway, 9 miles N. W. of Greenbrier White Sulphur Springs. It is on the site of the fort where the army of Gen. Lewis was stationed previous to its battle with the Indians at Point Pleasant in 1774, and has a stone church erected in 1795. It contains five churches, boys' school, public high school, public school for colored youth, and a weekly newspaper. The industries are agriculture, stock-raising, and manufacturing. Pop. (1880) 985; (1890) 1,016; (1900) 872. EDITOR OF "GREENBRIER INDEPENDENT."

Lewis'ia: a plant of the *Portulaca* family, named from its discoverer, Capt. Meriwether Lewis, who found it in the mountains about the sources of the Columbia river. It grows as far S. as Arizona. The root is called *racine amère* by the Canadian *voyageurs*, and is used for food by the Oregon Indians, who call it *spatlum*. It yields much starch.

Lewiston: city (laid out 1770, incorporated 1795, made a city 1863); Androscoggin co., Me. (for location of county, see map of Maine, ref. 9–B); on the Androscoggin river, and the Grand Trunk and the Me. Central railways; 33½ miles N. of Portland. It derives exceptional power for manufacturing from the river by means of a dam and a distributing canal constructed at a cost of $1,000,000. The census returns of 1890 showed that 210 manufacturing establishments (representing 50 industries) reported. These had a combined capital of $8,316,781, employed 7,348 persons, paid $2,681,442 for wages and $4,779,137 for materials, and had products valued at $9,062,190. The city is the seat of Bates College (Free Baptist, organized as a seminary 1854, changed to a college 1863) for both sexes, which in 1900 had 24 professors and instructors, 307 students, 20,000 volumes in library, 6 buildings, 50-acre campus, and $350,000 in endowments. There are 2 national banks with combined capital of $600,000, 2 savings-banks with surplus of $240,000, public library, large public hall, public park containing a soldiers' monument, and 7 newspapers. Pop. (1880) 19,083; (1890) 21,701; (1900) 23,761. EDITOR OF "EVENING JOURNAL."

Lewistown: town; capital of Fulton co., Ill. (for location of county, see map of Illinois, ref. 5–C); on the Chi. Burl. and Or. and the Fulton Co. Nar. Gauge railways; 50 miles S. W. of Peoria, 60 miles N. W. of Springfield. It contains flour and saw mills, can-making, carriage and wagon, duplex-scales, and veneer factories, 6 churches, and 3 weekly newspapers. Pop. (1880) 1,771; (1890) 2,166; (1900) 2,504. EDITOR OF "FULTON DEMOCRAT."

Lewistown: borough; capital of Mifflin co., Pa. (for location of county, see map of Pennsylvania, ref. 5–E); on the Juniata river, and the Pennsylvania Railroad; 61 miles W. of Harrisburg. It is in an agricultural region, has a number of important manufactories, and does a large business in shipping grain, iron, and coal. The beauty of the surrounding mountain scenery has made the borough a popular summer resort. There are an academy, a library founded in 1870, and three weekly newspapers. Pop. (1880) 3,222; (1890) 3,273; (1900) 4,451.

Lewis-with-Harris: the largest and northernmost of the Outer Hebrides, separated from the mainland by the Minch Channel; area, 770 sq. miles. The coasts, especially of the southern part, Harris, are wild and rugged; in the interior tracts of swamp and peat-moor occur. Barley and potatoes are cultivated, but fishing is the principal occupation. The inhabitants speak the Gaelic language, though in the northern part there is a colony of purely Scandinavian descent. Stornoway, situated on the eastern coast, is the only town on the island. Remains of Druidical structures are very frequent, and remnants of forests which formerly covered the surface are met with. Pop. (1881) 30,301.

Lex Domicilii: See INTERNATIONAL PRIVATE LAW.

Lex Fori [Lat., the law of the forum]: the law of the place or state where a remedy is sought or an action instituted. See INTERNATIONAL PRIVATE LAW.

Lexicography: the art of making a lexicon, or DICTIONARY (*q. v.*). The words *lexicon* and *dictionary* are synonymous, the first being derived from Greek λεξικόν, an adjective with which βιβλίον, book, is understood, and the second from Low Latin *dictionarium*. Besides these the terms *vocabulary*, *glossary*, *index*, *thesaurus*, *cornucopia*, are sometimes similarly used, and differ mainly in degree from the terms above. The first three are usually limited to the words in a single volume or author, sometimes to the more difficult words only. *Thesaurus* and *cornucopia* belong to the class of descriptive titles sometimes used, as do also *bibliotheca* and *catholicon*. An early Latin-English dictionary was called *Promptorium*, cellar, storehouse, and an English dictionary of Elizabethan times was named the *New World of Words*. For a polyglot dictionary the French use the term *calepin*, from the name of an Italian, Calepino, who prepared an early polyglot. Other descriptive titles for English dictionaries in early times are *abecedarium*, *alvearie*, beehive, *glossographia*, *gazophylacium*, treasury, all of which have gone out of use. Nearly allied to the dictionary is the concordance, an alphabetical list of words with reference to the places in which they are used by a single author. More remote is the cyclopædia, an alphabetical list of subjects explained and illustrated.

The lexicon, or dictionary, doubtless originated in the marginal gloss explaining some difficult passage. These were no doubt first added to works in a foreign language or to those composed at a much earlier date. As such works became less known, explanatory references became more necessary and the marginal glosses more numerous. One intermediate step between the gloss and the dictionary is exemplified by the interlinear version of early times, each word of one text being explained by another word written immediately below. Finally the explanatory glosses were gathered from various texts and arranged more or less systematically, so that they could be used with all books in the language glossed. The elaborate dictionary of modern times has thus been gradually evolved out of the marginal explanation of a single word.

In the history of culture the dictionary ordinarily belongs to the later periods of a nation's development; for, as foreign languages were not usually studied in early times, the early gloss would be limited to periods in which an older literature and an older culture were studied, or, in other words, to the critical rather than to the creative age. Exceptionally, however, as in England, the adoption of Latin Christianity led first to the study of a foreign language and the making of the bilingual gloss. As we should expect under normal conditions, the lexicographer flourished especially at such times as the founding of the schools of Alexandria, at the revival of learning, and during the eighteenth and nineteenth centuries, when antiquarian and philological research has revived the study of older literatures. With the growth of international relations, as between Rome and Greece, with the Middle Age reverence for the classics, and with the development of intercourse among modern nations, the bilingual dictionary became a necessity, as it had not been in the earlier periods of culture. Later, the systematic study of origins in language led to the preparation of the etymological dictionary; the establishment of meters based on rhyme led to the

rhyming dictionary, arranging words according to final syllables; and the growth of the discriminating sense in relation to language made the dictionary of synonyms a necessity.

We have no knowledge of the beginning of early lexicography except as we have a record of certain early dictionaries. The earliest of which we have an account is one found in a palace at Nineveh, written in cuneiform letters on a series of clay tablets. The king's seal imprinted upon these shows they were made in the time of Asshurbanipal, who reigned in the seventh century before Christ. The earliest lexicography of which we have considerable knowledge is that which relates to the classic tongues, especially Greek. Greek lexicography began at Alexandria. This great center of early learning was founded just as Greece was losing her intellectual supremacy while gaining political supremacy under Alexander. Ptolemy Sotor, who received Egypt in the dismemberment of the Macedonian empire, drew to Alexandria Greek scholars in literature and philosophy, and gave them every opportunity to prosecute their studies. At the suggestion of his friend Demetrius Phalerius, it is said, he founded the great library and built the Museum, or Academy of Science. Alexandrian scholarship flourished from the fourth century B. C. to the seventh century of our era, or from the founding of the Macedonian kingdom to the rise of the Mohammedan power. It tended especially to research, was critical rather than creative, and it originated the sciences of grammar, prosody, lexicography, mythology, and archæology.

The study of Greek learning at Alexandria early produced glossaries and dictionaries. According to Athæneus, Zenodotus, the first librarian of the famous Alexandrian library and a noted Homer scholar, wrote a glossary to Homer and a dictionary of foreign phrases. His successor as librarian, Aristophanes of Byzantium, wrote several works, the titles of which seem to indicate that they were dictionaries of more or less limited scope. One of his pupils, Artemidorus, wrote about 240 B. C. a dictionary of terms used in cookery. Among others, Nicander (second century B. C.) wrote a glossary in three books; Parthenius, a pupil of Dionysius (first century B. C.), wrote on choice words used by historians; and Didymus in the same century wrote dictionaries of the tragic and comic poets, of ambiguous words and corrupt expressions. The works of all these and of many others have been lost, but the record of them shows how early and how extensively the making of dictionaries was carried on. The earliest Greek lexicon extant is one by Apollonius, who lived in Alexandria in the time of Augustus. He prepared a Homeric lexicon which is so valuable that it has been printed in France, Holland, and Germany since 1773. Other Alexandrian lexicographers are Ælius Mœris, the Atticist, who wrote an Attic lexicon in the second century A. D.; Harpocration (fourth century), whose lexicon of the ten Attic orators was printed in 1503, and in the nineteenth century at Oxford; Hesychius, who lived in the same century, wrote a dictionary based on an earlier one by Pamphilus and Zopyrion. This contains dialectal and local expressions, and was reprinted in 1867. When the heathen temples at Alexandria were destroyed about 390, Helladius escaped to Constantinople, where he wrote a large and important lexicon mainly of prose. A fellow priest who accompanied him, Ammonius, wrote the first dictionary of homonyms, often reprinted in modern times. Orion, an Egyptian grammarian of Thebes, wrote what is probably the first etymological dictionary, an edition of which was printed at Leipzig in 1820.

Greek learning was easily transplanted from Alexandria to Rome, although the first Roman contact with the literature of Greece was due to the conquest of the latter country by the Romans in the second century B. C. The special influence of Alexandrian scholarship upon Rome may be dated from the time of Augustus. Among Roman lexicographers should be mentioned Erotian, or Herodian, physician to Nero, who prepared an alphabetical dictionary to Hippocrates. Still more important is Julius Pollux, a native of Naucratis Egypt, who was made Professor of Rhetoric at Athens by the Emperor Commodus. He wrote an *Onomasticon*, a dictionary in which the words of best usage were classified according to subject. Greek learning also flourished at Byzantium, especially from the death of Justinian to the capture of Constantinople by the Turks. Among Byzantine lexicographers is Photius, a patriarch of Constantinople in the last half of the ninth century, who compiled a lexicon, part of which is still preserved. The greatest of Byzantine lexicographers, however, is Suidas, who probably lived in the tenth century. He wrote a dictionary including personal and place names, together with extracts from many Greek writers and critics of an earlier time, so that although carelessly arranged it is still of great value. It was first printed at Milan in 1499, afterward at Halle in 1853. In the eleventh century was compiled by an unknown author an *Etymologicon*, which has been frequently printed in modern times. Its value consists largely in its quotations of earlier authorities, and in its historical and mythological references. In the same century Eudocia Augusta, wife of the Emperors Constantine XI. and Romanus IV., compiled perhaps the first dictionary of history and mythology, to which she gave the fanciful title *Bed of Violets*. Zenoras, a Byzantine historian and theologian, also wrote a lexicon in the twelfth century. The thirteenth century is represented by a lexicon of Attic words, the author of which was Thomas, or Theodulus as he was called when he became a monk. This was printed in 1476, and at Rome in 1817.

So far we have dealt with Greek lexicography because of the great importance of Greek in the history of early culture. Latin lexicography was itself inspired by the Greek scholarship of Alexandria. Marcus Varro, a Roman scholar and friend of Cicero, wrote *De Lingua Latina*, but this is rather a treatise on etymology and peculiar uses of words than a dictionary in the strict sense. In the time of Augustus, Verrius Flaccus wrote a treatise *De Significatione Verborum*. This we have, except for a few fragments, only in an epitome by Pompeius Festus (probably second century), aphabetized with regard to the first letter, a common order in early lexicons. Festus also wrote a treatise on obsolete Latin words, but this has not been preserved. The epitome by Festus was again abridged by Paulus Diaconus, an Italian historian of the eighth century. About the middle of the eleventh century Papias, a Lombard, compiled a *Vocabularium* from glosses of the sixth and seventh centuries. Giovanni Balbi, of Genoa, finished about 1286 his *Catholicon*, or *Summa*, a Latin dictionary partly based on Papias, but interesting now because printed by Faust in 1490. The European nations using Latin as the language of learning and the Church often needed the help of the lexicographer. In England, for example, the *Epinal* and *Erfurt Glosses* were prepared, the former probably as early as the first part of the eighth century. Glosses or glossed texts are also frequent, while just before the modern period more elaborate dictionaries were compiled. Of these the *Medulla Grammatice*, an early English-Latin dictionary, is worthy of special notice. It was written about the middle of the fifteenth century, and on it was based the *Ortus* (*Hortus*) *Vocabulorum*, or *Garden of Words*, first printed by Wynkyn de Worde in 1500.

The next special era in which lexicography flourished was that of the Renaissance, when the study of the ancient languages became the evidence of a renewed culture. We have already mentioned the printing of many ancient Greek dictionaries in the last part of the fifteenth century. The first fruits of Greek lexicography at the revival of learning was a dictionary compiled by Crastoni, an Italian monk of Piacenza. This was printed in 1478, and in it Greek words were for the first time explained by Latin words, sometimes by Italian. Guarino (born about 1450) published a *Thesaurus* in 1504. About the same time the polyglot had its origin, the first being prepared by an Augustine monk, Calepino, who died in 1511. Calepino's work, published in 1502, was a Latin dictionary with Greek equivalents, and therefore simply bilingual. Later the Italian, French, and Spanish equivalents were added, and in 1590 an edition printed at Basel contained no less than eleven languages. The sixteenth century was particularly prolific of dictionaries among the Romance nations, as well as in England and Germany. An epoch-making volume was Robert Estienne's *Thesaurus Linguæ Latinæ* (Paris, 1532), which was edited as late as 1734. The first Latin-English lexicon was prepared a few years later (1538) by Sir Thomas Elyot. In 1562 Robert Constantine published at Basel a *Thesaurus* of the Greek language alphabetically arranged. This was superseded by the more scholarly *Thesaurus Græcæ Linguæ* (Paris, 1572) of Henri Estienne, son of the Robert mentioned above. Estienne's dictionary exhibits the most careful scholarship for its time, and it has not only been made the basis of many later editions, but has been twice reprinted in the nineteenth century. The most noted Latin-English dictionary since the sixteenth century is that of Robert Ainsworth, which was based on the *Thesaurus* of Faber and was published in 1736. This has been often reprint-

ed, but is now supplanted by various dictionaries based on the works of German scholars, as Riddle (Oxford, 1835) and Andrews (New York, 1850). For many years Greek was studied through Latin, and it is interesting to know that the first Greek-English lexicon was planned in America and partly executed by John Pickering in 1814. Its publication, however, was delayed until 1826, so that it was antedated by the English work of John Jones, 1823. The Liddell and Scott Greek dictionary was not published until 1845.

It was not until Greek and Latin had long been subjects of study that the modern peoples turned to their own languages, the vulgar tongues, as they were called in the mediæval exaltation of the classics. The first significant plea for the use of a modern language in literature was Dante's treatise *De Volgari Eloquio*, in which he favors the use by Italian writers of living Italian rather than dead Latin, advice which he was the first to follow. About a century later Bembo championed Italian against the classics. As a result of the efforts of Bembo and others, the first Italian lexicons were written in the sixteenth century, the earliest of the language as a whole, a *Vocabulario*, by Acarisi in 1543. Others were published in the sixteenth century. Finally the literary academies which had been founded for studying the classics turned their attention to the mother-tongue. The most famous of these was the Academia Della Crusca, a body of Italian purists, whose device was the sieve. The great dictionary prepared under the auspices of this learned body, the *Vocabolario Della Crusca*, was published in 1612, and gave an impulse to the study of the modern languages which can not be overestimated. It was enlarged in 1729–38, and still remains of the highest importance for the language of Italy. In Spain the dictionaries of Lebrixa (1492) and Cavarrubias (1611) preceded that of the Academia Española, 1726–39. In France the *Thesor* of Ranconet (1564), edited by Nicot (1606), was the foundation of all French dictionaries up to that of the French Academy. The latter was begun in 1639, but not published until 1694. This has been frequently revised, the last supplement appearing in 1854. The first great dictionary of modern German was one called *Die Teutsch Sprach*, by Maaler, Zurich, 1561. Early English dictionaries will be treated by themselves.

With the new philological activity, and the birth of the science of comparative philology in the last of the eighteenth century, began a new era for the lexicographer. He was now to follow for the first time a careful philological method, and give up entirely the haphazard guessing of his predecessors in the fields of phonology and etymology. The new philology produced in this century, outside of England, two masterpieces of lexicography by eminent scholars of Germany and France, the Grimm brothers and Littré. The *Deutsches Wörterbuch* of Jacob and Wilhelm Grimm was begun upon a new and hitherto unattempted scale of completeness and thoroughness. It was to include every word from Luther to Goethe with a history of its changes in form and meaning, these illustrated by quotations from the literature of all periods. The undertaking was so vast that neither of the brothers saw its completion, although before Jacob's death the work had reached the letter S. The first volume was issued at Leipzig in 1854, and the dictionary has been continued under the direction of Wiegand, Hildebrand, Heyne, and Lexer. As evidence of the herculean labors of the Grimms, it is said that the vast collections left by the brothers were sufficient to complete the original plan in all its essential features. The last (1894) complete volume (to *Schiefe*) was issued in 1893, the remaining volumes being complete only in parts. The French dictionary of Littré has been called the best dictionary of any living language. Its compilation is the work of some thirty years of his life, but, more fortunate than his German predecessors, he lived to see its completion and recognition by the nation. The dictionary was printed between 1863 and 1873. In method Littré follows Grimm, giving examples from classic authors, the etymology of words, and the classification of meanings in the order of primitive, derived, and figurative significations. In all these respects Littré's dictionary, while conforming to modern scholarship, differs from the dictionary of the French Academy. The latter has followed the custom first established of making its own examples, and arranging meanings of words on a logical rather than a historical basis. Besides these famous exemplars of lexicography, it would be impossible to enumerate the dictionaries produced during the nineteenth century, owing to the phenomenal progress in philological science. Of works especially important outside of England may be mentioned the great Sanskrit-German dictionary of Böhtlingk and Roth (St. Petersburg, 1853), the Italian dictionary of Tomasseo and Bellini (1861), the Spanish dictionary of Caballero (1849), the Dutch dictionary of de Vries and te Winkel (1864). Dictionaries of the older periods of all the modern languages have also been prepared, thus opening to study the older literatures.

In connection with the history of Latin and Greek lexicography attention has already been called to dictionaries of these languages prepared in England. We are more concerned, however, with the history of English lexicography. The earliest works that can be called dictionaries of English in any sense are bilingual, usually English-Latin. The same was true of other modern languages, and was due to the fact that Latin was still the language of learning. The earliest of these English-Latin dictionaries is the *Promptorium Parvulorum*, written by Galfridus Grammaticus about the middle of the fifteenth century, and first printed in 1499. Another, compiled somewhat later in the same century, is the *Catholicon Anglicum*, by an unknown author. The sixteenth century saw numerous dictionaries of English and one or more foreign languages. It is said that Caxton's successor, Wynkyn de Worde, printed a "dictionarie for yonge beginners," but there is no certain copy of this till 1554. This, too, was an arrangement of words in classes rather than a true dictionary. In 1530 John Palsgrave, tutor of Mary, sister of Henry VIII., published a grammar of French with an English-French vocabulary. In 1552 Richard Huloet, or Howlet, published his *Abecedarium*, English-Latin, with some curious definitions in English. Other bilingual or polyglot dictionaries of the sixteenth century are a *Manipulus Vocabulorum*, an English-Latin rhyming dictionary, by Peter Levins (1570), and the *Alvearie*, an English-Latin-French dictionary, by John Baret (1573). In 1580 was published *Synonymorum Silva*, a dictionary of English synonyms with many Latin and some Greek equivalents. As an indication of the study of modern languages in England may be mentioned the Spanish, French, and Italian dictionaries of Percivale, Hollyhard, and Florio in the last decade of the sixteenth century.

The first attempt to explain English words in the same language is the *English Expositor* of John Bullokar (1616), which was very popular in its time. In the next year was published the great polyglot, *Guide into the Tongues*, by Minshew, a work with words from ten different languages illustrating and explaining English. Other dictionaries of the seventeenth century are by Henry Cockeram (1623), a rival of Bullokar's *Expositor*; the *Glossographia* of Thomas Blount (1656), intended especially "for the more knowing women and less learned men"; the *New World of Words* (1656), by Edward Phillips, nephew of Milton. The earliest etymological dictionary in the strict sense is the *Etymologicon* of Dr. Stephen Skinner (1671), although some attempts at etymology had been made in preceding dictionaries. About the same time the learned Junius was employed upon a similar work which was not published until the next century. We may note, also, the *English Dictionary* of Elisha Coles (1672), and the *Gazophylacium*, published anonymously in 1689.

The eighteenth century produced some very important, many unimportant, lexicographical works. The earliest of note is the *Universal Etymological English Dictionary* of Nathan Bailey (1721). This passed through twenty-four editions before the end of the century, and it was recognized as the great standard before that of Johnson. In 1827 Bailey published a second volume with many new words, and made for the first time an attempt to show by the use of accents the correct pronunciation of words. In 1743 Edward Lye edited, with many additions, he says, an *Etymologicum Anglicanum* from the manuscript collections of Junius, already mentioned. We now come to what has been regarded as one of the most important English dictionaries ever published, that of Dr. Samuel Johnson, which appeared after seven years of labor in 1755. Johnson's dictionary was really inspired by the same critical purpose which in Italy and France had established the academies, the purpose of improving and permanently establishing the modern language. An academy had never been established in England, although Swift at the beginning of the eighteenth century had proposed the founding of one similar to that in France. Nothing was done, however, and Dr. Johnson, in his dictatorial way, scorned this restriction on "the spirit of English liberty," as he called it. Yet he himself, as shown by his prospectus of the dictionary addressed to

Lord Chesterfield, attempted all that an academy was supposed to be able to do, "to fix the English language." It is true that by the time he had finished the dictionary he had reached some truer views of language, as we see from the preface to his great work. Johnson's dictionary had, however, a great influence. Its special merits were in establishing the orthography, in discriminating definition, and in illustrating the use of words by quotations from the best authors, in this respect anticipating the practice of Grimm. In etymology, Johnson relied on the best sources available at his time, using for the Teutonic element the works of Lye and Skinner, but these are far behind present knowledge. So far as pronunciation is concerned, Johnson did little more than indicate accent, as Bailey had done before him. Johnson's dictionary and the abridgment he made passed through many editions in the eighteenth century, and was last edited by Latham (1866–74).

Of the remaining dictionaries compiled in the eighteenth century may be mentioned that of William Kenrick (1773), which is the first to pay special attention to pronunciation beyond the matter of accents; the *Royal Standard English Dictionary*, by William Perry (1775); and a *General Dictionary*, by Thomas Sheridan (1780). Both the last had as a main object "to fix a standard for the pronunciation of the English language," a special feature of all dictionaries succeeding Johnson's. This new attention to orthoëpy, or correct pronunciation, culminated in a *Critical Pronouncing Dictionary and Expositor of the English Language*, by John Walker (1791). Walker was an elocutionist, and he distinctly makes pronunciation the important thing in the preface to his dictionary. Much of Walker's theory is undoubtedly correct, but much is wholly wrong, especially in connection with the doctrine of analogy he sets up.

Among nineteenth-century dictionaries may be mentioned the *Walker Remodeled*, by Smart, and a *New Dictionary*, by Richardson, both published in 1836; the *Imperial Dictionary*, by John Ogilvie (1850), a later edition of which, by Annandale, is still quoted; and the *Encyclopædic Dictionary* of Robert Hunter (1879–88). The greatest achievement of English lexicography in the nineteenth century was the result of the new philology. This is the *New English Dictionary*, begun and partially completed under the auspices of the Philological Society and the editorship of J. A. H. Murray. It is on the model of Grimm's monumental undertaking, and aims to give, besides pronunciation and etymology, the history of each word in its changes of meaning and use, with illustrative examples from all periods. No more important work has ever been undertaken by Englishmen, and when completed it will be of priceless value to the scholar. With English dictionaries may be classed Jamieson's *Etymological Dictionary of Lowland Scotch* (1808), edited by Longmuir (1879). Of no slight importance also are the etymological dictionaries of the nineteenth century, the one by Wedgwood (1859) and the other by the eminent English scholar, W. W. Skeat (1881). The latter has fully superseded all others in English, but even this is not characterized by the exact scholarship of Kluge's *Etymologisches Wörterbuch der Deutschen Sprache*. Many special dictionaries have been prepared, as that of *Obsolete and Provincial Words*, by Thomas Wright (1857); a *Glossary of Anglo-Indian Words*, by H. Yale (1886); a *Dictionary of Anglicized Words and Phrases* (1892); *Slang and its Analogues*, by John S. Farmer (A–F, 1890).

Lexicography in the U. S. began with Noah Webster's *Comprehensive Dictionary* in 1806. The noteworthy feature of this was the recognition by Webster of the considerable element of words distinctly American, and of an American as distinct from a British pronunciation. Webster also proposed changes in the orthography of certain classes of words, all in the direction of simplicity and uniformity. In 1828 Webster published his great work, which he called an *American Dictionary of the English Language*. Besides the features already mentioned, Webster gave etymologies, but these were full of blunders owing to the slight scholarship of the author. In 1830 Joseph E. Worcester published his *Comprehensive Pronouncing and Explanatory Dictionary*. Worcester was more conservative than Webster as to recognizing an American pronunciation of English, nor does he accept all the latter's orthographic changes. Various editions of both these works have appeared, the last edition of Webster's dictionary disregarding entirely the original aim by its name of an *International Dictionary*. The latest and most considerable work is the *Century Dictionary, an Encyclopædic Lexicon*, under the editorship of Prof. W. D. Whitney, of Yale (1891). This is an elaborate work in six quarto volumes, is especially complete in scientific and technical terms, and partakes, as its name indicates, of the encyclopædic character. It leans rather toward Webster than Worcester in spelling and pronunciation. One special feature of the *Century Dictionary* is its attempt to include all words belonging to the language since the union of the English and the Normans.

The differences in vocabulary between the English used in Great Britain and the U. S. have led to the preparation of special dictionaries, as that of *Americanisms*, by John R. Bartlett (1848, last edition 1877); *Americanisms, Old and New*, by John S. Farmer (1889).

The study of the oldest periods of the modern languages has originated in various ways. In England this study began in an antiquarian and theological interest. The first Old English text was printed to show the belief of the ancient English Church. The first Old English dictionary was the *Dictionarium Saxonico-Latino-Anglicum* of William Somner (1659). About a century later, in 1772, Edward Lye published his *Dictionarium Saxonico et Gothico Latinum*. A renewed interest in the study of the older language began in the nineteenth century, and a *Dictionary of the Anglo-Saxon Language*, by Joseph Bosworth, appeared in 1838. A new edition of this, edited and enlarged by T. Northcote Tollar, was begun in 1882. Old English dictionaries have also been prepared by E. H. Müller, Grein, and Leo in Germany. Dictionaries of the middle period of English (1100–1500) have also been compiled by German scholars, as that by Stratmann (last edition, 1878), and by Maetzner, begun in 1878 and continued to the letter M. The former has been revised by Henry Bradley (1891), and this is now the most serviceable edition. A *Concise Middle English Dictionary* has also been prepared by A. L. Mayhew and W. W. Skeat. With these may be mentioned a scholarly and useful work for a somewhat later period, the *Shakspeare Lexicon* of Alexander Schmidt (1874).

The form and arrangement of the dictionary is of the highest importance. Early dictionaries differed considerably in these respects from those of modern times. Sometimes words were arranged according to subject, as names of animals, occupations, trades. Later the alphabetical order came to be used, but it was at first very imperfect, the first letter only being considered. In the Greek dictionary of Henri Estienne words were arranged according to roots. This plan was also used by German scholars in the early part of the nineteenth century; but it does not commend itself, even to scholars, for convenience or utility. In Sanskrit lexicons words are usually arranged according to the phonetic relations of the letters. It may be laid down as a fundamental principle of lexicography that the strictest alphabetic arrangement is always best. Scarcely less important is the arrangement of meanings on some systematic basis. Early dictionaries are lacking in any system in this respect. The French Academy, as did Johnson, follows a logical basis, giving first the present meanings of words. The new philology, however, has emphasized the importance of an historical arrangement, and this has been followed in the dictionaries of Grimm, Littré, and in the New English dictionary.

There has been a gradual development also as to that which shall be included in a dictionary. In England, for example, the simplest explanation of words was alone given at first. Etymology was next attempted. Accent signs were not added until the early eighteenth century, and a system of signs for more exact pronunciation not until about half a century later. A later addition was the expression of opinion by the lexicographer as to words, by the use of such terms as *rare*, *obsolete*, *low*, *vulgar*, terms that are at best but very general and of slight value. Modern dictionaries have also shown a tendency to claim excellence in proportion as they have surpassed in the number of words included. The lists have thus been swelled by large additions of technical terms used in some one department of thought or activity. Notwithstanding this tendency, one important class of words, belonging peculiarly to English as a Teutonic speech, has been too often omitted. These are compounds—both those so marked by union in writing, and true compounds not so marked. Some improvement has been made in this respect in recent dictionaries, but much might still be done to advantage both as representing the actual fact of English usage, and as showing the extent to which the Teutonic custom of forming compounds still prevails in English.

OLIVER FARRAR EMERSON.

Lexicon: See DICTIONARY and LEXICOGRAPHY.

Lexington: town; McLean co., Ill. (for location of county, see map of Illinois, ref. 5–E); on the Chi. and Alton Railroad; 16 miles N. E. of Bloomington, 110 miles S. of Chicago. It is in an agricultural and stock-raising region, and has a large trade in horses and live stock. It also manufactures tile. Pop. (1880) 1,254; (1890) 1,187; (1900) 1,415. EDITOR OF "UNIT."

Lexington: city (founded 1775, incorporated 1782); capital of Fayette co., Ky. (for location of county, see map of Kentucky, ref. 3–H); on the Ches. and O., the Ky. Cent., the Ky. Union, the Louisv. and Nash., the Louisv. S., and the Queen and Crescent railways; 80 miles S. of Cincinnati, 85 miles S. E. of Louisville. It is the commercial and financial center of the famous Blue Grass region, and the principal market for its three great products, blooded horses and cattle, hemp, and tobacco. The census returns of 1890 showed that 174 manufacturing establishments (representing 46 industries) reported. These had a combined capital of $1,411,580; employed 1,427 persons; paid $744,256 for wages, and $1,224,105 for materials; and had products valued at $2,524,041. The principal products are Bourbon whisky, tobacco, hemp, stoves, flour, building supplies, canned vegetables, saddlery, harness, carriages and wagons. It is the seat of Kentucky University (Christian, chartered 1858), of Hamilton Female College, Sayre Female Institute, and St. Catharine's Academy (Roman Catholic). It has Holly waterworks, gas and electric lights, electric street-railways, 2 full-mile racing-tracks, public library, 7 national banks with combined capital of $1,400,000, 2 State banks with capital of $2,013,900, 2 other banks, and 2 daily, 10 weekly, and 5 monthly periodicals. Pop. (1880) 16,656; (1890) 21,567; (1900) 26,369. EDITOR OF "KENTUCKY LEADER."

Lexington: town (settled in 1642); Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Bost. and Me. Railroad; 11 miles N. W. of Boston. There are no manufactures, the principal businesses being farming, dairying, and market-gardening. The town was settled under the name of Cambridge Farms, and probably received its name from Lexington (Laxington or Laxton), Nottinghamshire, England, of which place Francis Whitmore, an early settler, was a native. Memorable as the spot where the first blood was shed in the Revolutionary struggle, this historic town possesses many mementoes of that period. A modest granite monument upon the village green tells its story of life sacrificed for principle, while a memorial-hall contains tablets and statues of John Hancock and Samuel Adams; of the minute-man of 1775 and the soldier of 1861. Pop. (1880) 2,460; (1890) 3,197; (1900) 3,831.

Battle of Lexington.—On the evening of Apr. 18, 1775, the British general Gage dispatched a force of 800 men under Lieut.-Col. Smith to Concord, for the purpose of destroying the military stores there collected, and in anticipation had picketed the roads leading from Boston to prevent the news of the intended expedition from spreading. The capture of the colonials Hancock and Adams, who were at Lexington, was also contemplated. The first movement of the British regulars was at once made known by preconcerted signals, and Paul Revere, rowing across to the Charlestown shore, mounted his horse and rode toward Lexington, arousing each household as he went; the bells of the village churches rang the alarm; signal-guns were fired, and other messengers had given warning far and wide. By midnight Revere had arrived at Lexington and given the alarm; the militia at once assembled on the village green, but there being no signs of the British, they were dismissed to await their coming, after a number of men had been sent out toward Boston to report their approach. It was about half-past four in the morning when the British major Pitcairn, with six companies, who had surprised and captured all the outposts, arrived within a mile or two of Lexington. A general alarm was now sounded, and the militia to the number of sixty or seventy, under command of Capt. John Parker, were drawn up in line upon the green. Pitcairn, moving rapidly forward with his men, rode up and ordered the militia to surrender and disperse. The militia, however, held their ground, and after a volley had been fired over their heads without effect, they received a second fire, which killed eight and wounded ten of the little band. Capt. Parker, seeing that further resistance would result in the certain destruction of his men, ordered them to disperse, which they did, some discharging their muskets at the British as they retired, inflicting, however, but little injury upon the enemy (three of the regulars were wounded, and Pitcairn's horse struck), who now pressed on to Concord, 6 miles beyond, whence Revere, continuing his ride with Ebenezer Dow and Dr. Samuel Prescott, had hastened to spread the alarm. Revere and Dow were captured by a British patrol; Prescott, barely escaping, succeeded in reaching Concord. The Lexington men rallied after the departure of the regulars, and followed on to Concord, and in the retreat of the British which followed the battle at Concord bridge, joined in the pursuit, which only terminated on the arrival of the regulars at Charlestown Neck, under the guns of their shipping. In this pursuit three more of the Lexington militia were killed. In 1799 a small monument was erected upon the spot where began the contest of the Revolution. EDITOR OF "MINUTE-MAN."

Lexington: city (settled in 1837); capital of Lafayette co., Mo. (for location of county, see map of Missouri, ref. 3–E); on the Missouri river, and the Mo. Pac. and the Atch., Top. and S. Fé railways; 45 miles E. of Kansas City, 250 miles W. of St. Louis. It is the center of the richest coal region in the State, also of the hemp-growing section; on a bluff 300 feet above the river. It has manufactures and a large river commerce, and contains Wentworth Military Institute, Baptist Female College, Central Female College, Elizabeth Aull Female Seminary, 4 State banks with combined capital of $195,000, and 3 weekly newspapers. In Sept., 1861, a Union force of about 3,000 men, under Col. James Mulligan, occupied the hill on the N. E. of Lexington, which naturally strong position was fortified and held against a Confederate force of some 18,000 men, under Gen. Sterling Price, the siege terminating on the 20th in the surrender of the town and garrison. Upon Fremont's approach with a large force Price withdrew, leaving a few men in the town to guard the wounded prisoners remaining there. On Oct. 16 Maj. Frank J. White, with about 220 men, captured 60 or 70 prisoners, and released such of Mulligan's force as were found there. Again, in Oct., 1864, the army of Gen. Price here attacked Gen. Blunt, who, after a two hours' resistance, withdrew. Pop. (1880) 3,906; (1890) 4,537; (1900) 4,190.

Lexington: town; capital of Rockbridge co., Va. (for location of county, see map of Virginia, ref. 6–F); on the north branch of the James river, and the Balt. and O. and the Ches. and O. railways; 35 miles N. N. W. of Lynchburg. It is in an agricultural region, near the celebrated Natural Bridge and the picturesque Peaks of Otter; is the seat of WASHINGTON AND LEE UNIVERSITY (*q. v.*); and has good water-power, a foundry, flour-mills, public library, two State banks with aggregate capital of $145,000, and a daily, a monthly, and two weekly newspapers. Pop. (1880) 2,771; (1890) 3,059; (1900) 3,203. EDITOR OF "GAZETTE."

Lex Loci Contractus [Lat.]: the law of the place of a contract. See INTERNATIONAL PRIVATE LAW.

Lex Rei Sitæ [Lat.]: the law of the place where a thing is situated. See INTERNATIONAL PRIVATE LAW.

Ley'den, or **Leiden** (Lat. *Lugdunum Batavorum*): a city of South Holland, on the Old Rhine; 6 miles from the German Ocean and 31 miles W. of Utrecht (see map of Holland and Belgium, ref. 6–E). It is well built; has broad, well-kept streets, and is intersected by numerous canals, bordered by avenues of trees. It is chiefly interesting for its famous university, founded in 1575 by William of Orange as a reward to the citizens for their heroic defense against the Spaniards the previous year. The university has a library of 300,000 volumes and 5,600 MSS., and museums of natural history, antiquities, and ethnography. In the sixteenth century Leyden was the center of the woolen fabric industry, and had a population of 100,000, which in 1800 had dwindled to 30,000. In 1807 a portion of the city was destroyed by the explosion of a powder-ship. Pop. (1896) 53,368.

Leyden, ERNST: neurologist; b. at Dantzic, Prussia, Apr. 20, 1832; studied medicine at the University of Berlin, graduating M. D. in 1853; entered the medical corps of the Prussian army in 1854; in 1865 was appointed to the chair of Theory and Practice of Medicine at the University of Königsberg; in 1872 was elected to the same chair in the University of Strassburg; in 1876 to the same chair in the University of Berlin. In 1879 he started the *Zeitschrift für klinische Medicin*, of which he is still an associate editor. Among his important works are *Die graue Degeneration der hintern Rückenmarksstränge* (Berlin, 1864); *Die Klinik der Rückenmarkskrankheiten* (Berlin, 1874).

S. T. ARMSTRONG.

Leyden, John: poet and Oriental scholar; b. in Denholm, Roxburghshire, Scotland, Sept. 8, 1775; studied at Edinburgh University; was ordained in 1798, but soon abandoned the clerical for the medical profession, and in 1802 obtained an appointment as assistant surgeon in India. He first resided at Madras; studied the Oriental languages, and removing to Calcutta, became Professor of Hindustani in Fort William College. He afterward became a judge and assay-master at the mint. He accompanied the British expedition against Java, and died at Batavia, Aug. 27, 1811. Among other works he wrote an *Historical Account of Discoveries and Settlement of Europeans in Northern and Western Africa* (1789), and an *Essay on the Languages and Literature of the Indo-Chinese Nations*, in vol. xix. of *Asiatic Researches*; also *Poems and Ballads*, published after his death.

Leyden, Lucas Jacobszoon, called Lucas van Leyden: painter and engraver; b. in Leyden, Holland, in 1494. While still a child he had learned different methods of painting and engraving, and at the age of twelve, having acquired all his masters could teach him, he painted in tempera so surprising a picture of the *Story of St. Hubert* that the burghers of Lochorst gave him for it as many golden florins as he had years. He became an expert in the art of engraving, equaling Albert Dürer, who competed with him, each engraving subjects designed by the other. Lucas surpassed Albert in avoiding confusion in the figures, and in harmonious arrangement, while Dürer's correctness of drawing was greater. In 1520, when Dürer visited Flanders, he went to see his rival in art, and marveled to find so great a genius in so small and fragile a body. They both painted on the same picture in sign of amity. The *Last Judgment* in the counsel chamber at Leyden is one of Lucas's most important works. He painted many Scriptural subjects, among others *The Blind Man of Jericho*, a marvelous work in color, and his last. His portraits also are very remarkable. At the age of thirty-two he undertook a journey through the Low Countries, in order to make the acquaintance of all the best artists of his time. He had fitted out a ship very splendidly for this purpose, and at Middelburg he was joined by the eccentric Mabuse. He returned home ill, so that it is supposed he may have been poisoned by some envious rival. He languished in great suffering for six years, his only consolation being his art, at which he labored incessantly, having had his sick-bed fitted up with the means of painting and engraving. He was working when death put an end to his sufferings. He left an incredible amount of work in glass, in tempera, and in oil, besides his engravings, of which there are over 172. D. in 1533. W. J. Stillman.

Leyden Jar: a well-known form of electrostatic condenser, so named from its invention in the town of Leyden (1745) by Cuneus. It consists of a wide-mouthed glass jar, of some variety of glass which insulates well. Inside and out it is covered nearly to the neck with tin-foil. A brass knob inserted in the wooden cover is connected with the inner coating by means of a wire or chain. When a difference of potential is produced between the coatings of a Leyden jar, it becomes charged, the energy of charge depending, as in any Condenser (*q. v.*), upon surface of the coatings, their distance apart, and specific inductive capacity of the intervening glass. The length of spark, upon discharge, rises with the potential difference between the coatings, but not in direct proportion to the same, excepting when the spark occurs in certain liquid dielectrics. The distance from the upper edge of the coatings to the top of the jar should be such that the strength of the dielectric along the air-path from coating to coating (over the neck of the jar) is less than the electric strength of the intervening glass at its weakest point. Otherwise, if the process of charging be carried too far the glass will be broken by the discharge, and the jar will be ruined. Leyden jars are frequently connected in series (the cascade arrangement) to secure a potential difference equal to the sum of those due to the electrification of the individual jars, or in multiple, all outside coatings connected together and inner coatings the same, when increased quantity is desired. Such a combination, in either form, constitutes a Leyden battery. For the early history of the Leyden jar, particularly concerning the alleged discovery of it by von Kleist of Camin, previous to the celebrated experiment of Cuneus, see Fischer, *Geschichte der Physik*, vol. v., p. 490. See further, Condenser, Electricity, and Inductive Capacity. E. L. Nichols.

Leys, John August Henry: painter; b. at Antwerp, Feb. 18, 1815; was destined for the Church, but at the age of fifteen entered the studio of Brakeleer, his brother-in-law; exhibited in 1833 a picture that excited remark, *Combat of a Grenadier with a Cossack*; traveled and studied in France and Holland, and on his return till his death, Aug. 26, 1869, lived in his native city. The artist took the subjects for his canvases from the history of his own country and the life of the Middle Ages, and painted historical and legendary scenes with fidelity to costume and surroundings and strong feeling. His chief works, such of them as were not painted for his rich patron, M. Couteau, were executed on the walls of public buildings in Belgium. Three pictures which he sent to the Exposition in Paris of 1855 obtained for him one of the grand medals of honor. To the Exposition of 1867 he sent eleven pieces, and was again honored by a medal. In 1846 he was decorated with the order of Leopold; in 1851 was raised to the rank of officer; in 1867 was made commander of the order, and promoted to the dignity of officer in the Legion of Honor. He had already been created a baron by Leopold I. and elected a member of the Royal Academy of Belgium. Revised by Russell Sturgis.

Leyte: one of the larger of the Philippine islands, of the Viscaya group, separated by a very narrow strait from Samar; lats. 10° to 11° N., lon. 125° E. Area, 3,440 sq. miles. Pop. 270,000. It is long, narrow, mountainous, somewhat volcanic, has a good soil, warm and wet climate. The people speak Viscaya. M. W. H.

Lhermitte, lăr'mēt', Léon Augustin: genre-painter, principally of French peasant life; b. at Mont-Saint-Père, Aisne, France, Jan. 31, 1844. He was a pupil of Lecocq de Boisbaudran; received a second-class medal in the Salon of 1880; decoration of the Legion of Honor in 1884; medal of honor at the Paris Exposition of 1889. His pictures are notable for vigor and technical qualities of a high order; his representation of peasant character is truthful and wholesome in sentiment. *Harvesters' Wages* (1882) is in the Luxembourg Gallery, Paris; *The Vintage* (1884) in the Metropolitan Museum, New York. Studio in Paris. W. A. C.

L'Hôpital, lō'pĕĕ'taal', Michel, de: statesman; b. at Aigueperse, Puy-de-Dôme, France, about 1504; studied law, first at Toulouse, then at Padua and Bologna. Returning to France, he entered upon judicial functions in the parliament of Paris (1537); was sent to the Council of Trent, then just removed to Bologna (1547); became member of the council of state (1553); and president of the court of accounts (1554). On the death of Olivier he succeeded him as chancellor of France (1560). He contributed to reform the legislation of the kingdom, and by wise moderation tried to allay the bitterness of the civil dissensions by which France was torn. He opposed the introduction of the Inquisition into France, and at the meeting of the States-General at St.-Germain, just before the outbreak of the Huguenot wars, he asserted principles of toleration and civil liberty far in advance of the spirit of the age. "Many," said he, "may be citizens, who are not even Christians." He fell a prey to the enmity of the Guises, and retired from office in 1568. He escaped the massacre of St. Bartholomew's night, and died Mar. 15, 1573. His works, published by Dufeye in 1824, in five volumes, consist of Latin poems, memoirs, speeches, and papers of judicial and political interest. A. G. Canfield.

Liability of Employers: See Master and Servant and Negligence.

Liah: town in the Punjaub, British India; in lat. 31° N. and lon. 71° E. (see map of Northern India, ref. 4–B). It carries on a considerable trade in sugar, cotton, silk, indigo, copper, iron, and wool. Pop. about 18,000, mostly Afghans.

Liakhof Islands (from the Russian merchant Ivan Liakhof, who discovered them in 1770): the two southern islands of New Siberia, lat. 73° to 74° N., lon. 138° to 144° E., in the Arctic Ocean, off the mouth of the Yana. The larger and more southerly, Blizhniy Liakhof, is 70 miles in length and 40 miles in breadth; the smaller, Maly Liakhof, is 30 miles in length and 15 miles in breadth. They are rocky, not permanently inhabited, difficult of access, have reindeer, wolves, polar foxes, and white bears, but are especially remarkable for the large number of bones of mammoths and other extinct animals. M. W. Harrington.

Lia'na [Eng. also *liane*, from Fr. *liane*, any twining or climbing tropical plant. Cf. *lier*, bind; *lien*, bond]: a name (usually found in the plural) applied to the climbing and twining woody plants which, in some tropical countries (as Brazil), entwine themselves among forest trees, often rendering great areas of land quite impenetrable. They be-

long to many different families. Some are of very great size, and often kill the trees round which they cling.

Liadow, Anatole: See the Appendix.

Li'as [from Fr. *lias*, earlier *liais*, sort of hard limestone, prob. from Bret. *liach*, stone]: a group of strata occurring in Western Europe, and belonging to the Jurassic period; in its lower portion thin bedded limestones alternate with marls. In both Germany and England the Lias has yielded hundreds of perfectly preserved skeletons of saurians and pterodactyls; from 70 to 100 species of fish, often most beautifully preserved; and a host of mollusca. Corals were not so abundantly represented. It gives us the most complete representation yet found of any extinct fauna. The English Lias includes an important source of iron, the Cleveland ironstone, an argillaceous carbonate of iron, yielding on an average about 30 per cent. of iron. It extends over a district of some hundreds of square miles, in a stratum, generally oölitic in structure, and 16 feet in thickness.

Liba'nius: rhetorician; b. at Antioch in 314; probably survived the Emperor Theodosius, who died in 395; studied at Athens, but acquired his education principally by private study of the old Greek writers, whom he often imitated with success, and for whom he always showed great enthusiasm. He first set up a private school of rhetoric at Constantinople, and became so popular that the schools of the official teachers were deserted; and in their jealousy these teachers charged him with dealing in magic, and succeeded in getting him expelled from the city about 346. He went to Nicomedia, where he taught with equal success, but when recalled to Constantinople at the end of five years he was rather coolly received, and, persecuted by the intrigues of his rivals and harassed by domestic troubles and ill-health, he gave up teaching and lived in retirement in his native city. Libanius was a thorough Greek, and had no sympathy with Roman life and a scant knowledge of the Latin language. His idol was Greek style, and for his time he had rare success in mastering the secrets of Greek expression. A pagan born and bred, he was an ardent admirer of the Emperor Julian; but his devotion to the Apostate did not prevent him from associating on terms of affectionate intimacy with St. Chrysostom and St. Basil; for he was above all a rhetorician, and his tolerant attitude toward Christianity, so far as it did not interfere with the study of the Greek classics and the attainment of excellence in Greek composition, may be explained by his shallow cleverness as well as by his easy temper. His orations, declamations, etc., have been published by Reiske (4 vols., Leipzig, 1791–97), and his letters, which are of great value for the history of that period, by I. C. Wolf (Amsterdam, 1738). There exist, however, still many letters by him, in manuscript and unpublished, at Madrid, Venice, and other places. See G. R. Sievers, *Das Leben des Libanius* (Berlin, 1868).

Revised by B. L. Gildersleeve.

Liba'tion [from Lat. *liba'tio*, deriv. of *liba're*, taste, sip, pour out as an offering to a divinity; Gr. λείβειν, make a libation]: among the Romans, a drink-offering sacrificed to the gods or to the spirits of the dead, by pouring a portion of the draught upon the altar or the ground, either as a separate act of worship or in connection with other sacrificial rites. The libation was most commonly of wine, unmixed with water; but it might also consist of honey or milk, as the occasion or ritual demanded. The Greeks called such an offering σπονδή. G. L. Hendrickson.

Li'bau: town; in the government of Courland, Russia; on the Baltic, 146 miles W. by S. of Riga (see map of Russia, ref. 6–B). It has a considerable ship-building interest and large trade in timber and corn. Its harbor freezes later than other harbors of the Baltic, and is earlier free of ice. (See Harbors.) Pop. 29,700.

Libel [from Lat. *libel'lus*, little book, pamphlet, lampoon, dimin. of *li'ber*, book]: in civil law, the designation of the first pleading in an action. The term was adopted by ecclesiastical courts, and is still retained in divorce suits in some of the U. S. Its most frequent use in English-speaking countries is in admiralty proceedings. This pleading corresponds to the Declaration (*q. v.*) in common-law courts, and to the complaint of modern codes. See Pleadings. F. M. B.

Libel and Slander: in law, those utterances which produce a legal injury to the reputation of another. If the defamatory utterance consists in speech, either vocal or manual (as in the case of mutes), it is called slander. If made by means of permanent visible signs, employed to convey distinct ideas, as by writing, printing, painting, or effigy, it is termed libel. By the Roman law a person could be defamed by another's acts, unaccompanied by defamatory words or signs, as when with a view to injure his credit his goods were seized by the other on a fictitious debt. In such cases the English law gives the injured party an action for damages, but does not treat the wrong as defamation. Nor does the English law deal with every assault upon a person's reputation or honor by word or sign as an actionable defamation, even though it is made maliciously and causes harm to its victim. In order that it amount to actionable defamation it must produce legal injury to the reputation of the one assailed. Some of the rules for determining when a legal injury of this nature has been sustained are technical and unsatisfactory.

Defamation as a Tort.—Libel may give rise to a private action for damages, and also to a criminal prosecution. Slander, unless it consists in speaking blasphemous, obscene, or seditious words, is only a private wrong. And first of defamation as a tort. An actionable libel is generally defined as a written statement published without lawful justification or excuse, calculated to convey to those to whom it is published an imputation on another injurious to him in his trade, or holding him up to hatred, contempt, or ridicule. In this definition the words "written statement" are to be understood as including any permanent visible symbol of thought. In order that slander or spoken defamation be actionable, it must cause special damage to its victim, or it must be of such a character that the law presumes, without proof, that its victim's reputation has been impaired. This presumption exists in the following cases: (1) Where the words impute an indictable crime, involving moral turpitude or liability to infamous punishment. It is enough in England that the words impute a criminal offense, punishable by imprisonment. The crime need not be indictable even. Some courts in the U. S. adopt the English doctrine. Some require the words to charge a crime involving disgrace; others, to charge an indictable crime punishable corporally, and still others to charge a criminal offense involving both moral turpitude and corporal punishment. The weight of judicial decision supports the rule first stated above. (*Pollard* vs. *Lyon*, 95 U. S. 225.) What punishment is infamous depends largely upon public opinion, but imprisonment at hard labor in the State prison or penitentiary is such. To charge that a person "is guilty of the crime of concocting a blackmail or extortion scheme" has been held not actionable, because it did not charge an overt act, but merely a planning to act, and the intention to commit a crime is not a criminal offense: although the court thought the language seriously reflected upon the plaintiff's character. (2) Where the words impute to the plaintiff, at the time they are spoken, the possession of a contagious disease, which would naturally exclude him from society. The only examples furnished by adjudged cases are of leprosy, venereal disorders, or the plague. (3) Where the words disparage a person in his trade, business, office, or profession. In such cases it is not enough to show that the defamatory words were spoken of one while engaged in the duties of his office or calling. It must be shown that they were spoken of him in relation thereto, and to his prejudice therein—they must touch him in his office or calling. Thus to say of a restaurant-keeper, "You are an infernal rogue and a swindler," was held not actionable on the ground that there might be very successful restaurant-keepers who were both rogues and swindlers. If a person's calling requires a special kind of knowledge, a charge that he does not possess that knowledge is actionable; as to say of an attorney, "he has no more law than a goose," or of a physician, "he is a quack-salver." In case one holds an office of profit, anything said of him in his office, imputing to him a want of ability or honesty unfitting him for the office, is actionable. If he holds an office of honor or credit, the disparaging words must be such as, if true, to show an unfitness for the position, which would expose him to the risk of removal therefrom. Accordingly, it has been held that to say of a town councilor, "he is never sober, and is not a fit man for the council," is not actionable without proof of special damage. It was intimated, however, that if the imputation had been of a disgraceful act done in his office, although it might be an act not sufficient to deprive him of that office, it would have been actionable *per se*. (*Alexander* vs. *Jenkins*, Law Reports, Queen's

Bench Division, 1892, vol. i., p. 797.) *Special Damage.*—If the slanderous words can not be brought within one of these three classes they are not actionable without proof that they have caused the plaintiff special damage, and this term is limited to a material temporal loss which is the natural and probable consequence of the slander. It is not special damage that a slander causes its victim's friends to shun him, but he is legally damaged if the slander causes them to withdraw from him their hospitality. Mental distress and consequent physical illness do not amount to special damage. Various reasons are assigned for this doctrine. Such harm is spoken of as fanciful, and as not resulting fairly and naturally from the wrongful act. It is also said that it would be highly impolitic to hold all language wounding the feelings, and affecting unfavorably the health and ability of another to labor, actionable, for then the right of action would depend upon whether the victim's sensibilities were easily excited or not, and a dangerous use would be made of it. However, if the words are actionable *per se*, injuries to the feelings may be proved to enhance the plaintiff's damages. A slander that causes one's expulsion from a religious society does not produce special damage; but it may if it causes his expulsion from a social club. In the one case his loss is spiritual, in the other it is temporal.

If the defamation is by libel, it is actionable whether followed by special damage or not. The distinctions above referred to, which are of prime importance in the law of slander, although not resting on any satisfactory principle and quite artificial, have little or no application to libel cases. The publication of any written statement (using the term as above defined) calculated to bring another into hatred, contempt, or ridicule is actionable. Injury to reputation is deemed the natural and probable consequence of such a publication. A published sneer or pleasantry at the expense of another is not actionable. In which of these classes a particular publication belongs is sometimes difficult to decide, and is to be resolved in each case as a question of fact in the light of all the circumstances. It has been said that "there are no words so plain that they may not be published with reference to such circumstances, and to such persons knowing these circumstances, as to convey a meaning very different from that which would be understood from the same words used in different circumstances." Where the language is not obviously defamatory the plaintiff must allege and prove extrinsic facts showing that the hearers or readers on the particular occasion would naturally give to it an injurious meaning. This allegation is called an innuendo. If the defendant charged the plaintiff with "healing felons," the innuendo must allege that those words were used and would be understood to mean "concealing felons." Where the language is ironical, as "you are an honest lawyer," or does not contain the name of the plaintiff, an innuendo is necessary. The plaintiff is not required to show that the defendant intended to defame him. It is enough for him to show that injury to his reputation would be the natural and probable consequence of the defendant's language. "No one can cast about firebrands and death and then escape from being responsible by saying he was in sport."

Fair Comment.—When a person has done or published anything which may fairly be said to invite public attention, every one has a right to make fair and proper comment thereon, and as long as he keeps within that limit what he publishes is not a libel. (*Campbell* vs. *Spottiswoode*, 3 Best and Smith 769.) This right extends to all public affairs, including the public acts of those engaged in such affairs; to published books and pictures, to architecture, to theaters, concerts, and other public entertainments, and generally to every form of appeal to the public. It does not extend, however, to the private character or life of those who have invited public attention to certain of their acts or works. One may indulge in bold and even exaggerated criticism of a book, and of the author as connected with the book, without exceeding the limits of fair comment; but if under pretext of book criticism he attacks the author's character, or makes allegations of fact discreditable to him as a man, his language ceases to be fair comment and becomes actionable defamation. This is well illustrated by two cases between the same parties in England, *Strauss* vs. *Francis*, 4 Foster and Finlason 939 and 1107. The defendant described a novel by the plaintiff as "the very worst attempt at a novel that has ever been perpetrated," and commented severely on "its insanity, self-complacency, and vulgarity, its profanity, its indelicacy (to use no stronger word), its display of bad Latin, bad French, bad German, and bad English"; yet this language was not thought by the trial judge to exceed fair comment, and the plaintiff withdrew a juror. The defendant published a statement that he consented to the withdrawal of a juror, because he considered the plaintiff could not have paid defendant's costs had he recovered a judgment. The jury were told that if this statement was made for the purpose of attacking the reputation of the plaintiff it was malicious and actionable.

Privileged Occasion.—Publishing a defamatory statement on a privileged occasion differs from fair comment in that there is no libel or slander in the latter case, while in the former there is, but its utterance is excused. These occasions are of two kinds, absolute and privileged. Occasions of absolute privilege embrace legislative proceedings, judicial proceedings, including courts martial, and probably the reports of naval and military officers to their superiors. Absolute exemption from liability to suit in these cases is considered essential to the public interest. In the case of legislators it is secured in England by the bill of rights, and in the U. S. by constitutional provisions. The immunity does not extend to subordinate legislative bodies, such as county councilors or supervisors. Judges and jurymen are not subject to an action for defamation, for any language they may use while acting in their official capacity in any causes before them. The English courts extend the same exemption to the pleadings, affidavits, etc., of parties, to witnesses, and counsel. They believe that public policy requires that not only judges, but counsel, parties, and witnesses, shall perform their parts in a court of justice with their minds uninfluenced by the fear of an action for defamation or a prosecution for libel. Although some courts in the U. S. adopt this rule, the majority hold that in the case of parties, counsel, and witnesses, their defamatory statements must be pertinent and material to the case, or must be made in good faith and without actual malice; in short, that a judicial proceeding is an occasion to them of qualified privilege only.

Other cases of qualified privilege are when one makes a defamatory statement in the performance of a legal or social duty, or in self-protection, or as a fair report of public legislative or judicial proceedings. In England and in many of the U. S. this privilege has been extended by statute to a fair and true report of any public or official proceedings. Generally the liberty of the press consists only in the right to publish "without any previous license, subject to the consequences of the law," in case of abuse. Whether a report of public proceedings is fair or whether a statement is made in self-protection does not generally present a difficult question for the courts, but they have been greatly troubled in determining the limits of the legal or social duty, especially of the social duty, which will render a defamatory statement conditionally privileged. On the one hand is the consideration that if its limits are too narrow persons will be deterred from warning their fellows against rascals. On the other hand is the fear that extending the boundaries unduly will enable gossips to filch the good name of honest people, under color of the performance of duty. The English courts seem disposed to give to the term a broader scope than do those of the U. S. Compare *Byam* vs. *Collins*, 111 New York 143 (1888) with *Stuart* vs. *Bell*, 2 Queen's Bench Division 341 (1891). In the latter case Lord Justice Lindley said: "I take moral or social duty to mean a duty recognized by English people of ordinary intelligence and moral principle, but at the same time not a duty enforceable by legal proceedings, whether civil or criminal." If the maker of a defamatory statement has an interest in the subject-matter and the recipient has a like interest, the occasion is undoubtedly one of conditional privilege; as where the directors of a company circulate a report among the stockholders reflecting upon its agents. Whether the occasion is privileged or not is a question of law. If it is conditionally privileged, the jury are to say whether it has been abused.

Malice.—It is often said that a defamatory charge must be malicious in order to be actionable. This use of the term has been deplored by eminent judges. All that is meant by it is that the charge is made without just cause or excuse. The defamation may be published without a particle of malice or improper motive and yet be actionable. If the statement is conditionally privileged, however, the plaintiff is bound to show that it was made with actual malice. Whether such malice actuated the defendant is a question for the jury; but it is proper for the court to instruct the jury that such tests of actual malice as the fol-

lowing may be applied: "If a man is proved to have stated what he knew to be false, no one inquires further; everybody assumes that he was malicious, that he did so wrong a thing from some wrong motive. Again, if it be proved that out of anger or from some other wrong motive the defendant has stated something as true without knowing or inquiring whether it was true or not, therefore reckless, by reason of his anger or other motive, whether it is true or not, the jury may infer that he used the occasion for the gratification of his anger or other improper motive," and therefore acted maliciously.

Justification.—The defendant, in a civil action for defamation, who alleges and proves the truth of his statement, is entitled to a verdict, though he published the charge with express malice. Such a charge does not invade the plaintiff's right of reputation, though it may show that he has been enjoying a reputation that he did not deserve. He has sustained no legal injury. However, the legal presumption is that every defamatory statement is false. The burden is therefore upon the defendant to allege and prove the truth of his particular charge, and the courts enforce this rule with great vigor. In the older cases there is some authority for the view that the defendant could justify by showing that he simply repeated the statement of another, giving at the time the name of the author and acting in good faith. Those decisions seem to have proceeded on the theory that actual malice was necessary to actionable defamation, and have long been overruled. The author of a defamatory statement is not liable for its repetition, unless he actually or impliedly authorized the repetition. The one repeating the charge is the proximate cause of the damage which the statement thus repeated produces. If the statement is made to one who is known to the author to be under a legal, official, or social duty to repeat it, and the occasion of its repetition is thus privileged, the author will be liable.

Defamation as a Crime.—Although every libel that is actionable as a tort is also a misdemeanor at common law, some kinds of defamation are punishable criminally which will not sustain a civil action for want of a proper plaintiff. Such are blasphemous, obscene, or seditious words, calumnies on a court of justice, libels on the dead, and those which tend to excite the hatred of the people against a sect or class but not against particular individuals. The first two classes are dealt with as crimes, because they tend to corrupt public morals or endanger the institutions of the state; the others because they conduce to a breach of the peace. Prosecutions for seditious defamation are practically unknown in the U. S., and the doctrine of *scandalum magnatum*, founded upon the statutes of 3 Edw. I., c. 34, and 2 Ric. II., c. 5, that words derogatory to "great men of the realm" would sustain civil and criminal proceedings, although such as would not be actionable if applied to a commoner, has never been adopted in the U. S. The doctrine is practically obsolete in England, no action having been brought calling for its application since 1710. Blasphemous defamation is discussed in the article on BLASPHEMY.

Defamation of a deceased person is not actionable civilly, for it does not assail the reputation of any one who can act as plaintiff. (*Luckumsey Rowji* vs. *Hurbun Nursey*, Indian Law Reports, 5 Bombay 580.) In an English case the court expressed a doubt whether such defamation constituted a crime (*Reg.* vs. *Labouchere*, 12 Queen's Bench Division 320), although it has been understood that if the publication was made with intent to scandalize the deceased person's relatives, and thus tended to a breach of the peace, it was indictable. Such is the statutory rule in many of the U. S.

Publication.—This is a necessary element in the cause of action for defamation, whether the proceeding is civil or criminal. A criminal libel is published whenever the utterer knowingly displays or parts with it in such circumstances as to expose it to be seen or understood by another. Hence there is a publication if the writer sends the libel in a sealed envelope to the one defamed. The tendency of such an act is to provoke the recipient to a breach of the peace. This would not amount to publication for the purposes of a civil suit, for injury to the reputation of the plaintiff is the ground of such action, and one's reputation consists in the good opinion of his fellows. In Virginia a statute has dispensed with publication to a third person. (*Rolland* vs. *Batchelder*, 84 Virginia 664.) Communication of the libel by the utterer to the wife of its victim is a publication; but communication of it by the utterer to his wife is not, for the communication is privileged.

If a person, intending to send an innocent writing to another, by mistake sends a libel on a third, he has published it for the purposes of a civil action, but not for those of a criminal prosecution. In the former his intention is immaterial; in the latter a guilty intention is necessary. Where a libel appears in a book or paper there is a publication by the author, by the printer, and by any one who sells or delivers it to another, conscious of its defamatory character.

Justification.—At common law "it is immaterial with respect to the essence of a (criminal) libel whether the matter of it be true or false, since the provocation and not the falsity is the thing to be punished criminally." (4 Blackstone's *Commentaries* 150.) In applying this doctrine, Lord Mansfield declared that "the greater truth, the greater libel." The common-law rule has been changed both in England and the U. S., and the defendant in a criminal prosecution for libel is allowed to prove the truth of his charge as a defense, provided he also proves that the publication was with good motives and for justifiable ends.

Court and Jury.—Prior to the statute 32 Geo. III., c. 60 (1792), known as Fox's Libel Act, it had been decided by the court of King's Bench that "on the trial of an indictment for a libel the only questions for the jury are the fact of publication and the truth of the innuendoes. The question of libel or no libel is necessarily a question of law." Justice Willes dissented, holding that while the jury should receive the law of libel from the court, it was their constitutional right to examine the innocence or criminality of the writing, and, though they found the publications and the innuendoes were proved, they might still give a general verdict of acquittal without being obliged to give their reasons. (*Reg.* vs. *Shipley*, 4 Douglass 73.) This doctrine was declared by Fox's act to be the law of England. Statutes or constitutional provisions of like tenor are found in the U. S. In the former country the functions of the court and jury are the same in civil proceedings as in criminal proceedings for a libel. The court may nonsuit the plaintiff in a civil action or may direct the jury to acquit in a criminal prosecution, if satisfied that the publication is not libelous. On the other hand, though the court may deem the publication obviously defamatory, the question of libel or no libel must still be submitted to the jury, whether the proceeding be civil or criminal; although in a civil suit a verdict for the defendant in such a case may be set aside as against evidence, and a new trial ordered. (*Capital Counties Bank* vs. *Henty*, 7 Appeal Cases 741.) In the U. S. the court may decide as a matter of law the question of libel or no libel in a civil action, but not in a criminal case. (*Moore* vs. *Francis*, 121 N. Y. 199.) Starkie *On Slander*; Ogders *On Libel and Slander*; Townsend *On Libel and Slander*; Bishop *On Criminal Law*; May's *Constitutional History of England* (vol. ii., ch. ix.); Robert's *New York* (vol. i., ch. xvii.).

FRANCIS M. BURDICK.

HISTORY OF LIBEL AND SLANDER.—In primitive society insults are punished by private vengeance. When the community begins to discourage violence and to attempt to suppress it, the law substitutes for the right of revenge penalties enforced through judicial procedure. These penalties are at first (and for a long time) regarded as a compensation granted to the wronged individual in exchange for his older right. In early law, therefore, there is a tendency to make the penalty correspond to the degree of irritation which the wrong naturally excites. This tendency is nowhere more clearly marked than in the penalties attached to insulting and defamatory words and acts. Thus in early Icelandic law the man accused of cowardice had the right of immediately slaying his accuser. If he chose, however, to resort to judicial procedure, he could obtain the outlawry of his antagonist. The form of defamation which obtains widest currency in early society, and which is therefore as a rule most keenly resented, is the libelous chant or song. In an Icelandic law-saga of comparatively late origin the slaying of the author of such a song is treated as something very near to justifiable homicide (Dasent, *Story of Burnt Njal*, i., 135–146), and in the Roman Twelve Tables we find that the "evil song" (*malum carmen*), which Cicero (*De Republica*, 4, 12) defines as a libelous song, was punished with death.

These primitive ideas not only explain the origin of the criminal action of libel, but they represent the starting-point in the development of the English distinction between libel and slander. They also throw light upon certain principles of the English common law—such as the statement "the greater the truth, the greater the libel," and the saying that libel is punished criminally because it tends to a breach of the peace. The same reasoning was applied as

late as 1703 to the action of slander (cf. *Baker* vs. *Pierce*, 2 Lord Raymond 959), where the action of tort is recognized as a substitute for the impulse of the wronged party to take revenge, and where it is expressly argued that legal redress must not be made too difficult of attainment if private vengeance is to be suppressed.

Roman Law.—In the Roman law the line of development was in some respects different from the English. In addition to the criminal penalty imposed upon the author of the libelous song, the Twelve Tables gave an action for a penalty of twenty-five *asses* for every *injuria*. At a later period the prætors substituted the so-called *actio æstimatoria*, in which damages could be proportioned to the gravity of the offense and its publicity, and in which vindictive as well as actual damages could be recovered. "Injury," at Roman law, was a broader conception than defamation; it included injury to the physical person as well as attacks upon the reputation—i. e. it covered the field of assault and battery, as well as that of libel and slander. In the case of defamation, imperial legislation subsequently established criminal actions that supplemented the civil actions, and imposed severe penalties, such as whipping or exile, upon the authors and publishers of defamatory pamphlets (*libelli famosi*) and anonymous epigrams and pasquinades. Insults to the emperor and his family were not governed by the law of libel; they were punished as lese-majesty.

In the civil and criminal actions alike, malice (*dolus*) must be proved or inferred. The truth of an accusation was a defense to either action, provided that the truth had not been stated in an unnecessarily public and offensive manner. In other words, the form of publication might constitute an independent offense in which the truth or falsity of the accusation was immaterial; so, for example, with the *libellus famosus*.

Mediæval Law.—In the early German codes, which were merely compilations of tribal custom, we find various forms of defamation (particular words in some cases) taxed with varying fines. The heaviest fines are regularly imposed upon those who charge women with unchastity, or persons of either sex with witchcraft: for such charges imperiled the lives of the accused. In some tribal laws a reasonable distinction is drawn between words spoken in the heat of anger, which the speaker is willing to withdraw, and defamation persistently upheld. In the former case the slanderer escapes with a smaller fine and a declaration under oath of the plaintiff's unsullied honor. In the latter case the defendant seems to have been entitled to prove the truth of his charges by wager of battle, but if the ordeal goes against him the fine is greatly increased, amounting in many cases to the *wergeld* or sum paid in compensation for homicide. By the laws of the Alemanni, women were not responsible for ordinary scolding; but she who called a woman a witch or a man a fraud or a liar was fined twelve *solidi*. (Cf. Brunner, *Deutsche Rechtsgeschichte*, ii., 671–674.) With the reception of the Justinian law-books, toward the close of the Middle Ages (see Roman Law), the Roman rules of *injuria* were generally accepted, but with one modification, due partly to the survival of Teutonic custom and partly to ecclesiastical influences. Besides vindictive damages for defamation, the successful plaintiff was entitled to a public apology from the defendant, coupled with a formal withdrawal of the offensive expressions and a declaration of the plaintiff's honorable reputation. A modern remnant of this rule is found in the German penal code, which declares (Art. 200) that when judgment is obtained for public defamation the injured party shall be authorized to publish the judgment at the cost of the defendant. If the libel was published in a newspaper, the judgment, if possible, is to be published in the same part of the same paper and in the same type.

Modern European Codes.—The principles of the Roman law lie at the basis of most of the modern legislations on the continent of Europe; but the Roman *actio æstimatoria*, with its combination of actual and vindictive damages, has generally been abolished. Defamation gives rise to a civil action, but in such an action only actual damage can be recovered. The defamer is punished by concurrent criminal actions, which, however, are instituted only on the demand of the insulted party. The penalties (fine and imprisonment) are increased when the defamation is publicly made, and also (in German law) when it can be shown that the defendant knew that his statements were false. Fines imposed as a result of the criminal action go into the treasury of the state. In Germany, however, the defendant may be condemned also to pay actual damages to the party at whose instance the prosecution was instituted, and in this case no civil action can be brought subsequently.

The truth of an accusation can not always be pleaded in bar of an action. In the case of defamatory statements published in newspapers, the French law admits proof of truth only when the statements refer to official acts. (See Laws of May 26, 1819, and Apr. 15, 1871.) In the German law the proof of truth is regularly admitted; but it does not avert punishment, in the criminal action, if the true statement was clothed in an insulting form.

To the English doctrine of privilege corresponds the rule of the Roman law, that he who has made a statement in the exercise of a public right is not liable to the *actio injuriarum*. Modern European codes extend this privilege to legitimate criticism of scientific, artistic, and industrial productions, etc., when the criticism is not clothed in an insulting form; but in Germany such privilege is no defense when it can be proved that the person making the injurious statement knew it to be false. Decision of the criminal court of Berlin, Oct. 23, 1873.

At Roman law and in modern European legislations the protection of the reputation is not limited to living persons: it extends to the memory of the dead.

Insults directed against the head of the state and other public officers, against foreign princes and their diplomatic representatives, etc., are punished in many European legislations as special offenses and with special severity.

Survival of the Right of Revenge.—It can not be said that the evolution here indicated, from the primitive right of vengeance to the system of legal penalty, is even yet completed. In many modern states the duel is so lightly punished that it may be said to be practically tolerated: and the duel, of course, is usually resorted to for the avenging of insult and the protection of the insulted person's honor.

Literature.—Petit, *Les Injures et la Diffamation en Droit Romain* (Paris, 1863); Paillart, *De la Diffamation envers la Mémoire des Morts* (Paris, 1866); Baumeister, *Ueber Injurien* (Berlin, 1880); Boulanger, *De la Diffamation et de l'Injure* (Rennes, 1882); Freudenstein, *System des Rechtes der Ehrenkränkungen* (2d ed. Hanover, 1884); Landsberg, *Injuria und Beleidigung* (Bonn, 1886); Eckstein, *Die Ehre in Philosophie und Recht* (Leipzig, 1888); Kratz, *Strafrechtlicher Ehrbegriff* (Giessen, 1891); Hess, *Ehre und Beleidigung* (Hamburg, 1891). Munroe Smith.

Libelt, Karol: philosopher and statesman; b. at Posen, Poland, Apr. 8, 1807; studied mathematics, philology, and philosophy (under Hegel) at Berlin; received a gold medal for his essay on Spinoza in 1828; by his dissertation *De pantheismo in philosophia* won in 1830 the degree of Ph. D. In 1830 he took part in the Polish revolution, and was consequently sentenced to nine months' imprisonment at Magdeburg. In 1840 he returned to Posen, where he established a private school and edited two journals, *Dziennik domowy* and *Rok*. The essays contributed by him to various journals were afterward collectively published in *Zbiór pism pomniejszych* (Posen, 1849–51). A result of his experience as teacher was *Wyklad matematyki*, etc. (A Handbook of Mathematics for Gymnasial Schools, 2 vols., Posen, 1844). In 1845 appeared his first great philosophical work, *Filozofia i Krytyka* (Posen, 1845), which was to be an introduction to his *System umnictwa czyli filosofii umyslowéj* (A System of Philosophy. 2 vols., Posen, 1850; 3d ed. 1857). He was again imprisoned (1846–48), and during his confinement wrote an elegant historical study, *Dziewica Orleańska* (The Maid of Orleans, Posen, 1847). In 1848 he established a political journal, *Dziennik Polski* (suppressed a year later). The year 1848 was the most eventful of his life. He was a member of the Komitet Polski of Berlin, took part in the reorganization of Great Poland (Wielkopolska), presided over the Polish-Silesian section in the Slavonic Congress at Prague, and, as a deputy to the parliament of Frankfort, protested against the incorporation of Great Poland with Germany. In 1849 appeared the first volume of *Estetyka czyli Umnictvo piekne* (Esthetics, or the Fine Arts, Posen, 1849; 2d and 3d vol. at St. Petersburg, 1854); in 1850 his *System*; in 1852 a collection of short sketches, *Humor i prawda* (Humor and Truth). Shortly after he retired to the village of Brdowo, where he pursued agriculture and the study of political economy. D. June 9, 1875. Libelt is the first Polish philosopher of note. In his works he combats the absolutism of reason in philosophy, defends the unity of ma-

terial and unseen worlds, and expresses the hope that the spiritual scepter of Europe will pass into Slavonic hands.

J. J. Král.

Liber: See Bast.

Libera'le: painter; b. at Verona in 1451. He formed his style on that of the elder Bellini. He was a distinguished painter of religious subjects, and also illuminated many splendid books for the monks of Monte Oliveto, near Siena. He worked diligently all his life, and died at Verona in 1536. W. J. S.

Liberals: those who hold progressive views in politics or religion, especially the members of that political party in Great Britain which, in opposition to the Conservatives, has sought to promote reform. See Political Parties.

Liberal-Unionists: members of a political party in Great Britain, formed in 1886 by separation from the Liberal party in consequence of the latter's support of Home Rule. Under the leadership of the Marquis of Hartington, afterward the Duke of Devonshire, and Mr. Joseph Chamberlain, one of the members for Birmingham, they allied themselves with the Conservatives on the Irish question in that year, and secured the defeat of Mr. Gladstone. With the aid of this alliance the Conservatives remained in power till 1892, when in the general election the Liberals, with the help of the Irish members who favored Home Rule, secured votes enough in the House of Commons to defeat the Conservatives and Liberal-Unionists by a majority of 34.

C. K. Adams.

Liberia [from Lat. *liber*, free]: a republic on the western coast of Africa; between lat. 4° 20′ and 7° 20′ N.; stretching from the river San Pedro on the S. E. to the river Gallinas on the N. W., a distance of 600 or 700 miles.

Topography.—The coast-line, like that of most of Africa, is rather monotonous, broken only by a few capes and river-mouths. The territorial area, the boundaries of which were determined by agreement in 1855 and 1892, is about 35,000 sq. miles. The shore is elevated and rocky in the S. E., but otherwise low, generally sandy or gravelly, seldom marshy. The interior of the country is more elevated, swelling into forest-covered hills and lofty mountain ranges, traversed by fine valleys. For 200 miles or more it gradually rises toward the Kong Mountains, the head-waters of its rivers, and to a still undetermined boundary toward the interior. Many streams flow to the ocean, but none of them is navigable for more than 20 miles from the mouth; the most important are the St. Paul, navigable for 18 miles, and having 7 feet of water at low tide on the bar at its mouth, the St. John, the Junk, and the Cape Mount river. Fine oysters abound at some points, and some of the rivers are notable for their fine scenery, especially the Cavallo river, which equals the Hudson in its beauty and grandeur.

Climate.—The climate is thoroughly tropical. Of the two seasons the dry lasts from October to June, and the wet from June to October. In the dry season the average heat is 84° F., the mercury seldom rising above 90° in the shade; in the wet season the average heat is 76°, the mercury never falling below 60°. Büttikofer, who spent five years in Liberia, found the highest temperature to be upon the grass plains, where in 1881, in February, the tropical summer, the mercury marked 113° F. To the white man the climate of the lower regions is deadly, not from its excessive heat, but probably from miasmata; and even the Negro, when born and reared in another climate, suffers, on his arrival, from the so-called African fever. The natives, on the contrary, are healthy, robust, and long-lived.

Soil and Productions.—The soil is generally very fertile, and, in the more elevated regions particularly, capable of producing many of the products of the temperate zones. The principal farming districts lie along the valley of the St. Paul. Here the sugar-cane grows luxuriantly, one year's product sometimes reaching 300,000 lb. Cotton is indigenous, and yields two crops annually. Coffee of excellent quality is cultivated with success in the interior. The cereals are principally maize and rice. Two crops of the latter are produced during the year. Cabbages, peas, beans, tomatoes, cucumbers, lemons, oranges, guavas, tamarinds, pomegranates, pineapples, and African peaches are easily raised. The forests contain teak, mahogany, rosewood, hickory, and poplar trees, several kinds of gum-trees, dyewoods, medicinal shrubs, and varieties of useful palms, among which is the nut-bearing palm from which palm oil is made. Palm oil is a very important product, and is sent in great quantities to England and Germany. Tobacco, one of the most valuable products, is used as currency, one leaf being equivalent to two cents. Among other valuable products are the African rubber-tree, the cassava, the castor-oil plant, the pawpaw (*Carica papaya*), the unripe fruit of which is said to make tender the toughest meat; and the kola-nut (*Sterculia accuminata*), which surpasses in alkaloids any other fruit known. It is active as a stimulant, is a nerve tonic of great value, and is said to remove effectively the stupor of inebriety. Its medicinal properties are also found valuable in asthma, for which it is being brought into use in the U. S. The slave-trade of 150 or 200 years ago swept the country and left it desolate, so that where formerly hundreds of towns and thousands of inhabitants existed, one may now travel 50 and 75 miles without encountering a single town. The natives, in crossing this desolate region on their way to the coast, carry a few kola-nuts in the folds of their breech clouts, and crunching a few kernels will often perform a whole day's march without further sustenance. This nut has a more elongated form, but in size and color is not unlike a medium-sized horse-chestnut. The medicinal plants of Liberia are of great value. The active principle of the pawpaw is powerful as a dissolvent of albuminous substances, and the membraneous deposits of croup and diphtheria are said to be removed by it. Liberia also furnishes a hæmorrhage plant (the *Aspilia latifolia*), and a powerful antiseptic in its termite earth, valuable in ulcers, boils, and gangrene.

Minerals and Animals.—Iron abounds, and copper, gold, and quicksilver, with other minerals, occur in the interior. The country of the Mandingos, lying at the base of the Kong Mountains, is said to be gold-producing to a remarkable degree, that metal being used so abundantly that heavy twisted gold rings are common, the gold earrings of the Mandegna women being of such weight as to require being braced to the head-band. Only 140 miles from Grand Bassa iron ore occurs in great abundance and purity, the earth in some places seeming to be composed almost wholly of iron ore. This is, by the Mandingos, smelted in conical clay furnaces. Wild animals, the elephant, leopard, hippopotamus, crocodile, etc., are now nearly exterminated.

Population.—The population of Liberia consists of colonists and their descendants, estimated at about 15,000 to 20,000 in number; about the same number of contiguous and more or less civilized Christian natives; and the pagan and Mohammedan aborigines, never accurately enumerated, but numbering from 1,000,000 to 2,000,000 souls. The natives belong to different tribes: the pagan Veys, among whom the Protestant Episcopal Church of the U. S. has established a mission school at Cape Mount, 40 miles from Monrovia; the Pessehs, entirely pagans; the Bassas, among whom the American Baptist missionaries established a mission in 1835; the Kroos, mostly idolaters; the Mandingos, the most gifted of the tribes; and others. The Mandingos are a native Mussulman race of great intelligence. They read and write the Arabic language with equal facility to their own. The want of roads and other proper means of communication has prevented their becoming identified with the more cultivated inhabitants of the towns. As their country lies about 2,000 feet above the level of the sea, among them are found various animals of the more temperate zones, including horses, cows, and goats. These enter into the commerce of the people, as do also a great and interesting variety of textile fabrics. The Americo-Liberians possess a regular school system, and are progressing in all branches of civilization. The official report for 1892 shows a public-school system embracing 51 school districts, 58 schools, 60 teachers, 1,750 pupils for whose tuition the sum of $10,819 was paid, while 1,850 pupils were instructed in the private denominational schools. The Mandingos are a people by themselves, and have never come under the jurisdiction of the republic of Liberia. They are an extremely fine race of people, and the women are often finely formed and beautiful. Like many of the native African tribes they have shapely limbs and small hands and feet, and have the proud, independent air of a free people. They despise the American Liberian because of his former slavery, and often in disputes with them draw themselves up proudly and exclaim, "Me no slave! me no slave!" The Mandingos and the Veys seem to have been at some former time related, as the Mandingos coming down to the country of the Veys have little difficulty in comprehending them. The Veys are slightly shorter than the Mandingos, being about 5 ft. 8 in. in height. The Bassas are of medium size, and slender, dark brown in color, and keen and shrewd in intellect.

Industries and Commerce.—Industrial processes and manufactures have been started, and a lively trade has sprung up between the republic and the U. S., Great Britain, Belgium, and Hamburg. Palm oil, sugar, cotton, coffee, ivory, camwood, arrowroot, etc., are exported; cotton goods, cutlery, powder, and tobacco are imported. See LIBERIA in the Appendix.

Government and Finances.—The country is divided into four counties—Mesurado, Grand Bassa, Sinou, and Maryland. The capital, Monrovia, is situated on Cape Montserrado, and is a town of several thousand inhabitants. Other settlements are those of New Georgia, Caldwell, Virginia, Edina, Greenville, Lexington, etc. The total population in 1900 was estimated at 2,060,000, only 60,000 of whom were Americo-Liberians. The annual revenue is almost exclusively derived from custom-house duties. The official report of 1900 gives the receipts as $158,861; the disbursements as $151,975, leaving a balance to the credit of the country of $6,886, notwithstanding that in 1871 a debt of $500,000 was contracted. The constitution of the country is modeled after that of the U. S. All men are born free and equal before the law. Elections are conducted by ballot, and every male citizen possessing real estate has the right of suffrage. The president is elected for two years; the senators for four; the representatives for two. Each county sends two senators to the legislative assembly, and one representative for every 10,000 inhabitants. The first president was Joseph Jenkins Roberts, who served four terms, from 1848 to 1856, and was once more elected in 1871. Hilary R. W. Johnson was elected president in May, 1883. On May 5, 1891, John Joseph Cheeseman was, according to the provisions of the constitution, elected president for two years, and in 1893 was re-elected for a second term. English is the official language.

History.—Liberia was founded by the American Colonization Society, which had been organized in 1811 at Princeton, N. J., and had as its object the settling in Africa of freedmen and recaptured slaves. Since 1822 this society has sent out 18,000 persons from America to colonize Liberia. In 1817 agents were sent out to select a site, and chose Sherbro island and the adjacent coast, and in 1820 a colony of eighty-eight persons emigrated, intending to erect huts for the reception of several hundred slaves and to cultivate land for their own support. In 1822 they abandoned their settlement on Sherbro island and made a new one at Cape Mesurado. In 1824 the society adopted a plan for the civil government of Liberia, but retained the ultimate decision on all questions of government. In 1828 a more formal constitution was adopted, giving the colonists greater power in civil matters. To avoid threatened trouble with Great Britain, which claimed that Liberia had no existence as a nation, and could not levy imports on the goods of British traders, the directors of the society surrendered their powers and advised the colony to declare itself an independent nation. This was done July 26, 1847. In 1857 Maryland, a Negro republic to the E. of Cape Palmas, founded as a colony in 1821 by philanthropists of Maryland in the U. S., united with Liberia.

Liberia made an instructive exhibit at the World's Columbian Exhibition, in a court occupying a space allotted to it in the building of agriculture. It was constructed of African woods, tusks of elephants, and ropes. The collection included many interesting ethnological objects. See Stockwell, *The Republic of Liberia, its Geography, Climate, Soil, and Productions, with a History of its Early Settlement* (New York, 1868); *Liberia, the Americo-African Republic* (New York, 1886); and Anderson's *Journey to Musardu.*

FREDERICK DOUGLASS.

Libe'rius, SAINT: a Bishop of Rome, reckoned in the series of popes after Julius I., whom he succeeded May 22, 352. The Semi-Arians, countenanced by the Emperor Constantius, were then in the ascendant, and in the councils of Arles (353) and Milan (355) they condemned the doctrines of Athanasius. Liberius, together with some other Western bishops, having refused to sign this condemnation, was arrested by the emperor's orders and taken to Milan, where Constantius endeavored to secure his obedience by personal solicitation. Finding him resolute in maintaining his previous attitude, Constantius in 354 declared Liberius deposed from the bishopric of Rome, banished him to Berea in Macedonia, and had Felix, a deacon, consecrated in his place. In 357 Liberius was restored to his post in consequence of a petition from the principal women of Rome. The Council of Ariminum (Rimini), convened in 359 for the settlement of doctrinal difficulties, at first followed the suggestions of Liberius by confirming the Nicene Creed and condemning Arius, but gave way to the influence of Constantius, and finally accepted an Arian confession of faith proposed by him. Liberius has been falsely accused of having signed this confession, as well as of having purchased his recall from Berea by submission to the emperor's will as regarded Arianism. He built the basilica now called Santa Maria Maggiore. Felix, the antipope, died Nov. 22, 365. Liberius died Sept. 24, 366, and was succeeded by Damasus I. In the Roman Catholic calendar his festival falls on Aug. 27, and in the Greek on Sept. 23.

Libertad': a coast department of Peru; bounded N. by Lambayeque, Cajamarca, and Amazonas, E. by Loreto, S. by Ancachs, and W. by the Pacific; area, 18,766 sq. miles; population about 150,000. Capital, Trujillo. Libertad, together with Lambayeque, Cajamarca, Piura, and Amazonas, separated from it at various times, constituted the colonial *intendencia* of Trujillo; the present limits were fixed in 1874. The coast region, extending from 7° 10′ to 8° 57′ S. lat., is comparatively low, though much broken, hot, and in great part so dry as to present the appearance of a desert; some of the valleys, however, are very fertile. The western part lies in the Andes, embracing two parallel Cordilleras, with the valley of the Marañon—in parts reduced to a narrow gorge—between them. The mountains are said to be rich in silver, copper, etc., and gold is obtained in affluents of the Marañon; but these minerals are neglected or mined only on a small scale; the mountain region is very thinly inhabited.

HERBERT H. SMITH.

Liberty [from *liber'tas*, freedom, deriv. of *liber*, free]: in the abstract, the power of acting as you will (*postestas vivendi ut velis—Cicero*): but for a finite being this definition has to be modified into the power of acting as you will within the sphere of existence pertaining to the individual. It is assumed also that the will itself is free, in view of motives, to choose what appears to be the greater good before the less, or the less before the greater. For an infinite being the highest freedom coincides with the highest moral necessity; that is to say, there is one course, and one only, which his perfection of nature requires him to choose, and makes it certain that he will choose. For a finite being, moral excellence, united with the greatest perfection of intellect pertaining to human nature, will make the best course of action certain within his sphere of existence.

Liberty in the sphere of the citizen can not be understood without a correct idea of rights. (See JUSTICE and RIGHTS.) Personal and civic liberty may pertain to a man, while in particular cases he renounces the exercise of it; in which case a man waives his right—that is, freely renounces what he was free to own, do, or enjoy. (See also HABEAS CORPUS.) Liberty in this sphere consists in the power of freely exercising those rights which may be deduced from a true idea of the nature and destiny of man. The entire, or nearly entire, absence of such rights makes a man a slave. To be authorized to exercise some of them is imperfect liberty; to enjoy all of them is perfect liberty. Sometimes the liberty exists in a degree, although the individual would be injured if free to act as he chose. Such is the case with children, who have rights even against their parents, yet can not, under wise law, exercise the rights of contract and of testament, because they would be in danger, if they did, of injuring themselves.

Political liberty implies a share in political power, and those restraints on a government and on individuals which are necessary for the protection of one and of all in the civil and political spheres. Such liberty consists in the right of voting, the right of holding office, in a great variety of institutions and of guaranties, and in certain free modes of action in concert with others, such as the rights of association, of discussing, petitioning, and remonstrating against public measures, of freedom of the press, and others. What may be called personal liberty and equality of individual rights may exist without equality of political rights. Thus a man who can not read, or does not hold a certain amount of property or pay a certain house-rent, may have no right to suffrage or eligibility to office. So a woman, a male minor, a foreigner, may have no suffrage; a man over seventy may be incapable of holding a judicial office, or a man under thirty-five be ineligible to the office of President of the U. S. All these last-mentioned disqualifications exist in the U. S. In the most exact use of terms the status of

sueh persons is not equal to that of some others, although the disqualifications affect all, in each of the elasses affeeted, alike. We do make a differenee between *cives optimo jure* and *cives non optimo jure* (citizens enjoying the best right, and eitizens enjoying a right that is not the best). Under free institutions these disqualifications are so few that the persons affected by them are in no danger of having their personal liberties invaded, especially as they are connected by elose relations with others who have a somewhat greater share of political power. If, however, a larger part of a eommunity were shut out of suffrage and the power to hold offiee, in order to keep power in the hands of another distinct part, the guaranties of personal rights would not be felt to be great enough, and the prohibited good would be much coveted, while yet not one of a thousand, perhaps, of sueh persons, would under unlimited suffrage ever hold office.

T. S. Woolsey.

Liberty: eity; capital of Clay eo., Mo. (for location of county, see map of Missouri, ref. 3–D); on the Han. and St. J. and the Chi., Mil. and St. P. railways; 4 miles N. of the Missouri river, 14 miles N. E. of Kansas City. It is in an agricultural and stock-raising region; contains 6 churches, William Jewell College (Baptist), Liberty Female College (non-sectarian), 2 flour-mills, a distillery, and 3 weekly newspapers. Pop. (1890) 2,558; (1900) 2,407.

Editor of "Advance."

Liberty, Va.: See Bedford City, Va.

Liberty, Religious: absolute freedom of religious opinion and worship, the equality of all ehurches, religious associations, or persons in the way of proteetion or restraint by the legally expressed will of the nation. The distinction is quite elear and broad between what is civil and what is religious. Civil government is not to support or hinder any form of religion. Privileges are not to be granted nor are injuries to be inflicted because of religious belief. A state is manifestly unable to exercise minute supervision over religious opinions. The state can not go behind the overt act. Religion looks to the posture of the mind and the heart. Men are bound to submit their judgment on points of faith to no visible body. Toleration is the assumption of the right by eivil process to control religious affairs. Toleration *ex vi termini* implies that the state prefers one or more forms of belief, but graciously allows others. To permit implies the right to prevent.

The New Testament eontains no preeept favoring a national or state religion, or interference by government with the right of worship. It recognizes a clear distinction between "the things which are God's" and "the things which are Cæsar's." Disciples of Christ were such not by compulsion, but by free choice. The kingdom set up was not of this world, acknowleged no temporal head, asked no help from, nor alliance with, civil power. Until the third century Christianity had the hostility of governments. A state religion, under pagan governments, subjected the early Christians to severe persecutions. Unfortunately, Constantine in 313 established Christianity by law, and since that time Christians, when they have obtained power, have allied their religion with civil authorities. When the Roman Catholie Church was established and became strong, the governments of Europe were not so much in alliance with, as in subjeetion to, the ecclesiastieal power. When, as the result of the Reformation, several states in Europe renounced the authority of the pope, Protestant kings and governments, as a substitute for papal dominion, assumed to themselves authority over religion. In some instances, when the pope's authority ceased in the realm, much of the authority exercised by him was claimed by sovereigns, who became the heads of the Church in their respective dominions. Civil governments in Europe universally claimed and exercised the right of legislating upon ecclesiastical and spiritual matters. The power of legislation or control extended to the very being and constitution of the state Church—to its creed, ministry, offices, and ordinances. The Church became completely at the disposal of the eivil power in temporalities and in spiritual condition.

As the result of this claim on the part of the separate governments, a national Church was established in each. The Church thus estabished became the reeipient of state favors, was supported by state property, endowed with manifold and exclusive privileges, and became a part of the govcrnment. These national establishments rested at first on the prineiple of making citizenship and church-membership coextensive. To secure conformity and crush dissent lives were sometimes taken, property confiseated, civil and educational disabilities imposed, and other repressive measures enacted and enforced. Under the humanizing influenees of Christian eivilization this harshness has been greatly modified. In every government of Europe there has been more or less relaxation of rigid rules. Toleration is becoming general, and the tendeney is toward unrestrained liberty of worship. In France several denominations receive Government patronage. In Germany, although the Government elaims the management of ecclesiastical affairs, there is little interference with the right of worship. In Russia progress has not been so marked, but even there the public opinion of Christendom has made itself felt in opening prison-doors and obtaining exemptions. The revolutions in Spain and Italy have rid those countries of former exclusiveness, and now different forms of faith are entitled to protection. In Great Britain the change has been marvelous. The colonies enjoy perfect liberty of religion. The Anglican Church has been disestablished in Ireland. It still remains the establishment in England, as the Presbyterian is the establishment in Scotland, with many privileges, but there is now no public position, not ecclesiastical, for the tenure of which a particular religious belief is required, except the throne, the offiees of Lord Chancellor of Great Britain and Lord-Lieutenant of Ireland, and the office of governor, and certain fellowships, headships, and professorships of a few colleges. These reforms in Europe indicate the irresistible advance of public sentiment. Propagation of religion has almost ceased to be regarded as one of the ends of government. It has been found quite as easy to perseeute or bribe into one religion as into another. The conncetion of Church and state is increasingly regarded as corrupting to the Church, destructive of the purity and spirituality of religion, and antagonistic to the rights of men.

The success and popularity of republican ideas of government have contributed largely to these gratifying results. In the U. S. a distinctive prineiple of government is that what is religious is necessarily, from its very character, beyond the control of the civil government. Religious liberty is an absolute personal right. All denominations, ehurches, and religious faiths are equal and free in the eye of the law. None receive gratuities, nonc are subjected to inequalities. There is entire divorce of Church and state. Within the limits of the public peace and proper order the full liberty of religious thoughts, speech, and action is guaranteed. So long as private rights are not violated, no one is restrained from publishing or advocating his opinions on religion or morals. Worship is sustained, ministers are supported, ehurch-houses are built, missionary operations are carried on, by purely voluntary contributions. The Constitution of the U. S. contains these two articles: "No religious test shall ever be required as a qualification to any office or public trust under the U. S."; "Congress shall make no law respecting the establishment of religion, or prohibiting the free exercise thereof." It is prohibitory only upon the action of the Federal Government in reference to religion. The State eonstitutions are equally emphatic, and generally more specific, in the expression of their jealousy of ecclesiastieal ambition and sectarian intolerance, and in forbidding any diseriminating legislation in favor of, or against, any Church or sect. Absolute religious liberty is the contribution of the U. S. to the science of politics. Many external causes conspired to give it the vantage-ground in the establishment of soul liberty. The Roman Catholic colony of Maryland as early as 1649 passed a formal act granting liberty of conscience to all aceepting the eardinal doctrines of Christianity, as no interpretation of the charter could be made, "whereby God's holy rights and the true Christian religion, or the allegianee due to the King of England, may in any wise suffer by change, prejudice, or diminution." Religions tolerance did not originate in this colony with this act, but existed at least fifteen years earlier; in fact it was secured in the charter itself of the colony, obtained in 1632, earlier even than in Rhode Island, which long was credited with the honor of being the first state in the world to incorporate in its organic law, and to practice, absolute religious liberty. Other colonies set up some forms of Christian worship and established some articles of faith. In New England a kind of theocratic government was established. In South Carolina, New York, and Virginia the Episcopal Church was established. In some of these States harsh attempts were made to enforce conformity. Very early there was positive and prolonged resistance to the attempt to perpetuate the establishment of the English Church in the col-

onies, and the evidence is conclusive that such an attempt hastened the beginning and aided in the success of the American Revolution. J. L. M. CURRY.

Liboce'drus [Mod. Lat.; Gr. λίβος, tears + κέδρος, cedar]: a genus of coniferous trees, of which a few species are known. Two grow in New Zealand, one in Chili, and one (*L. decurrens*) in California, where it was discovered by Fremont, and is now known as white cedar. In France and England it was for some time confounded with the *Thuja gigantea*, or arbor-vitæ of Oregon, which it somewhat resembles. The California species is found only in the mountains, generally at an elevation of 4,000 feet or more. It is a beautiful tree, attaining a height of 120 to 200 feet, with a trunk 6 or 7 feet in diameter, and a peculiar fibrous bark, much like that of *Sequoia*. It has a yellowish wood of great durability, the leaves are glossy and bright, and the young tree is elegant in form.

Libourne': town; in the department of Gironde, France; on the Dordogne, at its confluence with the Isle, and 22 miles by rail N. E. of Bordeaux (see map of France, ref. 7–D). It is a handsome and thriving town, with large manufactures of leather, ropes, nails, and yarn, and trade in wine, salt, grain, and timber. Pop. (1896) 18,016.

Li'bra [= Lat., liter., *balance*]: the sign of the zodiac which the sun enters at the autumnal equinox (about Sept. 23). The constellation Libra has no very remarkable stars. It corresponds at present to the sign Scorpio, while the sign Libra corresponds to the constellation Virgo.

Libra: See As.

Library [from O. Fr. *librairie*, bookstore, bookcase, library, deriv. of *libraire*, bookseller < Lat. *libra'rius*, bookseller, deriv. of *li'ber*, book]: a collection of volumes, manuscript or printed, containing the product of human thought. Libraries are to be ranked among the foremost agencies of civilization. The great development which they have undergone in modern times, and especially since 1875, both in Europe and the U. S., has very nearly doubled the numerical extent of the principal collections, while many more progressive libraries have advanced in a still greater ratio.

The oldest approximations to libraries known were found in the mounds of Mesopotamia, and consist of Babylonish books inscribed on clay tablets, supposed to have been prepared for public instruction about 650 B. C. It is said that Pisistratus founded a library at Athens about 537 B. C., though there is no clear evidence of the fact. Strabo says that Aristotle was the first known collector of a library, which he bequeathed (B. C. 322) to Theophrastus; and this library, through successive hands, at length found its way to Rome on the capture of Athens by Sylla. The story of the great Alexandrian library, founded by Ptolemy Soter, and burned by order of the Caliph Omar in the seventh century, rests on insufficient evidence. Its alleged number of volumes, stated by different writers at from 100,000 to 700,000, so vastly exceeding the aggregate of any library of the Middle Ages, or indeed for three centuries after the introduction of printing, throws discredit upon the whole story, except the single fact of the existence of a collection of books at Alexandria. Plutarch says that the library of Lucullus at Rome was open to all, and this antedated the library of Pollio, which Pliny asserts was the first public library established at Rome. Suetonius relates that Augustus collected in the temple of Apollo two libraries of Greek and Latin writers, while Tiberius and Domitian assembled manuscripts to add to these libraries, and employed scribes at Alexandria to copy works there preserved. Many Romans, notably Cicero, collected extensive libraries, notwithstanding the limitations which the great cost of copying and the scarcity of books and material entailed upon the collectors. St. Jerome records that St. Pamphilus of Cæsarea (A. D. 309) made a collection of 30,000 volumes, chiefly religious, with a view of lending them out to read. This, if authentic, is the first record of a circulating library, except some obscure notices in the Latin writers.

The libraries of the Middle Ages were very limited in extent, and were of monkish origin. One of the earliest known was the still existing library of the Swiss abbey of St. Gall, which claims an antiquity of 1,000 years. As early as the thirteenth century there are records of a library-tax levied on all the members of an individual monastery. Indeed, many mediæval conventual institutions were universities for the copying or reproduction of books, and rendered inestimable service in preserving, before the invention of the printing-press, precious manuscripts which might otherwise have been lost. The first approach to a library in England is said to have been nine precious MSS. brought by Augustine on a mission from Pope Gregory the Great (A. D. 596), and preserved at Canterbury. In 668 this deposit at the monastery of Christ Church was enlarged by the library of Theodore of Tarsus, brought from Rome in the same year. The abbey of St. Albans had a collection by the year 1100, and other monasteries of the English Benedictines collected a few hundred volumes. The monastery of Croyland had 300 volumes and 400 tracts, all of which perished by fire in 1091. Richard of Bury (A. D. 1333) was an enthusiastic book-collector, and has eloquently written in praise of libraries in his *Philobiblon*. Among the earliest royal libraries that of Charles VI. of France numbered 1,100 volumes in 1411. As late as the reign of Henry VIII. the royal library of the British crown contained only 329 volumes. In striking contrast to this literary poverty in England and France was the splendid library of Matthias Corvinus, King of Hungary, which at his death in 1490 numbered 50,000 volumes, nearly all MSS. Forty years afterward this precious collection was pillaged and burned by the Turks. Lorenzo de' Medici gathered a great library, which still forms the basis of the Laurentian Library of Florence. In 1556 the royal library of France, then containing 2,000 volumes (of which only about 200 were printed books), received by royal ordinance the privilege of a copy of every book printed in France. This was the foundation of the copy-tax, which has been the means of enriching so many of the great government libraries of Europe. That of France had grown to 200,000 volumes as early as 1789, and was then, as now, the foremost library in the world. Italy, which has long enjoyed the reputation of being rich in libraries, and which possesses many manuscript treasures and early printed books, is poor in collections of modern literature. The library of the Vatican, the most precious in Rome, contains about 275,000 volumes of printed books and 25,000 MSS. In Germany, the land of books and universities, are more libraries of great extent and value than in any other European country. Petzholdt, in his *Adressbuch der Bibliotheken Deutschlands* (1875), enumerates 1,044 libraries of all grades in Germany, Austria, and Switzerland, twenty-nine of which contain over 200,000 volumes each. The largest collections are the Royal Library at Berlin, 925,000 volumes, including pamphlets; the Imperial Public Library, Vienna, 540,000; the University Library at Strassburg, now numbering 700,000 volumes; and the Royal Library at Munich, 700,000 books and 500,000 pamphlets. The last-named library has long passed in statistical tables as the second in Europe; this claim was based on the fallacious system of enumeration which counted every thesis and tract as a separate book—a method which would swell many collections in our table to double the figures claimed for them. France has, besides the National Library, over twenty collections of 100,000 volumes or upward, and the provincial libraries of that country furnish superior opportunities for improvement. Spain has about thirty public libraries, containing altogether some 700,000 volumes, of which the largest, the National Library at Madrid, has 530,000. The Imperial Library of St. Petersburg, now containing over 1,000,000 volumes, is, next to the libraries of Paris and the British Museum, the richest in Europe. Of Northern European libraries, the Royal at Copenhagen contains 550,000 volumes, most others being of small account in comparison.

In Great Britain, the library of the British Museum dwarfs all other collections. Founded in 1753 by the wise and timely purchase of Sir Hans Sloane's collection for £20,000, it received no other grant of public money for its increase until 1807, or more than half a century. It has been fortunate in munificent gifts of many valuable private collections, and there has been a systematic and highly successful effort to make it a great monumental library whose fundamental idea should be inclusiveness, not exclusiveness. For many years past the sum expended for books and binding has been £16,000 annually, and the British Museum Library now counts 1,650,000 volumes. Next to this stands the Bodleian Library at Oxford, the oldest and most valuable collection, next to the British Museum, in England, now numbering 530,000 volumes. The library of the University of Cambridge stands next, with 500,000 volumes. The Faculty of Advocates library in Edinburgh numbers 393,000, and the library of Trinity College, Dublin, has about 225,000. These five libraries enjoy the benefit of the copy-tax, and may each

claim one copy of every work printed in the United Kingdom. In Great Britain there are only fourteen libraries exceeding 100,000 volumes each. Provincial and town libraries are, however, springing up, having been originated in 1850 with the Manchester Free Library. The fact that for nearly a century and a half after Shakspeare's time there was no public Library in London speaks volumes as to the development of this means of public enlightenment.

The first establishment of a library in the U. S. was in 1638, when the library of Harvard College was founded at Cambridge, Mass. In 1700 a public library was founded in New York city, which was known for over half a century as the City Library, but, not flourishing in that form, was converted into a subscription library in 1754, becoming the New York Society Library. Yale College Library was founded in 1700. In 1731 Dr. Franklin and his associates founded in Philadelphia a library company, still in existence, which was the first subscription or proprietary library of which there is any record. The Library of Congress—or, as it was called in its first general catalogue, the Library of the U. S.—was founded in 1800, on the establishment of the seat of government at Washington. The Capitol and library having been burned in 1814 by the British army, Congress purchased ex-President Jefferson's collection of 7,000 volumes as the basis of a new library, which was gradually increased until 1851, when it had reached 55,000 volumes, and was again nearly consumed by fire, only 20,000 volumes being saved. The collection now numbers over 735,000 books, besides 225,000 pamphlets. The valuable scientific library of the Smithsonian Institution was incorporated with the collection in 1866. The library of Congress is rich in history, jurisprudence, political science, and books relating to America, while no other department of letters has been neglected in its formation. It is the only library in the U. S. receiving the benefit of the copyright law, through which it will in time come to possess an approximately complete representation of the entire product of the press of the U. S. The preservation in a national fireproof repository of all the national literature, with a selection of the best literature of all other countries, is a boon which will be more and more appreciated by scholars with the advancing development of the country. Next to the Library of Congress in numerical extent stands the Public Library of Boston, founded in 1848, and now numbering over 600,000 volumes, circulating through numerous branches or subsidiary libraries in the suburbs of that city. This is one of the most widely useful collections of books in America, lending its volumes free of charge to all citizens. Its example has been widely followed in other cities and towns. Cincinnati and Chicago, for instance, have each rapidly increasing free-lending libraries, supported, like that of Boston, by funds derived from municipal taxation.

The school-district library system, originated by New York in 1838, has been adopted by many other States, the books collected being paid for by a proportion of the school taxation fund of the respective States. The State libraries of the country are many of them collections of considerable extent and value. That of New York at Albany is the largest, numbering 190,000 volumes, and furnishing a model of a well-stored and liberally managed public library, free to all. In the other States, and in all of the Territories, libraries have been gathered at the seat of government, primarily for legislative uses, and consist chiefly of documents, all of which are open to public use and reference.

A class of subscription libraries which have had much success in the U. S. are the mercantile libraries, of which those of New York and Boston were founded in 1820, the Philadelphia Mercantile in 1821, the Cincinnati in 1835, and the San Francisco in 1853. Of professional libraries, law, medical, theological, and scientific, there are many. The largest medical collection in the U. S. is the library of the surgeon-general's office at Washington, numbering 110,000 volumes; next to which stands the library of the College of Physicians, Philadelphia, with 52,000. Several of the historical societies, of which more than 240 have been organized in the U. S. since 1789, have valuable libraries, those of New York, Massachusetts, and Pennsylvania being especially rich in early American books and pamphlets, and in manuscripts. Public libraries founded by individual bequest are becoming numerous. Some of the principal are the Astor and the Lenox Library at New York, the Watkinson Reference Library at Hartford, the Newberry and John Crerar libraries at Chicago, and the Peabody Institute and Enoch Pratt Free Library at Baltimore.

By the returns of 1892 the public libraries in the U. S., including in that designation every collection down to college, society, religious, and other libraries, numbering 1,000 volumes and upward, each, as well as the large libraries open to public reference, numbered 3,804 collections, aggregating about 27,000,000 volumes. The number of libraries in the U. S. returned as containing 10,000 volumes or upward was 609, according to the tables published by the commissioner of education in 1893. These library statistics exhibit an increase in the last six years of 66 per cent. in the number of volumes contained in American libraries—a fact as gratifying as it is remarkable.

The following table exhibits all the libraries of the world known to contain 100,000 volumes or upward at the latest dates. The figures given are for years varying from 1890 to 1895, except for the libraries of the U. S., which are corrected to the year 1895.

City.	LIBRARY.	Volumes.
Aberdeen, Scotland	University	120,000
Aix, France	Méjames	151,430
Albany, U. S. A	New York State	189,359
Amsterdam, Netherlands	University	100,000
Annapolis, U. S. A	State Library	100,000
Athens, Greece	National	185,000
Augsburg, Germany	Royal and City	200,000
Avignon, France	City	120,300
Baltimore, U. S. A	Enoch Pratt Library	163,000
" "	Peabody Institute	123,000
Bamberg, Germany	Royal	300,000
Barcelona, Spain	Provincial and University	154,000
Basel, Switzerland	Public University	186,900
Berlin, Germany	Royal	925,000
" "	University	215,000
Besançon, France	Public	140,000
Birmingham, England	Free	200,290
Bologna, Italy	University	255,000
" "	Municipal	226,376
Bonn, Germany	University	219,000
Bordeaux, France	Public	160,000
Boston, U. S. A	Public	610,000
" "	Athenæum	183,000
Bremen, Germany	City	120,400
Breslau, Germany	Royal and University	300,000
" "	City	153,000
Brooklyn, U. S. A	City	120,000
Brussels, Belgium	Royal	402,000
Budapest, Hungary	National	463,000
" "	University	211,626
Caen, France	Municipal	100,620
Cambridge, England	University	506,500
Cambridge, U. S. A	Harvard College	448,000
Carlsruhe, Germany	Grand Ducal	167,424
Cassel, Germany	National	160,000
Charkow, Russia	University	129,871
Chicago, U. S. A	Public	211,157
" "	University	380,000
" "	Newberry	125,000
Christiania, Norway	University	330,000
Cincinnati, U. S. A	Public	202,705
Cologne, Germany	City	117,000
Copenhagen, Denmark	Royal	550,000
" "	University	305,000
Cracow, Austria	University	306,784
Darmstadt, Germany	Grand Ducal	400,000
Detroit, U. S. A	Public	131,192
Dijon, France	Municipal	101,558
Dorpat, Russia	University	179,867
Dresden, Germany	Royal Public	406,000
Dublin, Ireland	Trinity College	231,538
Edinburgh, Scotland	Faculty of Advocates	393,000
" "	University	181,000
Erlangen, Germany	University	183,000
Ferrara, Italy	Communal	100,000
Florence, Italy	Marucellian	130,000
" "	National Central	452,579
Frankfort, Germany	City	186,805
Freiburg, Germany	University	250,500
Geneva, Switzerland	City	121,500
Genoa, Italy	University	111,057
Ghent, Belgium	University	350,000
Giessen, Germany	University	160,000
Glasgow, Scotland	University	150,000
Gotha, Germany	Ducal Public	207,037
Göttingen, Germany	Royal University	481,800
Graz, Austria	University	139,055
Greifswald, Germany	Royal University	148,000
Grenoble, France	City	174,090
Hague, The, Netherlands	Royal	400,000
Halle, Germany	University	190,800
Hamburg, Germany	City	505,000
Hanover, Germany	Royal Public	163,500
" "	Technical High School	145,000
Heidelberg, Germany	University	406,625
Helsingfors, Russia	University	173,000
Innsbruck, Austria	University	139,476
Ithaca, U. S. A	Cornell University	175,000
Jena, Germany	University	200,800
Kasan, Russia	University	167,924
Kieff, Russia	University	118,000
Kiel, Germany	University	222,885
Königsberg, Germany	Royal and University	221,100
Leipzig, Germany	City	107,256

City.	LIBRARY.	Volumes.
Leipzig, Germany	University	504,000
Lemburg, Austria	University	130,532
Leyden, Netherlands	University	190,000
Liège, Belgium	University	200,000
Lille, France	City	100,511
Lisbon, Portugal	National	209,415
Liverpool, England	Public	181,131
London, England	British Museum	1,650,000
" "	London Library	100,000
" "	University College	105,000
Lubeck, Germany	City	100.000
Lund, Sweden	University	150,000
Lyons, France	City	101,600
Madison, Wis., U. S. A.	State Historical Society	106,000
Madrid, Spain	National	530,000
" "	University	206,134
Manchester, England	Free Reference	250,503
Marburg, Germany	University	150,000
Marseilles, France	City	103,656
Mayence, Germany	City	181,100
Meiningen, Germany	Ducal Public	150,000
Melbourne, Australia	Public	153,000
Mexico, Mexico	National	100,000
Milan, Italy	Ambrosian	178,100
" "	National Brera	228,800
Modena, Italy	Esti	128,451
Montpellier, France	City	120,090
Moscow, Russia	University	217,000
" "	Public Museum	350,850
Munich, Germany	Royal, including pamphlets.	1,200,000
" "	University	402,000
Münster, Germany	Royal Paul	110,300
Nantes, France	Library	104,403
Naples, Italy	University	171,506
" "	Royal National	363,693
New Haven, U. S. A	Yale College	234,500
New York, U. S. A.	Astor	260,651
" "	Mercantile	248,950
" "	Columbia College	210,000
Odessa, Russia	University	163,718
Oldenburg, Germany	Grand Ducal	113,203
Oporto, Portugal	Public Municipal	100,000
Ottawa, Canada	Parliament	150,000
Oxford, England	Bodleian	530,000
Padua, Italy	Royal University	138,143
Palermo, Italy	National	184,938
" "	Communal	216,263
Paris, France	National	2,701,972
" "	Arsenal	463,654
" "	St. Geneviève	122,392
" "	Sorbonne	170,000
" "	Mazarin	305,800
" "	University	141,678
Parma, Italy	Palatine	258,190
Pavia, Italy	University	137,100
Philadelphia, U. S. A.	Library Company	182,962
" "	Mercantile	171,000
" "	University of Pennsylvania.	115,000
Piacenza, Italy	Communal	122,010
Pisa, Italy	Royal University	109,274
Prague, Bohemia	University	222,511
Princeton, U. S. A.	College of New Jersey	135,000
Quebec, Canada	Laval University	100,000
Reims, France	City	101,700
Rio Janeiro, Brazil	National	235,000
Rome, Italy	Vatican	275,700
" "	Casanata	217,000
" "	National	366,067
Rostock, Germany	University	307,000
Rouen, France	Public	135,800
St. Andrews, Scotland	University	115,000
St. Louis, U. S. A.	Public	103,000
St. Petersburg, Russia	Imperial Public	1,106,000
" "	Academy of Sciences	170,000
" "	University	238,388
San Francisco, U. S. A.	Sutro Library	205,000
Stockholm, Sweden	Royal	341,000
Strassburg, Germany	University	700,000
Stuttgart, Germany	Royal Public	500,000
Tokio, Japan	University	188,000
Tours, France	City	101,743
Troyes, France	Communal	112,828
Tübingen, Germany	University	320,000
Turin, Italy	University	269,300
" "	National	209,462
Upsala, Sweden	University	292,000
Utrecht, Netherlands	University	200,000
Venice, Italy	St. Mark's National	415,816
Verona, Italy	Communal	140,480
Vienna, Austria	Imperial Public	539,105
" "	University	455,560
Warsaw, Russia	University	131,500
Washington, U. S. A.	Library of Congress	735,490
" "	House of Representatives	125,000
" "	Surgeon-general U. S. army.	110,847
Weimar, Germany	Grand Ducal	230,000
Wolfenbüttel, Germany	Brunswick Ducal	302,003
Würzburg, Germany	University	300,000
Zurich, Switzerland	City	134,300

The classification of every library by subject-matters is indispensable. The catalogue system most universally employed is the card catalogue in manuscript, by which a strict alphabetical arrangement is secured, and the accessions to the library can be kept constantly catalogued up to date. The printing of complete catalogues has been abandoned by most of the largest collections, including the principal government libraries of Europe, as too expensive and laborious to be kept up without falling hopelessly into arrears. When it is considered how enormous is the production of printed matter, and that the principal libraries both in Europe and in the U. S. have doubled during the last twenty-five years, this deprivation to the public of the boon of printed catalogues of the largest collections is partially explained. Yet there is no library hitherto gathered, however large, which contains anything like a complete collection of the literature of all nations, or even of its own. Every national library should have for its object the collection and preservation, on the exhaustive system, of all that the country within which it is located produces. The use of a great library is not for one generation only, but its value is developed by passing into the hands of successive generations, and furnishing a complete record of the progress of letters from age to age. See the article on LIBRARY ADMINISTRATION below.

A. R. SPOFFORD.

Library Administration: the arrangement and management of libraries.

I. *The Building.*—Libraries are now for the most part planned, like most other buildings, with a view to utility, and not to mere architectural beauty of design externally. Nearly all modern library buildings have certain features in common: (1) A large lobby or delivery-room centrally located, properly under a rotunda where such a feature is introduced; (2) a well lighted and ventilated reading-room opening from the delivery-room, and preferably separated from it by a partition largely of glass, enabling the delivery attendant to supervise the reading-room as well; (3) librarian's room and cataloguing-room, also in immediate connection with the delivery-room, in order that the librarian may be entirely accessible to the readers and may also have the cataloguing work under his eye; (4) delivery counter and desk at the side or end of the delivery-room nearest the book-room, furnished with all needed facilities for the prompt supplying of the wants of readers; (5) the book-room itself, so arranged as to combine large capacity for books with the greatest possible convenience in their use. The only important difference among intelligent librarians as to the plan for a library building refers to the arrangement of the book-room. The stack system is a favorite with some, and has been largely introduced into the newer buildings. Under this system, of which the best examples are to be found in the new congressional library, the book-room is a clear space from floor to roof, from 50 to 80 feet in height, and in it is built up an iron or steel framework consisting of bookcases running across the room at intervals of about 2 feet, and reaching from the bottom to the top, light openwork floors being introduced at every 7 feet in height, so that all books can easily be reached from the floors. The great advantage of the stack system is in its compact storage of books, in which it undoubtedly excels any other known method; but serious drawbacks are connected with this advantage. It is impossible to introduce daylight into the interior portions of a stack, and the effort to do so leads to the use of very large side windows and of skylights, both of which are objectionable, the former for the injury from excessively strong light to books placed near them, and the latter for the roof heat, which is seriously injurious to books in the upper portions of the stack. The stack is also inimical to the plan of allowing readers access to the shelves, a plan which is growing in favor in all but the circulating departments of the larger libraries.

The plan of building most in favor as opposed to the stack system is the one advocated for many years by Dr. W. F. Poole, of Chicago, and incorporated in the Newberry Library under his direction. By this plan the building is divided into separate stories, from 15 to 18 feet high, only the lower half of each story being occupied with bookcases, and the upper part devoted to the proper distribution of light and air. Fewer books can be accommodated in a building of a given height on this plan than with the stack, but they can be so much better accommodated that the difference is fully atoned for. Dr. Poole's system provides abundant daylight, admitted mainly in the upper part of the walls of each story, and so being of the most available kind. Either of these methods of building is equally adapted to large or small libraries, the differences being mainly in the matter of size and proportions. A library of 100,000 volumes can be provided for on the Poole plan in a

book-room 60 × 80 feet, and space be left for convenient use by readers admitted to the shelves. When a library grows beyond this size it will naturally be divided into departments occupying separate floors, each provided with reading-room and other facilities.

II. *Classification of the Books.*—The classification of books is a matter requiring much attention from the librarians. Even in a circulating library it is needed to facilitate the finding of books for applicants, but it is especially useful in reference libraries or where readers go to the shelves naturally wishing to find the books on a given subject together. Classification is to many a fascinating study, and various elaborate schemes have been worked out which are widely adopted. Chief among those now in use are the Dewey decimal and the Cutter expansive systems. By the Dewey system the library is divided into ten sections—Philosophy, Theology, Sociology, Philology, Science, Useful Arts, Fine Arts, Literature, History, and General (encyclopædic and bibliographical). Each of these is separated into ten divisions and these again on the same decimal plan; thus number 974 means simply the fourth subdivision (New England) in the seventh division (North America) of the ninth section (History). In the later editions of this scheme it is very thoroughly worked out and copiously indexed, and presents many claims for acceptance. The chief objection to it is found in the "Procrustean" nature of this rather arbitrary method of division. The Cutter system recognizes the need of a more elastic scheme, and provides, by a somewhat intricate combination of letters with figures as symbols of notation, for a division at any point into any desired number of subdivisions. The system takes its name of "expansive" from the fact that it is presented in seven forms proceeding from the simplest to the most complex. A small library may be arranged by the first form of the scheme, and as it increases there may be applied to it the additional features of the more complicated forms, one after the other, without materially changing any of the book-designations already used. Both of these systems, and others which have had wide acceptance, are ingenious and elaborate, being carefully constructed on the basis of a division and subdivision of the field of knowledge. As was long ago pointed out by Edward Edwards in his *Memoirs of Libraries*, these schemes are better adapted to the arrangement of titles in a catalogue than to that of volumes on the shelves. The reason why no fine scheme of classification can ever be rigidly applied to books is that so many of the best books are composite in their nature and can not be broken up to fit the classification. The great argument for elaborate classification is that it will exhibit in a given place all the resources of the library on a certain subject. Just so far as the classification is depended on to do this it will be misleading, and tend to limit and dwarf one's reading. For example, if there is in the political economy section a class "Taxation," one may find perhaps two or three books arranged under that subdivision; while in order to find the best material the library has on the subject he should be referred to the general works on political economy and to many papers in the publications of societies, in the periodicals, etc. In the natural sciences the same thing is more strikingly true, as in many cases much more on a given subject can be found in transactions and periodicals than in separate books.

If it is thus understood that the classification can not be made to serve the purpose of guiding the reader to the material he needs, the reason for devoting painstaking attention and large expense to its elaboration falls to the ground. One-fourth of the effort sometimes expended in this direction is ample to provide for a simple and practical arrangement of the books, the main dependence for finding books being placed, as it must always be, on the catalogue. An effective classification for a small library, say up to 10,000 or 15,000 volumes, may be made by separating the books into about ten or twelve classes as: (*a*) Fiction, (*b*) Juveniles, (*c*) Poetry, (*d*) Miscellaneous Literature, (*e*) History, (*f*) Travels, (*g*) Biography, (*h*) Natural Sciences, (*i*) Useful Arts, (*j*) Fine Arts, (*k*) Philosophy and Religion, (*l*) Political and Social Science. To each of these classes will be applied a letter of the alphabet, as above, and in each class the books will be numbered consecutively from 1 up. When the library has outgrown this classification and demands a more minute subdivision, this can easily be made by adding a figure or another letter to each of the class-marks, and renumbering the books. A classification made for the individual library and growing out of its own exigencies is better than one imported from without.

III. *Cataloguing.*—Cataloguing is recognized as the most important feature of technical librarianship. The only accepted form of library catalogue is that arranged alphabetically, primarily by authors and titles, secondarily by subjects. The subject portion of a catalogue is often given in classified form, but even here the alphabetical is probably the more common method of arrangement. Formerly every library undertook periodically to issue its printed catalogue, and there was quite a rivalry among libraries as to the elegance and thoroughness of their issues. The rapid growth of libraries rendered this process so expensive and its results so unsatisfactory that the practice has very generally been abandoned in favor of the issue of simple and cheap finding-lists for the use of readers, dependence for anything more complete and elaborate being placed on the manuscript catalogue kept in the library. Finding-lists are usually made in a classified form, the titles being grouped under subject-headings, those in each group being arranged alphabetically by authors. Titles are written as briefly as is consistent with their serving to identify the books. Most libraries print these finding-lists on fine Manilla paper to resist the wear and tear of use by their popular constituency, and issue frequent supplements and occasional new editions.

Permanent catalogues in manuscript are now almost universally made on the card system. Each title is written (or type-written, or even printed) on a separate Bristol-board card, generally of the ordinary postal-card size, and these cards are set on edge in drawers in alphabetical order. By this means insertions can be made at any point and to any extent without deranging the titles already in place. Entries are usually made for each book not only under the name of its author, as Birrell, *Augustine. Obiter dicta*, London, 1887, 16mo, but also under title, as Obiter *dicta*, by A. Birrell, and under subject, as English literature, Birrell, A., Obiter dicta.

Most books thus require three separate cards placed in different portions of the catalogue. In many cases even this is not sufficient. For example, the book already referred to has distinct chapters on several prominent English authors. To make the subject portion of the catalogue complete, each of these chapters requires a card headed with the name of the person treated, as Milton, John, Birrell, A., *In his* Obiter dicta, vol. i. Johnson, S. Birrell, A., *In his* Obiter dicta, vol. ii. These latter entries are called analytics, and where thoroughness of cataloguing is made an object, they become very numerous, as some books are worthy of having cards made for them under a hundred or more different subjects. To reduce to a minimum the labor and expense of this elaborate cataloguing, all title and subject entries and all analyticals are usually written very briefly, just enough being given to refer the reader to the book intended. The author-card, on the other hand, generally receives more careful and fuller treatment. On it are given such particulars as second edition, illustrated, and the imprint, number of pages, etc., also all library marks necessary for a complete record of the book. The author-card thus becomes the primary or complete entry, the others being regarded as references. In some libraries the different classes of cards are kept in separate sets of drawers, one constituting the author-catalogue, another the subject-catalogue. The title-entries are generally placed with the authors, but sometimes with the subjects. This division of the catalogue seems especially useful in university libraries and others where the patrons are mostly somewhat scholarly and well-informed. In popular libraries it is generally preferred to merge the whole in one general alphabet, and in one alphabetical order, this arrangement being known as a dictionary catalogue, meaning that one is to look for either authors, subjects, or titles in the same alphabetical order as one would look for words in a dictionary. The best examples of printed catalogues have been made on precisely the same principles, and they have often been printed directly from the card-catalogue. Those of the Boston Athenæum, Boston Public Library (Bates Hall), Peabody Institute of Baltimore, and Cleveland Public Library may be cited as good examples of the printed dictionary catalogue. All these conform to the *Rules for Making a Dictionary Catalogue*, compiled by Charles A. Cutter, and issued by the U. S. Bureau of Education. These rules are generally followed in the libraries of the U. S., Mr. Cutter having compiled them in 1876, rather as a consensus of the practice of leading librarians than as a scheme of his own.

The general principles of cataloguing as given above may seem quite simple, and one may well be surprised to

know that it requires 120 closely printed octavo pages to contain *Cutter's Rules* with the neeessary specifications, examples, exceptions, and discussions of mooted points. The fact is that books present so many differences of practiee among authors and publishers that, outside of a comparatively small number that are regular and fall under simple rules, every book taken up seems to require some special treatment, and the expert cataloguer, after a lifetime in the work, often finds his ingenuity taxed in the effort to make a book fall in with the established rules and precedents, the only object sought being to make the book findable by means of the catalogue as likely to be understood and used.

For many years librarians have been impressed with the evident extravagance and wastefulness of a system under which all the elaborate and earcful work described above must be done for each book in each one of perhaps hundreds of libraries in which the book was to be found. Relief has been sought in two directions. In the first place, the attempt has been made with considerable suceess and with promise of more, to reduce the amount of work put into the subject-eatalogue by substituting for its analytical referenees indexes, printed and thus made available once for all. As an illustration of this reform may be mentioned the fact that for some years prior to 1880 many of the larger libraries were putting into their eatalogues as analyticals references to leading periodieal articles. In 1882 the new and enlarged Poole's *Index to Periodicals* was published, and has been kept up to date by supplements, and this part of the cataloguing work was thus rendered unnecessary. Similarly the *A. L. A. Index* to essays and composite books, published in 1893, has made it unnecessary to insert such analyticals as those given above in connection with *Obiter dicta.*

The other way in which relief is being found from the wasteful repetition of careful cataloguing of the same books in multitudes of libraries is in the furnishing to libraries of the titles already printed on cards by some central agency. This system has been fairly established by the Library Bureau of Boston, and it only remains to be seen whether there is a sufficient number of books common to many libraries to make the undertaking successful. Another scheme is that of the Rudolph Indexer Company, who offer to furnish to libraries printed titles of all books which they may have on narrow strips of cardboard to be clipped by an ingenious proeess on large sheets of pasteboard, put together by a detaehable binding in large volumes, or strung on endless bands and made to pass before the reader under glass by turning a crank, the slips to be movable for the insertion of new ones in their proper places.

IV. *Other Records.*—Besides the regular catalogue of a library made in general as described above, other records of its books are essential. First among these is the aecession-book, or register of all books as received. This can readily be so kept as to be practieally a bill-book, each lot of books being entered in it from the bill, but with titles extended, and all neeessary particulars given. The usual items for each book are: Date of entry, aecession-number (a running number carried on continuously from the first), shelf-number (inserted afterward), author and title, plaee of publication and publisher's name, date of publication, number of volumes, size, binding, from whom reeeived, price, remarks (a blank for future statements). This makes a permanent reeord which is useful for many purposes, especially when books are lost or misplaced, or the catalogue-eards are found to disagree, or are themselves lost.

One more record must be kept up in order to maintain a library in efficient working order—a shelf-list. This is usually a series of lists rather than one, a separate list being made for eaeh subdivision of the library, the titles being arranged in the due order of the books on the shelves. The main uses of the shelf-list are two—to answer at once the constantly recurring question, To what book does a certain number belong? and to serve as a stock-book in the annual stock-taking or examination of the library.

No library, however small, can afford to dispense with any of these records. The smaller the library, the more easily can they be made and maintained, and in a simple form they should be found in the smallest. In many larger libraries there is nothing else that causes so much trouble as the fact that the records made in their early history were so imperfect, if indeed any have been preserved.

Many different methods of recording loans are in use, but the one most in vogue has great advantages over all others. This is the book-card system; each book contains, while in the library, a card headed with its number and title. When a book is drawn, its card is marked with the borrower's number and the date, and placed in a box on the desk. In this box the cards are stood on edge, and those drawn on each day are separated from the others by a movable partition of wood or pasteboard, marked with numbers representing the days of the month. When books are returned, their cards are taken from the box and returned to the books, and those remaining in the box make it appear at once what books have been kept out over the allotted time. The usual praetice is to send for these books by a printed postal-card notice, which is generally received as a favor by the reader, who is thus saved from accidentally running up a large fine. This system is so simple and effective that it is to be advocated for the smallest libraries, while with some added features, to fit the exigencies of a particular case, it is also suited to those having the largest circulation.

V. *Reading-rooms.*—Reading-rooms constitute an important part of all public libraries. These rooms should be earefully adapted to their peculiar uses. The following are some of their requisites: Ample daylight from north or east windows; good warm air in winter, and ventilation at all seasons without draughts; sufficient and well-placed artificial light—incandescent electric lamps, dropped near the tables and well shaded, are by far the best means; good reading-tables (small ones are best), and light, arnless chairs shod with rubber. Reading-room floors, and all those subject to much passing, should be covered with linoleum or cortieene. The room should be well supplied with reference-books, consisting of dictionaries, encyclopædias, atlases, and the many special works adapted to this use, as dictionaries of biography, history, literature, science, music, fine arts, biblical and religious knowledge, etc. The number of these books which, each in its own field, supplement the ordinary encyclopædia with more extended and precise information, is considerable, and a public reading-room is greatly enriched by a full supply of them. Sets of the leading periodicals, with the volumes of *Poole's Index* up to date as a key to them, also form a desirable feature.

VI. *The Reference-room.*—In many libraries the reading-room is supplemented by a reference-room, in whieh ease the latter receives most of these reference-books, and is also used for the consultation of books drawn freely from the library for that purpose. The change in methods of instruction, by which pupils are expeeted to read on various topics of study the best available books, tends to send people to the library to study up subjects rather than to draw single books. Whatever value may attach to the circulating of books for home reading (and it is inestimable), this reference-work is coming well to the front as a leading function of the library. For its effective accomplishment a library needs special means, among which may be named, outside of its own complete catalogue, a good outfit of general and special bibliographical books, indexes to literature, catalogues and bulletins of other libraries, but above and before all else a qualified librarian. The qualifications required in this position are a good knowledge of books, a large stock of general information, a lively interest in the pursuit of knowledge, and infinite patience with the vagaries and the ignorance of many applicants for help. In a library of any importance the ehief librarian can not do this work, but much is gained if he is entirely aceessible, so that those who think they need the best guidanee the library can afford, can freely resort to him. Most of this assistanee to readers must devolve on the one attendant whose business it is, and about whose desk are gathered the needed indexes, bibliographies, etc.

Within a few years there has been a reaction against the rigid exclusion of readers from the book-shelves of public libraries, and arrangements are now made in many institutions for their free access to such classes of books as they may wish to consult. So far as this freedom of access proves to be consistent with the safety and good order of the library, it should certainly be granted, and will be of great value in giving readers contact with books in masses and an opportunity to become acquainted with the outside at least of many not read, and thus to acquire much of the bookishness which makes people intelligent readers and stimulates a fondness for books and ease in their use. Every scholar knows the difference between selecting books for his own use from a list of titles and going directly to the books themselves. It is coming to be recognized that much of the good which a public library might do in providing the means of culture is sacrificed when readers are

kept away from the books and served only through an apparatus of catalogues, cards, tickets, and red tape, managed by ill-instructed and unsympathetic attendants.

VII. *College Libraries.*—College and university libraries present some features affecting the administration which differ from those met with in public libraries. Reference-work in them predominates largely over circulation, though general culture through miscellaneous reading is not overlooked. The departments of study must each receive special attention along the lines of the curriculum, while enough attention is paid to general literature to make the library fairly representative of the best authors. Where seminary methods of instruction prevail, department libraries are generally formed by withdrawing books from the general library for this purpose. The preservation of these segregated books from loss and injury can only be effected by some such system as that employed at Harvard University, where each of the departments is frequently visited by an officer of the library, who checks off the books and institutes an immediate inquiry for any found absent. It is desirable that the number of books from the general library set aside for department use should not exceed absolute requirements, and books of value for general reading should be duplicated if needed for a department.

In a college library there can not be the same strictness of regulation as to the loan of books that is usually enforced in a public library. Professors and teachers will require considerable latitude as to the number of books taken out and the length of time for which they can be kept, nor can any regulation of these matters be enforced by fines in the case of the faculty. It therefore becomes necessary that the record of loans shall be so kept that the whereabouts of any book may be immediately ascertained, in order that it may be sent for if especially wanted. By such a system a library may be kept at its highest efficiency, it being understood that one who desires to get a book is not debarred by its being in use, but may have it recalled if the person who has it is not actually using it at the time. The system of charging books loaned by means of cards, described in the early part of this article, is exactly adapted to this purpose.

No class of readers is more likely to be benefited by direct access to the book-shelves than students, and in many colleges they are freely admitted to the larger part of the library. The idea is gaining ground that it is an essential part of a liberal education to learn to use books. Brief courses in bibliography and the use of books are now given as a part of the course of instruction in several colleges and universities, and in others efforts are made to furnish to individual students visiting the library all needed facilities for becoming acquainted with the bibliographical apparatus, and learning to make practical use of it.

VIII. *Training of the Librarian.*—The growing demands of the librarian's position and the increasing appreciation of its importance have led to provision for the training of those who would enter it. Since 1886 a school of library economy has been conducted by Melvil Dewey, first at Columbia College, and now at the State Library at Albany. This school provides a regular two years' course of instruction, theoretical and practical, and has already graduated a large number of students who are acceptably filling important positions. Shorter courses in library economy are also offered at the Pratt Institute in Brooklyn, the Drexel Institute in Philadelphia, the Public Library, Los Angeles, Cal., and the Summer School of Languages at Amherst, Mass. *The Library Journal*, established in 1876, is a veritable thesaurus of information on all library topics, containing, in addition to much other matter, the papers and proceedings of the meetings of the American Library Association, held nearly every year since 1876. The meeting held in 1893 at Chicago was so arranged that its papers covered the whole field of library work, each topic being assigned to a writer specially competent to treat it. The report of this meeting, issued by the U. S. Bureau of Education, constitutes almost an encyclopædia of library science. W. I. FLETCHER.

Libur'nia: in ancient geography, a mountainous district of Illyricum extending along the coast of the Adriatic in the present Croatia and Dalmatia. Driven by the unfriendliness of their mountains, the Liburnians turned their attention to commerce; their ships were seen in every sea, and became of great value to Rome after the submission of the Liburnians in 176 B. C. Revised by J. R. S. STERRETT.

Lib'ya (in Gr. Λιβύη): the name which was given by the Greeks to the whole continent of Africa, but after the Roman conquest the name Africa became universal, and the name Libya was generally applied only to that part which is now called the Libyan Desert, extending from Egypt to Fezzan and from the Mediterranean to Darfur, and consisting of vast stony terraces, sometimes covered with sand and gravel, and sometimes broken by oases, Seewah being the largest. Revised by J. R. S. STERRETT.

Lib'yans: a nation which occupied in ancient times the whole northern coast of Africa with the exception of the Delta of the Nile, though, according to Lepsius and other Egyptologists, they probably at one time occupied this territory too, but were driven out by the Egyptians. They were a seafaring people, and harassed the Egyptians with continuous invasions, until their power was checked in the sixteenth century B. C. by Thothmes III. In the fourteenth century B. C., when the Pelasgians on the northern coasts of the Mediterranean had acquired some importance on the sea, the Libyans renewed their attacks on Egypt in connection with the Tyrrhenians and Achæans, and conquered Lower Egypt, but were entirely defeated by Ramses II. At the period when the Phœnicians founded Carthage and the Greeks Cyrene, the Libyans became enfeebled. They were pressed back from the coast, and submitted completely to the Romans, and fell partly into barbarism. With respect to their ethnographical and linguistical relations, see the article BERBERS.

Libyan Sea: in ancient geography, that part of the Mediterranean situated between the island of Crete, the Delta of the Nile, and the territory of Carthage, or Africa proper. *Syrtis Major* and *Syrtis Minor* were inlets of this sea.

Lica'ta, or **Slicata**: a seaport-town of Sicily, in the province of Sicily; on the south coast; 25 miles S. E. of Girgenti (see map of Italy, ref. 10–F). It exports grain, wine, sulphur, etc. Near it are the ruins of the ancient *Gela*. Pop. 17,478.

Lice: wingless insects which occur as parasites upon the bodies of birds and mammals. Two distinct groups are recognized among the forms united under the common name lice: the one, the bird-lice, forming a distinct order (*Mallophaga*), the others which occur upon mammals being included as a group, *Parasita* or *Pediculina*, among the *Hemiptera*, or true bugs. (See ENTOMOLOGY.) The bird-lice have their jaws fitted for biting. They live almost exclusively upon birds, each species of which has its peculiar parasite. They feed upon the feathers and dead skin, and it is to rid themselves of these pests that hens, etc., roll themselves in the dust. In a few cases, as the goat and sheep, the *Mallophaga* occur upon mammals, where they feed upon the wool or hair. The true lice (*Pediculina*) have the mouth-parts, like those of the true bugs, fitted for piercing the skin and sucking the blood of their host. In some cases they manage to burrow entirely under the skin. Their feet are shaped something like pipe-tongs, enabling them to hold firmly to the hairs among which they move. They lay their eggs in firm capsules attached to the hairs, and the young pass through changes closely similar to those of the other *Hemiptera*. Man is subject to the attacks of three different species of lice: the head-louse (*Pediculus capitis*), the body-louse (*P. vestimenti*), and the crab-louse (*Phthirius pubis*). Other mammals have their own parasites. The best remedy for these pests is cleanliness. See Denny, *Monographia Anoplurum* (1842); Giebel, *Insecta Epizoa* (1874); Piaget, *Les Pédiculines* (1880). For the parasitic insects which affect plants, see APHIDES and PLANT-LICE. J. S. KINGSLEY.

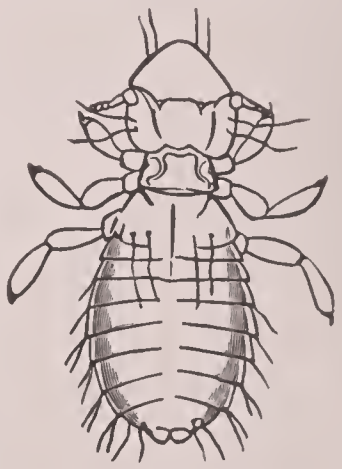


FIG. 1.—Hen-louse.

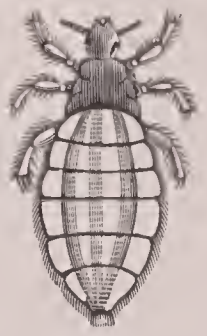


FIG. 2.—Body-louse.

Licensed Fool, called also **Court Jester, Buffoon**, and **Motley**: a personage found in the courts of kings and nobles of mediæval Europe, whose employment it was to amuse the household by witty and mirth-provoking acts and sayings.

At first the office was filled by any half-witted fellow whose senseless or seeming shrewd talk was tortured by his hearers into a semblance of wit; but he soon gave place to the jester proper, and, in royal retinues, the office became of such importance that graduates of Oxford and Cambridge were not ashamed to fill it.

Philip of Macedon, Alexander the Great, Augustus and his successors, all maintained fools, and in Eastern courts they are a very ancient institution. The office has been filled by women, but infrequently.

Among the famous fools are Triboulet and Brusquet, attached to the court of Francis I. of France; Boisrobert, the buffoon and secretary as well of Cardinal Richelieu; Klaus der Narr, court fool of Frederiek III. of Saxony; Kunz von der Rosen, court fool of the Emperor Maximilian I.; Gonello, in the service of the Marquis of Ferrara, by whom his judgment was so highly prized that he was consulted on affairs of state. Some of the famous English jesters are Scogan, jester to Edward IV.; John Heyward and Will Somers, to Henry VIII.; and Hitard, to Edmund Ironside. Archibald Armstrong was a famous fool attached to the household of James VI. of Scotland. On the accession of Charles I. he retained his office, and accumulated enough wealth to make him a popular butt for rhymsters.

Court fools do not appear distinctly and officially till after the crusades, and the office ceased to exist in most European countries about the end of the seventeenth century.

The typical fool's costume consisted of close-fitting doublet and hose, of two colors, counterchanged, and a motley coat; a hood, ornamented with bells, covered head and shoulders. Yellow formed so large a part of these grotesque costumes that it became known as "fool's color." The jester always carried a wand, terminating in a grotesque, grinning head, also ornamented with bells. M. V. Worstell.

License, or **Leave and License, Plea of**: in common-law pleading, the plea made by a defendant to an action who relies upon a license given him by the plaintiff, as justifying or excusing, either in whole or in part, the act complained of. The plea of license is most commonly employed in actions for trespass upon land, but may be used also in actions for trespass to personal property, or in actions of covenant or of detinue, or in actions upon the case. Except in actions upon the case the defense of license must be specially pleaded, and can not be given in evidence under the general issue. (See Issue.) In an action of covenant a plea of license is not sustainable as a defense if the license was by parol, unless a parol license is provided for by the terms of the deed. In those States where common-law pleading has been abolished there is no particular form of plea or answer designated by this name, but a license may of course be pleaded as a defense whenever it constitutes one.

F. Sturges Allen.

License, Private: a permission by one person to another to do what but for the license would subject the actor to legal liability. It is a topic of considerable interest in several branches of the law, although it is most prominent in the law of real property.

Many of the applications of force to the person of another would be actionable assaults but for the "leave and license" of the injured party. A dentist who pulls a tooth, a surgeon who performs an operation, an athlete who strikes, pushes, or grapples his antagonist, commits an assault and battery, unless his act has the legal consent of his patient or his opponent: or the act is done in such circumstances that the law implies consent. If the consent is obtained by fraud, or for the purpose of doing anything which the law prohibits, as fighting, it avails nothing. Again, a person has no right of action for defamation against one whom he has licensed to publish the charge. It is not necessary that he intended to give a license. If he sends an agent to procure a copy of a libel with the view of bringing an action, he thereby consents to its publication to the agent.

In the law of Copyright (*q. v.*) and Patents (*q. v.*) a license is to be distinguished from an assignment. In order that a contract, relating to a patent, shall operate as an assignment it must be a conveyance of the entire right secured by the patent, or of an undivided part of such right, or of the exclusive interest in such entire right for a specified territory. So an assignment of a copyright is the conveyance of proprietary rights therein. The grant of an exclusive privilege to print or to sell a book, or to use, rent, and sell a patented article, is only a license. It does not give to the licensee the right to maintain actions for the infringement of the patent or of the copyright, nor the power to enjoin unlawful sales of the book or article within his territory. A licensee can not assign his right, unless specially empowered to do so by the licensor.

License Appertaining to Land.—This is an authority to do an act or series of acts upon land without passing any estate therein. It may be created by a written instrument, verbally, or by conduct. If a landowner suffers his neighbor to construct a drain from the land of the latter to his land, he thereby licenses the act, as he would have done had he expressed his permission orally or in writing. The characteristics of the ordinary real property license are (1) that it does not pass an estate in the land; (2) it is personal and non-assignable; (3) it is revocable at the will of the licensor.

Whether a written agreement for the use of land amounts to a license simply or transfers an estate, depends upon the intention of the parties as disclosed by the writing and the surrounding circumstances. The fact that the parties describe the agreement as a license is not controlling. Accordingly, where a landowner granted by deed what he styled a license to an ice company, its successors, and assigns in said ice business to use a strip of land as a way of ingress, egress, and regress, and upon which it might pass and repass railway cars containing ice and materials for use in its ice business, and it appeared that this strip of land afforded the only means of communication between the ice company's premises and those of the railway company upon which the ice company depended for the transportation of its ice to market, the court held that the ice company acquired an Easement (*q. v.*), and not a mere license. The position of the parties, taken in connection with the language of the contract, indicated that they intended to convey and acquire a permanent interest in the land, and not a revocable user. (*The Greenwood Lake, etc., Company* vs. *The New York, etc., Railway*, 134 N. Y. 435.) On the other hand, a permission by a mine-owner to another to enter and work a mine if he sees fit is a mere license and not a Lease (*q. v.*). The purchaser of a ticket to a place of amusement acquires no more than a license, which the proprietor of the place has the power to revoke at any moment. *Wood* vs. *Leadbitter*, 13 Meeson and Welsby 838.

An indefeasible interest in land can not be transferred by oral agreement, because of the Statute of Frauds (*q. v.*), which requires the conveyance to be in writing. Such agreement, however, may operate as a license, protecting the party who relies upon it from all liability as a trespasser for acts done before its revocation. Indeed, if it purports to be a sale of the land, the purchaser, by part performance, may acquire the right to a conveyance which a court of equity will enforce. The agreement is no longer a license, and revocation is impossible.

As a license is personal—that is, restricted to the original parties—the death of either terminates it. So does a conveyance to another of the premises to which the license appertains, or a grant which is inconsistent with the license. Moreover, it can not operate either for or against strangers to it. Therefore, a party who has a license for the exclusive use of a private canal can not maintain an action against others who make use of it. If one person obtains by written contract a license to explore and examine the land of another, he can not assign the contract to a third party; nor can a license be sold under an execution against the licensee.

A mere license is revocable at the will of the licensor, whether a valuable consideration has been given for it or not. Of course, if its revocation amounts to a breach of contract, the licensee will have a right of action for damages. For example, if the holder of a theater ticket, after taking his seat, is notified by the proprietor to leave the building, he is bound to do so. If he remains he will become a trespasser, and the proprietor may lawfully eject him; but if the license is thus revoked, and he withdraws, without fault on his part, he can sue for the breach of contract.

In some jurisdictions it is held that in case the licensee has made expenditures upon the land, relying on the license, a court of equity will intervene and prevent a revocation, which would operate as a fraud upon him. (*Sauer* vs. *Keller*, 129 Ind. 475.) The weight of authority, both in England and the U. S., is opposed to this doctrine, and fully sustains the rule that a license is always revocable. Consequently, if one grants for a consideration a license to another to enter on the licensor's land and construct a watercourse, or a sewer, or a railway track, the licensor has the power at any time to revoke the license. Certainly the licensee, during

the continuance of the license, acquires no rights by adverse possession, because he exercises his privilege not against the will of the landowner, but with his consent. Nor has he the right to the interposition of a court of equity to compel the specific performance of an agreement void by the statute of frauds when made, but now partly performed. He entered and made his expenditures not on a parol contract for an estate in land, but pursuant to a license which did not purport to give a permanent interest therein. (*Pitzman* vs. *Boyce*, 111 Mo. 387; *Lawrence* vs. *Springer*, 49 N. J. Eq. 289.) If the license is revoked, either expressly or by implication, and the former licensee continues to use the land as before, such enjoyment will be adverse to the landowner, and may ripen into an irrevocable right by PRESCRIPTION (*q. v.*). *Eckerson* vs. *Crippen*, 110 N. Y. 585.

A transaction may have the appearance of a license when, in fact, it is the abandonment of an easement. An abutting landowner consents to the construction of an elevated railway in the street in such a manner as to abandon to a certain extent his easement of light and air therein. Neither he nor his grantee can revoke the consent. (*White* vs. *The Manhattan Railway*, 139 N. Y. 19.) Such a transaction is the permanent surrender of an interest in the land of another; not a temporary permission to that other to do a series of acts on his own land. To call it a license is to use a misnomer, and produce confusion.

Quasi License.—It is frequently said that a license coupled with a grant is irrevocable, and the following example is given by way of illustration. If one agrees orally with another that the latter may cut and carry away growing trees from the former's land, this is revocable, before the trees are cut; but after they are cut, and have thus become the personal property of the purchaser, the license to take away such property is irrevocable. It is submitted, however, that the license to remove chattels from the land of the vendor, or of one who has brought them upon his land, or who has consented to their remaining there, is a license by operation of law, and not by agreement of the parties. As it does not originate in the landowner's consent, but may arise against his will and in spite of his opposition, it is not subject to his revocation. It is as distinguishable from a true private license as a quasi contract is from a true contract.

FRANCIS M. BURDICK.

The rules of the *Roman law* and of the modern *European codes* are very similar to those of the English law. No civil action lies for *injuria* (see LIBEL AND SLANDER, HISTORY OF) if the acts or statements on which the complaint is based were authorized or permitted. "Volenti non fit injuria"—no wrong is done to him who consents; but where such injurious acts or defamatory utterances are forbidden on grounds of public interest, such authorization or permission will not necessarily exclude the criminal actions established by the law.

As regards *property, immovable or movable*, possession and use could be granted at Roman law by a mere license (*precario*); and, as in English law, such license was revocable at the pleasure of the licensor (*precario rogatus*). Even an express agreement that the possession of the licensee (*precario possidens*) should continue until a certain date had no effect as against the licensor's change of purpose. If the licensee refused to restore possession on demand, the licensor had a summary remedy—viz., the *interdictum de precario*; but as against all other persons the licensee enjoyed the protection of the ordinary possessory remedies. See POSSESSION.

Precarium, or license, closely resembled *commodatum*, the gratuitous bailment for use. *Commodatum* also was applicable to land and to movables alike. *Precarium* differed from *commodatum* (1) in the absence of all obligation on the part of the licensor; (2) in that the licensee was not liable for damage caused by his negligence; and (3) in that the licensee had no counterclaim even for necessary outlays. *Modern European codes* incline to subject the licensee to responsibility for negligence, and to give him a counterclaim for necessary outlays; and therefore, as a rule, they do not recognize *precarium* as a separate legal relation. Either no mention is made of it, as in the *Code Napoléon*, or it is expressly declared to be a special form of *commodatum* (*prêt à usage, Gebrauchsleihe*), differing only in the right of the bailor to demand re-delivery whenever he pleases: so in the Saxon code, arts. 1173, 1181; the Swiss Federal law of obligations, arts. 321, 327; and the German draft code of 1888, art. 558. On the other hand, the Prussian code, arts. 222–234, and the Austrian code, arts. 971, 974, recognize *precarium* as a separate institution. See LOAN.

LITERATURE.—G. E. Schmidt, *Commodatum und Precarium* (Leipzig, 1841); Bulling, *Das Precarium* (Leipzig, 1846); *Motive zum bürgerl. Gesetzbuch für das Deutsche Reich* (1888), ii., 453, 454.

MUNROE SMITH.

License, Public: a permit granted by competent public authority to do certain acts which it has been made unlawful to do without obtaining such permits. The authority granted by such a license, of course, is not more extensive than the power of the licensor to regulate the subject-matter of the license, or to exempt from the operation of the laws which forbid the acts permitted by the license.

The necessity of obtaining a license lawfully to perform certain acts may be imposed either for the purpose of raising revenue, in which case it is simply a form of taxation, or, more usually, for the purpose of regulating those callings, trades, or classes of acts which bear such a relation to the state that it is for the general welfare of the public that the state or government shall regulate them, such as the practice of medicine, the driving of a public hack, the peddling of goods, the celebration of marriage, the burial of the dead, etc.

The authority of the Federal Government to grant licenses is limited by the Constitution, and, except as to those matters the regulation of which is intrusted to Congress, such as navigation, a license taken out under the laws of the U. S. would be of no force as against a State law forbidding the licensed acts. Thus where Congress in its internal revenue legislation provided that no person should engage in certain occupations without obtaining a license from the U. S., and these occupations were not among the subjects which Congress has power to regulate, the granting of a license to pursue one of these occupations under this legislation gave the licensee no other privilege than that he should be subject to no penalty under the national law for so doing, and the law requiring the obtaining of a license was nothing more than a mere form of imposing a tax, the States being free to prohibit the occupations entirely or regulate them in any other way; but a license granted by Congress in the exercise of a power granted by the Constitution, such as that of regulating interstate commerce, give to the licensee authority to do whatever is authorized by the terms of the license without interference by State legislation on that subject or by a State tax. (License-tax Cases, 5 Wallace 462, 470.) The licensee, however, is subject in the exercise of the privileges of the license to the State and local laws passed for purposes of police regulation.

Most public licenses, however, are included among those which are required either by State legislation or by the laws of or ordinances of municipal corporations deriving their powers from the State. The State may, in the exercise of its police power, within certain wide limits, which can not with accuracy be conclusively defined, require a license to be obtained by persons following any trade or calling, but all trades or callings are open to all, except when expressly restricted by legislation. It may also forbid the performance without a license of any acts which involve an element of danger to the welfare of the community when unregulated.

Municipal corporations have no power to pass license laws, except as these powers are expressly or by implication conferred by their charters or the laws of the State, and the laws granting such powers will be strictly construed. Thus the grant of the power to "regulate" certain trades will not be construed to include the power to regulate those trades by license laws; and the grant of the power to "regulate by license laws" does not authorize the corporation to impose licenses for the purpose of revenue. In some cases, however, where the natural method of regulation would be by license, as in the case of the liquor traffic, the power to pass license laws has been inferred from a general clause granting authority to make such laws as may be necessary for the general welfare of the community.

Unless a license be of the nature of a franchise, it will be revocable at any time without a return of the license fee, if one be paid; although it has been held, in some cases where the fee was in the nature of a tax, that a proportionate amount of the fee must be returned. This rule of law is based upon the principle that neither the State nor a municipal corporation chartered by it can bargain away its power of police regulation. Slaughter-house Cases, 16 Wallace 36.

The license laws of the States are frequently held to be unconstitutional, as being contrary to the provisions of the Constitution of the U. S., especially those providing that Congress shall have power to regulate commerce among the

several States (Const. art. i., sec. 8, sub. 3); that "the citizens of each State shall be entitled to all privileges and immunities of the citizens of the several States" (art. iv., sec. 2, sub. 1); and that no person shall "be deprived of life, liberty, or property without due process of law." Amendment V.

The first of these provisions prohibits the State from requiring the taking out of a license from persons, as traveling salesmen, engaged in any form of INTERSTATE COMMERCE (*q. v.*).

The second provision prohibits license laws by which a discrimination is made, directly or indirectly, by a State in favor of a citizen of one State as against those of another, as by forbidding the sale of the products of another State except by persons holding a license, or by requiring the citizens of another State to take out a license when licenses are not required of its own citizens, or by making the license fee larger in the one case than in the other. A corporation existing under the laws of another State is not regarded as a citizen within this provision, and a State is not prohibited from discriminating against a non-resident corporation or prohibiting it from transacting business within its lines.

The third provision prohibits such license laws as result in the exclusion of persons or classes from lawful employments, the making of illegal discriminations between persons in similar circumstances, and the granting of monopolies in trade. The rule as to monopolies must be distinguished from those cases where the State gives permission to do something not otherwise lawful, in which case it may make the privilege exclusive. This subject will be treated under PRIVILEGES AND IMMUNITIES (*q. v.*). For a fuller treatment of this subject, see Cooley's *Constitutional Limitations*, Dillon's *Municipal Corporations*, and the cases referred to under INTERSTATE COMMERCE. F. STURGES ALLEN.

License to Trade: in international law, a permission given by a belligerent government through its agent, such as a commander of a squadron, to trade with the enemy. It may be given to a neutral trader or to a fellow subject; and it generally specifies the kind of articles to be conveyed to the enemy, the port, the time, perhaps the amount. It may allow of importation, and not of exportation. Being a permission to do something otherwise forbidden, it is of strict interpretation, so that to go beyond its specifications would subject the vessel and cargo to heavy penalties, unless the violation could be shown to be unavoidable. Of course, the enemy is not bound to receive such a licensed vessel into his ports, so that to trade safely and successfully the merchant needs a license from each belligerent. Revised by T. S. WOOLSEY.

Licen'tius: a Christian poet of the beginning of the fifth century; native of Tagaste, North Africa; pupil of Augustine, to whom he addressed a poem in 154 hexameters, still extant. See pages 413–420 of Baehren's *Fragmenta Poetarum Romanorum* (Leipzig, 1886). M. W.

Lichen [see LICHENS]: a term applied to a number of distinct diseases of the skin, in all of which, however, there is a tendency to the formation of slightly raised and reddish spots. Persons of low vitality and children of scrofulous diathesis are especially predisposed to these diseases. *Lichen ruber* is characterized by spots, as described, which show no tendency to coalesce, but which occasion great itching. Fortunately, this is a rare disease, as it causes great deterioration of health, and may end fatally. *L. planus*, on the other hand, is distinguished by the coalescence of the dull-red patches, but there is not the same deterioration of health. *L. scrofulosis* occurs in strumous children, and is recognized by the salmon-colored, scaly patches, occurring in groups. The treatment in all forms requires attention to the general health, and tonics, such as iron, strychnia, and cod-liver oil. Arsenic has decided value, as have ointments of tar and sulphur. WILLIAM PEPPER.

Lichen'ine, or **Moss-starch**: a substance contained in the cryptogams called lichens, constituting in some cases, as in that of the so-called Iceland moss, reindeer moss, *tripe de roche*, etc., nearly the whole mass. Many other lichens contain similar mucilaginous bodies. Lichenine may be obtained pure from Iceland moss by long soaking first in cold water, renewed until it remains tasteless, which removes a bitter principle and saline substances. Addition of a little carbonate of soda to the first water is useful. Some chemists treat also with ether and alcohol. The washed mass may then be dissolved in boiling water, strained, and evaporated to a hard, brittle, tasteless mass, which swells in cold water without dissolving, and with boiling water forms a jelly. Like other starch-isomeres, it is converted into a gummy or dextrin-like body by long boiling with water. A sugar is formed by dilute acids, as in the case of common starch, and strong nitric acid forms with it oxalic acid. Iodine does not blue lichenine when pure, as it does common starch, but forms merely a yellow stain, as with cellulose. Lichenine does not occur in the plant in the cellular or granular form, like common starch; and some investigators have advanced the idea that it is properly not to be classed with starch, but is cellulose in a soluble modification. Strong alcoholic liquors are prepared on a large scale in extreme northern regions from these lichens.

Lichens, lī'kenz [= Lat. =Gr. λειχήν, λιχήν, lichen, tree-moss]: a group (*Lichenes*) of parasitic lower plants of the class of the Sac Fungi (*Ascomycetes*), characterized by being parasitic upon microscopic algæ. They occur abundantly upon the ground, walls, rocks, wooden fences and buildings, tree-trunks, and in the tropics upon leaves. The number of species is unknown; an enumeration by Nylander in 1858 comprised 1,302 species. Krempelhuber's list in 1869 contained 6,250 entries, which included a great number of duplicates. Tuckerman in 1872 reckoned the whole number of species "as somewhere from 1,350 to 1,750." Tuckerman's unfinished *Synopsis of North American Lichens* (1881–88) and Willey's supplementary list (1887) enumerate 929 species for North America. Perhaps we may roughly estimate the total number of described species of lichens in the world at not far from 2,500.

Lichens differ greatly in external appearance, some being flat and foliaceous (Fig. 1, C), others consisting of a thin layer closely adherent to the substratum (Fig. 1, D), others again are branching stems (Fig. 1, A, B), while in still others the plant-body is minute and inconspicuous.

FIG. 1.—Lichens: A. *Cladonia cornucopioides*; B, *Cladonia rangiferina*; C, *Physcia stellaris*; D, *Graphis scripta*.

A section of the plant-body (thallus) shows it to be composed of branching, usually colorless, threads (*hyphæ*), which often become indurated and compacted at the surface. The microscopic algæ upon which the lichen is parasitic are intermingled with the threads, either scattered irregularly (e. g. *Collema*, *Leptogium*, etc., Fig. 2, B, C) or disposed in

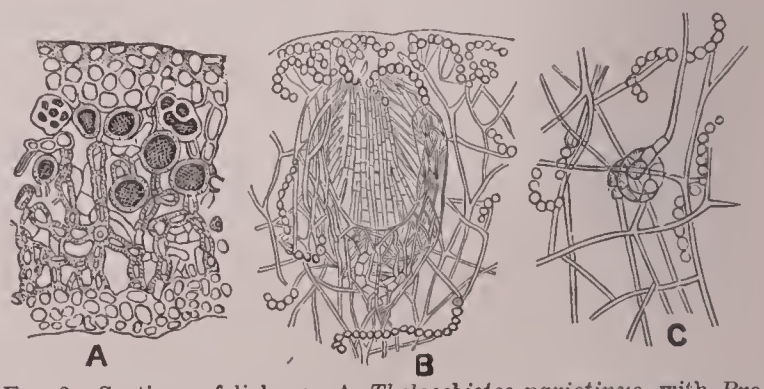


FIG. 2.—Sections of lichens: A, *Theloschistes parietinus*, with *Protococcus* cells; B, *Collema myriococcum*, young fruit, and *Nostoc* cells; C, *Collema nigrescens*, young ascogone, and *Nostoc* cells.

one or two more or less distinct layers (e. g. *Usnea*, *Physcia*, *Parmelia*, *Sticta*, etc., Fig. 2, A).

Schwendener and others have carefully studied these

algæ, and referred them to species common on trees, rocks, fences, earth, etc. When dissected out from the lichen-body they grow freely. Formerly these host-algæ were thought to be parts of the lichen itself, and were styled gonidia (a

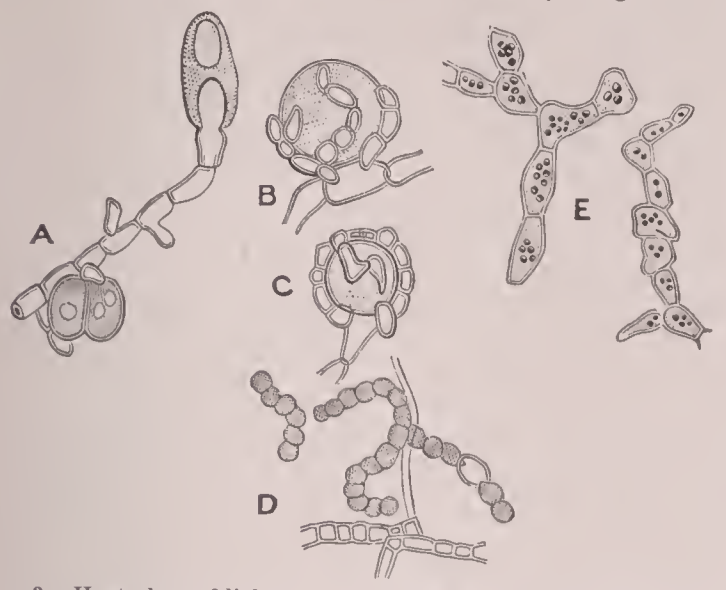


Fig. 3.—Host-algæ of lichens: A, *Protococcus viridis*, attacked by a thread from a spore of *Theloschistes parietinus*; B C, *Protococcus*, with threads of *Cladonia furcata*; D, *Nostoc*, with threads of *Leptogium myochroum*; E, *Chroolepus umbrinum*, dissected from *Graphis scripta*.

term which it is still convenient to use). Some lichenologists still adhere to this view.

The lichen-threads penetrate or clasp around some of the cells of the host-algæ (Fig. 3), from which they derive nourishment. Such attacked cells soon die, but the others grow rapidly in the moist air of the interior of the lichen-thallus. While individual algæ here and there are destroyed by the parasitic lichen, the alga colony as a whole is doubtless benefited by this symbiotic relation.

Lichens are reproduced by the formation of spores of one or more kinds, and also by the escape of colonies of host-algæ with a few attached threads (called the formation of soredia), soon resulting in the production of a new lichen-thallus. Of the stalked spores (stylospores) which line certain cavities (pycnidia) now and then found on the thallus, we need only to say that they are probably asexual spores homologous with those similarly named in the Black Fungi.

The spermogones are small cavities lined with hairs which bear great numbers of minute spore-like bodies known as spermatia (Fig. 4). In *Collema*, *Leptogium*, and similar jelly-lichens spermatia are known to be male fertilizing bodies analogous to antherozoids, but it is not known whether they have this function in all lichens.

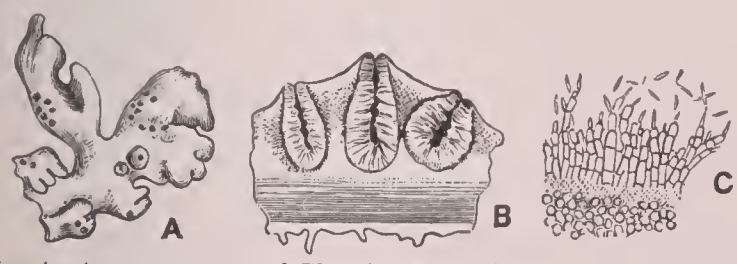


Fig. 4.—A, spermogones of *Physcia stellaris* (shown as minute black specks); B, the same in section; C, spermatia-bearing hairs.

The ordinary spores of lichens are borne in cups, disks, furrows, or globular structures (*apothecia*) (Figs. 5 and 7) consisting of erect spore-sacs (*asci*) and sterile threads (*paraphyses*), surrounded by a margin (*exciple*), which is an upturned portion of the thallus (thalline exciple, Figs. 5 and

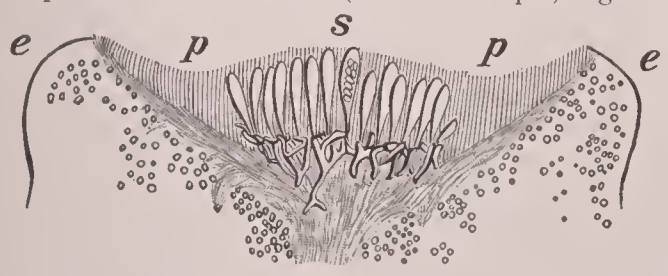


Fig. 5.—Diagrammatic section of young apothecium of *Lecanora subfusea*: *e*, exciple (thalline); *p*, paraphyses; *s*, spore-sacs.

7, A), or a specially developed tissue (proper exciple, Fig. 7, II., III., IV., V.). The apothecia vary greatly in shape and appearance. In many common species they are concave disks from 1 to 10 mm. in diameter, and situated on the upper surface or margin of the thallus (Fig. 7, I., II.); in others the sides of the disks are greatly incurved, forming the globular apothecium (Fig. 7, IV., V.); in still others the disk is much elongated into a sort of furrow, whose sides may be more or less approximate (Fig. 7, III.). These differences in the shape and structure of the apothecia are made the basis for the separation of the several families of lichens.

The spore-sacs do not differ essentially from those of the Black Fungi, and their spores, which range from one to a

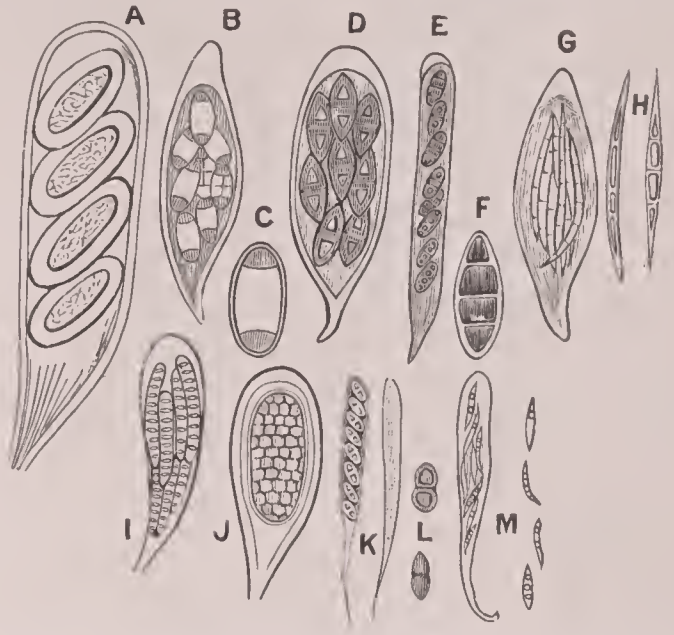


Fig. 6.—Spore-sacs and spores: A, *Pertusaria leioplaca*; B, C, *Physcia*; D, *Physcia stellaris*; E, F, *Pyrenula nitida*; G, H, *Peltigera*; I, *Graphis*; J, *Umbilicaria pustulata*; K, L, *Acolium*; M, *Bœomyces roseus*.

hundred or more in each sac, are equally similar. The spores are simple or compound, spherical, oval, or from cylindrical to needle-shaped. In one family (*Caliciaceæ*) the walls of the spore-sacs are very thin, and at maturity have broken up, so that the spores are then naked in the apothecium.

In 1877 Stahl discovered the sexual organs of *Collema*, one of the jelly-lichens (*Collemeæ*). He found that previous to the formation of the apothecium a deep-lying thread develops into a coil (*ascogone*) from which one extremity (the *trichogyne*) ascends to and projects beyond the surface of the lichen-thallus (Fig. 2, C). At the same time spermatia escape from the spermogone, and coming in contact with the protruding trichogyne fertilize it, after which many vertical threads spring up from the ascogone or its surrounding threads, and develop into spore-sacs and paraphyses (Fig. 2, B). It is not yet known whether such a fertilization takes place in other genera than *Collema*, *Leptogium*, and their near relatives. While it is supposed by some botanists to be present in all lichens, its existence has not yet been proved outside of the *Collemeæ*.

There are some lichens whose spores are not formed in sacs, but externally upon homologous cells (*basidia*), thus showing relationship to the toadstools and puffballs. In other words, while most of the lichen-forming fungi are Ascomycetes, a few are Basidiomycetes. The latter are referred to in recent works under Hymenolichens (related to toadstools) and Gasterolichens (related to puffballs).

It is evident that the group *Lichenes* is not a strictly natural one. We are dealing here with plants of considerable structural differences among themselves, and marked resemblances to other chlorophyll-less carpophytes. It is not improbable that the lichens will eventually be distributed among several of the great orders of the fungi, e. g. the Black Fungi (*Pyrenomyceteæ*), Cup Fungi (*Discomyceteæ*), puffballs (*Gasteromyceteæ*), and toadstools (*Hymenomyceteæ*). If we exclude the Gasterolichens and Hymenolichens the great body of lichens may be arranged as follows, essentially in accordance with Prof. Tuckerman's system:

Family I. *Parmeliaceæ*.—Apothecia open round disks, with a thalline exciple, sometimes with a proper exciple also (Fig. 7, I.).

This large family includes nearly one-half the species, which are distributed among many genera—e. g. *Ramalina*, *Usnea*, *Cetraria*, *Theloschistes*, *Parmelia*, *Physcia*, *Umbilicaria*, *Sticta*, *Peltigera*, *Collema*, *Leptogium*, *Placodium*,

Lecanora, etc. *Roccella tinctoria* and related species furnish litmus. *Cetraria islandica* is the Iceland Moss (*q. v.*). *Sticta pulmonaria* was formerly used in medicine, but has properly fallen into disuse. *Lecanora tartarea* furnishes a dye (cudbear), and *L. esculenta* supplies a valuable food in Asia Minor. The story is told that it occasionally falls in showers from the sky, whither it had been carried by whirlwinds. Berkeley states that during a famine at Erzeroum such a shower "fell most opportunely, to the great relief of the inhabitants."

Fig. 7.—Families of lichens: I., *Parmeliaceæ*; II., *Lecidiaceæ*; III., *Graphidaceæ*; IV., *Caliciaceæ*; V., *Verrucariaceæ* (*a*, apothecia; b, sections of same).

Family II. *Licidiaceæ*.—Apothecia open round disks, with a proper exciple (Fig. 7, II.).

A family next in point of numbers to the preceding, and containing many species of the genera *Cladonia*, *Bæomyces*, *Biatora*, *Lecidea*, *Buellia*, etc., *Cladonia rangiferina* of the northern regions, is the well-known reindeer-moss which supplies a valuable food to the reindeer of Arctic America, Europe, and Asia.

Family III. *Graphidaceæ*.—Apothecia mostly elongated, furrow-form, with a proper exciple (Fig. 7, III.).

Here are gathered many species of bark-lichens whose thalli are crustaceous or indistinct, and whose apothecia form more or less elongated, crooked, black lines (Fig. 1, D). The common genera are *Opegrapha*, *Graphis*, *Arthonia*, etc.

Family IV. *Caliciaceæ*.—Apotheeia open, globular or nearly so, frequently stalked, with a proper exciple, the spores free by the breaking of the spore-sacs (Fig. 7, IV.).

The most important genera are *Acolium*, *Calicium*, and *Coniocybe*.

Family V. *Verrucariaceæ*.—Apothecia closed, globular, with a proper exciple (Fig. 7, V.).

The globular apothecia have a small opening at the summit for the escape of the spores. The more common genera are *Endocarpon*, *Verrucaria*, and *Pyrenula*.

See Botany, Fungi, Plants, Fossil; and Vegetable Kingdom.

Literature.—The following works will give the student an idea of the present state of our knowledge of lichens: Fries's *Lichenographia Europæa Reformata* (1831); Korber's *Systema Lichenum Germaniæ* (1855); Nylander's *Énumération Générale des Lichens* (1858); Nylander's *Synopsis Methodica Lichenum* (1858–60); Korber's *Parerga Lichenologica* (1865); Krempelhuber's *Geschichte und Literatur der Lichenologie* (1867–72); Schwendener's *Die Algentypen der Flechtengonidien* (1869); Tuckerman's *Genera Lichenum: an Arrangement of the North American Lichens* (1872); Bornet's *Recherches sur les Gonidies des Lichens*, in *Ann. Sci. Nat.* (series v., vols. xvii. and xix., 1873–74); Stahl's *Beiträge zur Entwicklungsgeschichte der Flechten* (1877); Tuckerman's *Synopsis of North American Lichens* (part i., 1882; part ii., 1888); De Bary's *Comparative Morphology and Biology of the Fungi, Mycetozoa, and Bacteria* (1887); Willey's *Introduction to the Study of Lichens* (1887); Sturgis's *Carpologic Structure and Development of the Collemaceæ and Allied Groups*, in *Proc. Am. Acad. Arts and Sciences*, vol. xxv. (1890).

Charles E. Bessey.

Lichfield: city of Staffordshire, England; 118 miles N. W. of London, on an affluent of the Trent (see map of England, ref. 9–H). It has carpet-manufactories, etc., a fine cathedral, and a grammar school, in which Addison, Johnson, and Garrick were educated. It is the seat of a bishopric. The cathedral, a noble pile, dates from the beginning of the thirteenth century, and is built in a transition style from Early English to Decorated. Its total length from E. to W. is 411 feet, with a breadth of 66 feet, and it has an imposing central tower 258 feet high, with two western spires 183 feet high. The building underwent extensive restoration in 1671 and in 1882. There is a statue of Dr. Johnson in the market-place. Pop. (1891) 7,864.

Li'chi, lee'chee', sometimes lī'chee': the fruit of a tree (*Nephelium litchi*) of the family Sapindaceæ (*q. v.*), found only in China and Cochin-China. It grows in clusters upon a small tree resembling a horse-chestnut, is globular, about 1½ inches in diameter, and contains a sweet edible pulp with the arillus inclosing the solitary seed. This fruit is highly valued by the Chinese, who dry it for preservation.

Lich'tenberg, Georg Christoph: writer; b. July 1, 1742, at Oberramstadt, Hesse-Darmstadt; studied at the University of Göttingen; became professor there in 1769. He made frequent journeys to England, where he studied the life of the people and gathered the material for his famous explanations of Hogarth's pictures. Of his physical writings, those are the best known which contain his investigations concerning electricity, more especially the so-called "Lichtenberg figures," which he explained in two independent memoirs. His satirical writings made a great sensation, and are still read. His *Ueber Physiognomik wider die Physiognomen* (1778) is directed against Lavater; *Ueber die Pronunciation der Schöpse des alten Griechenland* (1782) against Voss. The greatest general interest, however, was attracted by his *Ausführliche Erklärung der Hogarthschen Kupferstiche*, which first appeared in the *Göttingschen Almanach*, of which Lichtenberg was the founder and editor. His explanations contributed very much to introduce Hogarth in Germany. They are often very striking and very witty. Lichtenberg's wit, however, though pointed and generally sure to hit the nail on the head, is of a somewhat labored description. His writings have been republished, with an excellent introduction by A. Wilbrandt (1893). See also R. M. Meyer, *Jonathan Swift und Lichtenberg* (1886). Lichtenberg died Feb. 24, 1799. Julius Goebel.

Lichtenstein, Ulrich, von: minnesinger; b. in Austria at the beginning of the thirteenth century; was educated at the court of the Margrave of Istria, and was made a knight in 1222. His name appears in contemporary documents from Nov. 17, 1227, to July, 1274. He died Jan. 26, 1276. In his *Frauendienst*, a book which contains valuable information concerning the customs of the times, he gives an account of his adventurous life and his foolish and frequently ridiculous love-affairs. His *Frauenbuch* is a poem of more didactic character. He may be considered the romanticist of the minnesong, who, by his futile efforts to revive the waning ideals of chivalry, reveals the ludicrous, unnatural, and even immoral character of the whole structure of minnepoetry. See the editions of his works by Lachmann (1841) and Bechstein (1887); and Becker, *Wahrheit und Dichtung* in Ulrich von Lichtenstein's *Frauendienst* (1888); K. Knorr, *Ueber Ulrich von Lichtenstein* (1875). Julius Goebel.

Licinian Laws: certain Roman laws enacted or proposed at different times by different persons named Licinius. The most important are those passed 367 B. C., permitting plebeians to share the consular dignity with patricians, prohibiting the owning by a single individual of more than 500 acres of land, or of keeping more than 100 cattle and 500 sheep, and providing that interest already paid on debts should be deducted and the balance paid in equal installments within three years. See Rome.

Licinia'nus, Granius: a Latin historian of the second century A. D., of whose works fragments were discovered in an Egyptian palimpsest, and first published by Pertz, *Grani Liciniani Annalium quæ supersunt* (Berlin, 1857); also see *Editio philologorum Bonnensium heptas* (Leipzig, 1858). It appears to have been a compilation from Livy for school use.

M. W.

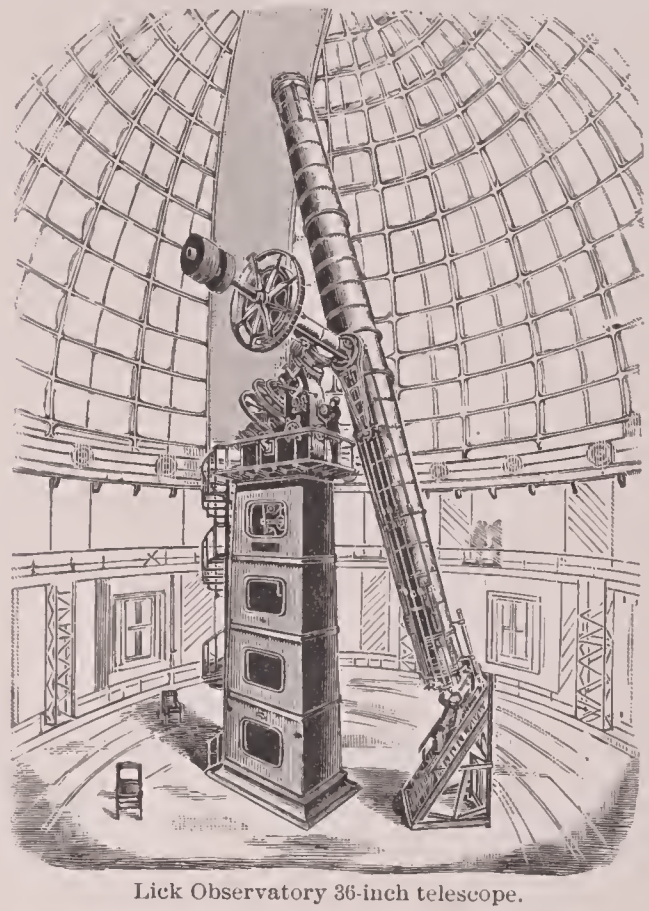
Licinio, Ital. pron. lĕe-chee'nĕe-ō, Giovanni Antonio, commonly called Pordenone: painter; b. at Pordenone, Italy, in 1484. He was known sometimes as Corticello, or de Corticellis, and as de Sachis. He also took the name of Regillo.

He is supposed to have studied art in Giorgione's school at Venice for a time. He then returned to his native place, where he worked in fresco for peasants until he acquired wonderful facility of execution. He painted at Valeriano, Vareno, Villanuova, Fontanella, Spilimbergo, Rovai, and at Treves, where his composition of *The Magi* has a procession of peasants in the background that is most realistic in treatment. His famous picture of *The Annunciation* in the Church of St. Peter the Martyr at Udine has been spoiled by repainting, but well-preserved works are to be met with in many of the little villages of Friuli. At Venice he painted the façade of a house in San Benedetto, for the Flemish merchant Martin d'Anna, using the history of Curtius as a subject. The foreshortening in this work is remarkable. His fame was henceforward assured, and he no longer hesitated to compete with Titian, whose successes stimulated him to further efforts. Both artists painted in S. Giovanni di Rialto. This rivalry continued in the ducal palace. These works have since been destroyed by fire. It is said that this emulation stimulated jealousies so bitter that when Licinio was decorating the cloisters of St. Stephen he had a sword and shield beside him always. A few fragments of his painting there remain. It was at this period in his career that he painted his masterpiece, the *S. Lorenzo Giustiniani*, now in the Venetian Academy. He then worked in the Cathedral of Cremona, where his frescoes are still to be seen. At Prince Doria's invitation he went to Genoa, where he worked conjointly with Perino del Vaga. He afterward painted in Mantua and at Piacenza, where he decorated the tribune and two chapels of S. Maria di Campagna. Charles V. conferred knighthood on him. He returned to Venice to paint in the Church of S. Francesco dei Frari a series representing the evangelists and doctors of the Church, and remained till called to Ferrara by Hercules II. to make designs for some tapestries. These represent the *Wanderings of Ulysses* and the *Labors of Hercules*. There he was taken ill and died within three days (1540). It was suspected that he was poisoned. Pordenone's work is chiefly in fresco. Among his best oil-pictures are *The Resurrection of Lazarus*, at Brescia; a *Holy Family* and a *St. Mark*, at Pordenone; the *Marriage of St. Catherine*, at Piacenza; and the *Annunciation*, at Murano. W. J. Stillman.

Lick, James: philanthropist; b. at Fredericksburg, Lebanon co., Pa., Aug. 25, 1796; in 1820 obtained employment in a piano-manufactory in Philadelphia; a year later started in the same business for himself in New York city, but failing to succeed for want of capital, went soon after to South America, where at Buenos Ayres, Valparaiso, and other places he engaged in the manufacture of musical instruments; in 1847 settled in San Francisco, where he invested in real estate and in enterprises, becoming wealthy thereby. In 1874 he placed his entire property, amounting to about $3,000,000, in the hands of seven trustees, to be devoted to public and charitable purposes. The bequests then made were in some respects twice changed before his death. Among them were the following: For the construction of a suitable observatory, and the erection therein of a telescope superior to and more powerful than any before made, $700,000, the same to be connected with the University of California; for the erection of free public baths in San Francisco, $150,000; for the erection of a monument to Francis Scott Key, author of *The Star-spangled Banner*, in Golden Gate Park, San Francisco, $60,000; for the erection in the City Hall of San Francisco of a group of bronze statuary representing by appropriate designs and figures the history of California, $100,000; to found and endow an institution to be called the California School of Mechanical Arts, $540,000. D. Oct. 1, 1876. In 1887 his remains were placed in a vault under the pier sustaining the great equatorial telescope of Lick Observatory (*q. v.*).

Lick Observatory: the Lick astronomical department of the University of California; founded by James Lick (*q. v.*) by a deed dated 1875, in which he charged his trustees "to expend the sum of $700,000 for the purpose of purchasing land and constructing on such land a telescope superior to and more powerful than any telescope yet made . . . and also a suitable observatory connected therewith," the whole to be made useful in promoting science. This was his only instruction in regard to it.

The site was selected during Mr. Lick's lifetime on the narrow summit of Mt. Hamilton, 4,209 feet above the sea, and 26 miles E. by road from San José, the chief city of Santa Clara co., Cal. Not only is the air clear during many months of the year, but it is quiet, so that the stars are steady (do not twinkle), hence high magnifying powers can be employed. The work of construction was begun in 1881. The major part of this work was completed before June 1, 1888, at which date the observatory was transferred to the university and began its astronomical activity. It was necessary to remove more than 70,000 tons of rock from the summit in order to get a level platform for the buildings and instruments; to arrange a sufficient water-supply; to make roads, etc. The main road from San José was built by Santa Clara County at a cost of $78,000. With the exception of a few acres which were purchased, the land for the site (2,600 acres) was granted by the U. S. and by the State of California. The chief question to be decided was, however, whether the most powerful telescope was to be a



Lick Observatory 36-inch telescope.

reflector or a refractor. It was finally decided to have a refractor of 36 inches clear aperture and 694 inches focal length. This was constructed out of rough glass disks, made by Feil & Mantois, of Paris, by Alvan Clark & Sons, of Cambridge, Mass. The object-glass weighs about 600 lb. in its cell. The crown-glass is 0·60 inch thick [edge] and 1·96 inch [center]; the flint is 1·65 inch thick [edge] and 0·93 inch [center]. The radii of curvature beginning with the first surface of the crown are $r' = r'' = +259{\cdot}5$ inches; $r''' = -239{\cdot}6$ inches, $r'''' = -40{,}000$ inches (+ convex − concave). The distance between crown and flint is 6·5 inches. Besides the visual objective (as above), there is a third lens of 33 inches aperture and radii of curvature of $R' = +253{\cdot}0$ inches, $R'' = -303{\cdot}1$ inches. When this is placed in front of the visual objective the combination becomes a photographic object-glass of 570 inches focal length (the diameter of the photographic image of the moon is about 5·2 inches). The cost of the visual objective was $50,000, of the photographic corrector about $13,000, mounting of the telescope about $45,000. The cost of the dome complete was about $85,000; of the whole observatory about $600,000. The mounting of the great telescope was made by Warner & Swasey, of Cleveland, O. The whole weight of iron pier and mounting is about 37 tons. The moving parts of the latter weigh about 7 tons; the tube weighs nearly 3 tons. The telescope is used for visual purposes, and micrometer measurements; it is also used for photography. A powerful spectroscope, made by Brashear, of Pittsburg, Pa., is also provided. The chief work to which the instrument has been put is the visual examination of planets and satellites, the observation of comets, nebulæ, and double stars, etc. In all of these fields it has made discoveries, some of them of high importance. Its photographs, especially those of the sun, moon, and planets, are also valuable. Its chief spectroscopic work is the study of the motion of nebulæ and of fixed

stars in the line of sight. The other instruments are engaged on the usual work of a first-class observatory. In 1889 eclipse expeditions were sent from Mt. Hamilton (to Bartlett Springs, Cal., and to Cayenne, S. A.), and a third to Chili to observe the eclipse of Apr., 1893. Standard time is furnished to the railways as far E. as El Paso and Ogden, and as far N. as Portland, Ore. Regular observations of earthquakes are made here, as well as the simpler meteorological observations.

The great steel dome is 75 feet in diameter, and weighs 100 tons. It was built in San Francisco. The floor of the dome is movable vertically (about 16½ feet), according to a plan by Sir Howard Grubb. This insures a convenient position for the observer, no matter whether the telescope is pointing horizontally or vertically.

The principal instruments are a 12-inch and a 6-inch refractor, a 4-inch comet-seeker, a 6-inch meridian-circle, a 5-inch photographic telescope, a 4-inch transit, a 5-inch photoheliograph, etc. Here also is the Crossley or Bermerside reflector, presented to the University of California by Edward Crossley, F. R. A. S., of Halifax, England, Apr. 6, 1895. (See TELESCOPE.) Six astronomers are now engaged in the work of research. Saturday night is set apart for the admission of visitors to look through the great telescope. Though there are no hotel accommodations at the summit, some 6,000 persons visit Mt. Hamilton every year.

EDWARD S. HOLDEN.

Lic'tors [plur. of *lictor* = Lat. plur. *licto'res*]: the attendants of the Roman magistrates possessing imperium, before whom they bore the *fasces* (axes and rods), the emblem of magisterial authority. They varied in number, according to the dignity of the officer whom they attended, from two for the prætor, within the city, to twenty-four for the dictator. They marched in single file before the magistrate whom they accompanied, and it was their duty to clear the way for him, to see that appropriate recognition was made of his dignity, and to execute his orders. They were generally chosen from the lower class of society, and were frequently freedmen of the magistrate whom they served. G. L. H.

Lid'dell, HENRY GEORGE, D. D., D. C. L.: classical scholar; b. in England in 1811; studied at the Charterhouse; graduated at Christ Church, Oxford, in 1833, with highest honors; was head master of Westminster School 1846–55; chaplain extraordinary to the Queen (1862); became dean of Christ Church 1855, and was vice-chancellor 1870–74; translated (with Dean Scott) Passow's *Greek Lexicon* (1843; 7th ed. 1883); wrote *History of Rome from the Earliest Times to the Establishment of the Empire* (1855). D. Jan. 18, 1898.

Liddon, HENRY PARRY, D. D., D. C. L., LL. D.: pulpit orator; b. at North Stoneham, England, Aug. 20, 1829: graduated B. A. at Christ Church, Oxford, in 1850; was vice-principal of the theological college, Cuddesdon, 1854–59; vice-principal of St. Edmund's Hall, Oxford, 1859–70; Ireland Professor of Exegesis there 1870–82; a prebendary of Salisbury 1864–70; canon of St. Paul's, London, 1870–86; chancellor 1886 till his death at Weston-super-Mare, Sept. 9, 1890. Besides numerous volumes of sermons and minor works, he published the Bampton Lectures on *The Divinity of our Lord and Saviour Jesus Christ* (1866; 14th ed. 1890) and *Some Elements of Religion* (1870–72; 5th ed. 1885). There appeared posthumously his *Explanatory Analysis of St. Paul's Epistle to the Romans* (1893) and the first part of his very elaborate *Life* of Pusey (vols. i. and ii., 1893). He was a preacher of remarkable power.

Revised by S. M. JACKSON.

Lie, lee, JONAS LAURITZ IDEMIL: novelist; b. at Eker, Norway, Nov. 6, 1833: studied law at the University of Christiania; was admitted to the bar in 1858, and for some years practiced law at the little town of Kongsvinger. In 1868 he moved to Christiania, in order to devote himself entirely to literature. In 1874 the Norwegian Storthing granted him a poet's pension (*Digtergage*). Since 1882 he has lived out of Norway, most of the time in Paris. In 1875 he received the cross of the order of St. Olaf for literary merit; in 1860 was married to his cousin, Thomasine Henriette Lie, who has been a steady coworker in his literary productions. His first publication, *Den Fremsynte eller Billeder fra Nordland*, a novel (1870; 8th ed. 1889), placed him at once in the front rank of Norwegian novelists, and has been translated into several languages, an English translation under the title of *The Visionary* having appeared in London in 1894. The next was *Fortællinger og Skildringer fra Norge* (Stories and Sketches from Norway, 1872)—one of these stories (*Little Grey, the Pony of Nordfjord*) has been translated into English by the Hon. Mrs. Arbuthnot (Edinburgh, 1873) and by Nellie V. Anderson (Chicago, 1885). *The Northfjord Horse* appeared in *Scandinavia*, vol. ii.; *Tremasteren Fremtiden*, a novel (1872), was translated into English by Mrs. Ole Bull, *The Bark Future* (Chicago, 1879). *Lodsen og hans Hustru* (1874; 7th ed. 1891), was twice translated into English; *A Norse Love Story*, *The Pilot and his Wife*, translated by Mrs. Ole Bull (Chicago, 1876), and *The Pilot and his Wife*, by G. L. Tottenham (Edinburgh and London, 1877). His novel *Thomas Ross* (1878), dealing with city life, and his next novel, *Adam Schrader* (1879), can not, as regards artistic merit, compete with his earlier productions. In *Rutland* (1880) and *Gaa paa* (Go Ahead, a sea story, 1882), Lie again takes his subjects from sailors' life. *Livsslaven* (The Life Convict) and the best among his later novels, not to say his chief literary production, *Familjen paa Gilje*, both appeared in 1883. Lie by these later-day novels has joined the realistic school of writers, although these works also show the same amiability of temperament and sympathy with human suffering that have been characteristic of his writings from the first. Then followed *En Malström* (A Maelstrom, 1884); *Otte Fortællinger* (Eight Stories, 1885); *Kommandörens Dötre* (The Daughters of the Commander, 1886), the last named ranking almost with *Familjen paa Gilje*; *Et Samliv* (Married Life, 1887); *Majsa Jons* (The Story of a Seamstress, 1888); *Onde Magter* (Evil Powers, 1890); *Trold I. and II.* (1891–92), a collection of monster tales. His latest novel is *Niobe*, which appeared in Dec., 1893, shortly after the author had left his native country, where he had spent the summer for the first time after an absence of twelve years, and had been honored with public festivities in Christiania and other Norwegian cities. The drama *Grabows Kat* (1880) and the dramatized poem *Faustina Strozzi* (1875) did not rise above the average.

P. GROTH.

Lieber, or **Liebler**: See ERASTUS, THOMAS.

Lieber, FRANCIS: publicist; b. in Berlin, Prussia, Mar. 18, 1800; served under Blücher in 1815 and was wounded at the battle of Namur. Having returned to Berlin and entered the gymnasium, where he became the favorite pupil of Jahn, he was arrested for his political opinions, and upon his discharge several months later was prohibited from studying at the Prussian universities. He consequently went to Jena, where he took his degrees in 1820. He soon afterward took part in the Greek war of independence. After suffering great hardships he went in 1822 to Rome, where he remained for a year in the house of the historian Niebuhr, and wrote his *Journal in Greece* which he published at Leipzig in 1823. Niebuhr quitted the embassy at Rome in 1823, and Lieber returned to Berlin, Niebuhr having previously obtained a promise from the King of Prussia that he should not be molested. He had hardly arrived in Berlin when he was again arrested upon the old charges of enmity to the government, entertaining republican sentiments, and belonging to a secret association, and was cast into the state prison at Koepniek. After some months he was liberated through Niebuhr's pressing solicitations. While at Koepniek he wrote a little volume of poems, *Wein und Wonne Lieder*, which was published in Berlin under the name of Arnold Franz. Fearing renewed persecution, he took refuge in England. He arrived in London in 1825, and resided there for a year, writing for German periodicals and giving lessons in the languages for his support. In 1827 he went to the U. S. with warm recommendations from Niebuhr, and passed the next five years in Boston at work on the *Encyclopædia Americana*. In 1832 he removed to New York, and there translated de Beaumont and de Tocqueville's work on the penitentiary system. He then spent two years in Philadelphia, where he published his *Letters to a Gentleman in Germany*. In 1835 he was appointed to the professorship of History and Political Economy in South Carolina College; he remained in that position at Columbia more than twenty years, during which period he wrote and published the great works upon which his fame chiefly rests. The three principal of these are his *Manual of Political Ethics* (2 vols., 1838); *Legal and Political Hermeneutics, or the Principles of Interpretation and Construction in Law and Politics* (1 vol., 1839); and his *Civil Liberty and Self-government* (2 vols., 1853). In 1856 Dr. Lieber resigned his professorship in South Carolina College. In 1857 he was elected to a similar professorship in Columbia College, New York, and subsequently to the

chair of Political Science in the law school of the same institution. During the civil war his pen was constantly at work supporting the Federal Government and upholding the Union. He was frequently summoned to Washington by telegraph by the Secretary of War for consultation and advice upon the most important subjects. Upon the requisition of the President of the U. S. he prepared a code of war, which was officially promulgated to the army in general orders of the War Department (No. 100, 1863), as *Instructions for the Government of the Armies of the United States in the Field*—a work which added to his great reputation. D. in New York, Oct. 2, 1872. Besides the works which have been already mentioned, Lieber wrote many minor works of value. His writings constitute a distinct landmark in the history of public law and political science. The saying of which he was the author, and which he adopted as a motto in his later years, may be taken as the keynote of all his political writings: "No right without its duties—no duty without its rights." He was a member of the French Institute and of many learned and scientific societies in Europe and the U. S. Revised by C. K. Adams.

Lieber, Oscar Montgomery: geologist and chemist; b. in Boston, Sept. 8, 1830; son of Dr. Francis Lieber; was educated as a chemist and mineralogist at the Universities of Berlin and Göttingen and the School of Mines at Freiberg, Saxony; was appointed State geologist of Mississippi in 1850; wrote *The Assayer's Guide* (1852); *The Analytical Chemist's Assistant* (1852); *Geology of Mississippi* (1854); and many articles in *The Mining Magazine*. In 1854–55 he was engaged in the geological survey of Alabama, and from 1856 to 1860 was mineralogical, geological, and agricultural surveyor of South Carolina, publishing four annual reports; in 1860 went as geologist to Labrador with an astronomical expedition; entered the Confederate army in 1861; was mortally wounded at the battle of Williamsburg, and died in Richmond, Va., June 27, 1862.

Liebig, lee'bich, Justus, Baron von: chemist; b. at Darmstadt, Germany, May 12, 1803; received his earliest edueation in the gymnasium of his native city; from 1819 to 1822 studied natural science and chemistry at the Universities of Bonn and Erlangen, and from 1822 to 1824 in Paris. A paper on fulminic acid which he read before the French Institute introdueed him to Alexander von Humboldt, and by his influence he was appointed Professor of Chemistry at the University of Giessen, Hesse-Darmstadt, in 1824. He resided in Giessen from 1824 to 1852; established a laboratory for practical chemistry, the first of its kind in Germany; founded, together with Geiger, of Heidelberg, the *Annalen der Pharmacie*; and made in a short time his lecture-room the center of the study of chemistry, to which students gathered in great numbers, and from which issued many great scientific discoveries, and a flood of new and most valuable practical ideas with respect to the application of chemistry. In 1852 he removed to Munich as Professor of Chemistry at the university and director of the chemieal laboratory. In 1860 he was chosen president of the Academy of Sciences at Munich, and in 1861 foreign member of the Academy of Sciences at Paris. D. Apr. 18, 1873, generally acknowledged as the greatest chemist of his time. Besides a great number of articles in the *Annalen der Pharmacie* and the *Handwörterbuch der Chemie* (9 vols., 1837–64), which he compiled together with Poggendorff, of Berlin, he wrote *Die organische Chemie in ihrer Anwendung auf Agricultur* (1840), translated into English by Dr. Lyon Playfair under the title *Chemistry in its Application to Agriculture and Physiology*; *Grundsätze der Agriculturchemie* (1855); *Theorie und Praxis der Landwirthschaft* (1856); *Naturwissenschaftliche Briefe über die moderne Landwirthschaft* (1859); and in another line, *Die Thierchemie oder organische Chemie in ihrer Anwendung auf Physiologie und Pathologie* (1842), translated into English by William Gregory under the title *Animal Chemistry, or Chemistry in its Application to Physiology and Pathology*; *Chemische Untersuchungen über das Fleisch und seine Zubereitung zum Nahrungsmittel* (1847); *Die Ursachen der Säftebewegung im thierischen Organismus* (1848). The volume which made him most popular, and contributed most to introduce chemical truths among educated people and spread sound views with respect to their importance in everyday life, was his *Chemische Briefe* (1844), translated into English under the title *Familiar Letters on Chemistry and its Relations to Commerce, Physiology, and Agriculture.* On practical life he probably exercised a greater influence than any chemist before him; new methods were introduced by him in agriculture, pharmacy, the manufacture of vinegar, glass, etc., the preparation of food, etc. His meat extract is now extensively used, and so is his *Suppe für Säuglinge* (baby soup). In science he ranks as one of the founders of organic chemistry, and his researches concerning the application of chemistry to physiology and pathology are invaluable.

Liebermeister, lee'ber-mīs-ter, Karl, von, M. D.: physician; b. in Bonsdorf, Rhenish Prussia, Feb. 2, 1833; pursued his professional studies in Bonn, Würzburg, Greifswald, and Berlin; graduated M. D. in 1856 from the University of Greifswald; from 1865 to 1871 was Professor of Pathology and director of the medical clinic at the University of Basel; in 1871 he went to the University of Tübingen. He stands in the first rank of clinicians. Among his numerous contributions to medical literature are: *Beiträge zur pathologischen Anatomie und Klinik der Leberkrankheiten* (Tübingen, 1864); *Handbuch der Pathologie und Therapie des Fiebers* (Leipzig, 1875); *Vorlesungen über specielle Pathologie und Therapie* (Leipzig, 1886). S. T. Armstrong.

Liebling, leep'ling, Emil: pianist and composer; b. at Pless, Germany, Apr. 12, 1851; studied under Kullak, Dachs, and Liszt; went to the U. S. in 1867; settled in Chicago in 1874; has played in principal cities both as pianist and in connection with leading orchestras. His compositions are entirely for the pianoforte. D. E. H.

Liebling, George: See the Appendix.

Liebling, Max Emil: See the Appendix.

Liebling, Sally: See the Appendix.

Liebreich, -rīch, Richard, M. D.: ophthalmologist; b. in Königsberg, Prussia, June 30, 1830; pursued his professional studies in the Universities of Königsberg, Berlin, and Halle, graduating M. D. from the latter in 1853. He studied under Donders in Utrecht and Brueeke in Berlin, and from 1854 to 1862 was assistant in von Graefe's elinic. While at the clinic he pursued his special investigations in the use of the ophthalmoscope, publishing his *Atlas der Ophthalmoskopie* in 1863. In 1862 he went to Paris to practiec his specialty, but on the outbreak of the Franco-German war in 1870 he left that city and made London his home. Besides a number of papers on topies connected with diseases of the eye, he has written several on investigations regarding visual defects of artists, as shown in their paintings.

Liege, leej (Fr. *Liège*; Dutch *Luyk*; Germ. *Lüttich*): the easternmost province of Belgium. Area, 1,117 sq. miles. The southern part of the province is hilly, consisting of rocks covered with heath or woods, but rich in coal and iron. The northern part, the so-called *Herveland*, is more level, is exceedingly fertile, and is cultivated like a garden. Large quantities of butter and Limburg eheese are made here. Pop. (1896) 817,473, of whom nine-tenths speak French and one-tenth Flemish.

Liege: city of Belgium; capital of the province of Liege, and the center of one of the most enterprising and prosperous manufacturing regions of the country (see map of Holland and Belgium, ref. 10–G). It is situated in a beautiful valley on both sides of the Meuse, at its junction with the Ourthe, and defended by a strong citadel on the summit of Sainte-Walburge to the N. W., and by several detached forts—Cornillon to the N., and Chartreuse to the E. The older part of the city consists of narrow and crooked streets, lined with tall, gloomy, and dirty houses; the more recent parts, the many public squares, and the quays along the rivers, which are crossed by a number of elegant bridges, are very fine. The most remarkable of the public buildings are the cathedral, built in the thirteenth eentury; the Church of St. Martin, which was burned in 1312, but was rebuilt in 1542; the Church of St. Jacques, one of the richest specimens of the ogival Gothic; the Palais de Justice, built in Renaissance style 1508–26, and formerly used as a residence by the prince-bishop. The university was founded in 1817, during the union with the Netherlands, and is now a flourishing institution, and has a library of 100,000 volumes, a mining-school, a polytechnic school, and a botanical garden connected with it. The whole region around Liege is very rich in coal and iron; the mines are run even under the city and the river. These natural riches, in connection with the favorable situation of the city at the junction of two navigable rivers, very early gave rise to an extensive commerce and manufacturing in-

dustry, which, in spite of many violent interruptions, have gone on increasing through several centuries. The products are very varied—cotton goods, cloths, straw hats, chemicals, etc.—but iron, especially as guns, cannon, and machinery, is the principal branch of manufactures in Liege, and is carried to perfection. In the seventh century the city existed as a village of the name of *Leodium*; in the eighth it became the seat of a bishopric; in the tenth it was surrounded with walls and fortified. During the wars with the French republic the Bishop of Liege, who was an independent prince of the German empire, was expelled, and his territory incorporated with France. In 1815 the city was assigned to Holland by the congress of Vienna, but in 1830 it was one of the first places which rose in rebellion against the unnatural union. Pop. (1896) 165,404.

Liégeard, li-ā'zhaar', François Émile Stephen: author; b. at Dijon, France, Mar. 29, 1830; practiced as an advocate in his native city; took an active part in politics; was a member of the legislative assembly from 1867 to 1870, but retired into private life after the fall of the empire. He has published several collections of poems: *Les Abeilles d'Or* (1859); *Le Verger d'Isaure* (1870); *Livingstone* (1876); *Les grands Cœurs* (1883), crowned by the French Academy with the Montyon prize. Besides these may be mentioned *Une visite aux monts maudits* (1872); *Vingt journées au pays de Luchon* (1874); *Au caprice de la plume* (1884); *La Côte d'Azur* (1888), a description of the coast from Marseilles to Genoa, crowned by the Academy with the Bordin prize; and *Trois ans à la chambre* (1873), a collection of political discourses. Revised by A. R. Marsh.

Lieg'nitz: town; in the province of Silesia, Prussia; at the confluence of the Katzbach and the Schwartzwasser; 38 miles W. by N. of Breslau (see map of German Empire. ref. 4–H). It is a neat and thriving town, with many good educational institutions and large manufactures of cloth, leather, and tobacco. It was formerly a fortress, but its fortifications have been transformed into gardens and promenades. In the twelfth century it became the seat of the Dukes of Liegnitz, and in its vicinity was fought the battle of Wahlstatt (1241), which though a victory for the Mongols checked their invasion. At times it was a center of conflict in the Thirty Years' war, and the Saxon army defeated the imperialist forces in the neighborhood in 1634, but the historical event for which it is chiefly noted is the battle of Aug. 15, 1760, in which Frederick II. defeated the Austrians. Pop. (1895) 51,518.

Lien, leen, or lee'en [Fr., bond]: As a legal term *lien* is used in so many different senses that it is impossible to frame a single definition which shall accurately describe them all. Properly, a lien is merely a right to retain possession of a chattel until some debt or demand, generally incurred in respect of it, is paid by the owner. In all other cases it is a charge or incumbrance upon either lands or chattels which are not retained in the possession of the creditor, as a security for the payment of some debt or demand, with power to enforce the claim by a judicial proceeding resulting in a sale of the thing and a payment of the demand from the proceeds. There is therefore no real legal identity between these different classes of rights. That first described is of purely a common-law origin; the others are mainly derived from doctrines of the Roman law. A lien is never, in any of its phases, an estate or property in the thing over which it extends; it is at most an incumbrance upon the thing, the property in which belongs to another, and a right to regard and treat the thing as a special fund from which the payment of the debt may be enforced. Liens exist either as the result of some general rule of the law, and are then the incidents of a prior transaction or legal relation entered into by the parties, or they may arise from the stipulations of an express agreement. Those which are created by the law operating upon the acts or omissions of the parties are separated into the following classes: I. Common-law Liens; II. Equitable Liens; III. Maritime or Admiralty Liens; IV. Statutory Liens.

I. *Common-law Liens.*—The liens which fall within this division were created or recognized as existing by the common-law courts, and the rules which govern them were established at a very early day in the history of English jurisprudence. They are entirely different in their nature and effects from those which belong to the other classes, having, in fact, little in common with them except the name. The essence of the common-law lien is the *possession* of the thing over which it extends. It consists in the right of the creditor, under the circumstances in which it arises, to retain in his own possession the goods and chattels of another until some debt or demand is paid by their owner. In order that the right should arise at all, the possession must be lawful and valid—that is, the person who delivers the articles into the custody of the one asserting the lien must have authority to make such a disposition of them, for the common law admitted no lien upon goods as against their rightful owner which would result from the unlawful or unauthorized acts of another. Exceptions to this rule have been created by statute in a few instances in the interests of trade, but the rule remains, as a general doctrine of the law, in full force. There can also be no lien when the possession was fraudulently or tortiously obtained by the creditor. As possession is the very essence of the common-law lien, as it consists solely in the continued retention of possession, it follows as a necessary consequence that when possession of the goods is voluntarily surrendered the lien thereon is at once and forever gone. If, however, a number of articles have been received at the same time and as one transaction, and the creditor afterward delivers to the owner a portion thereof, the lien for his entire demand in respect of the whole amount remains good against the balance still left in his hands. For example, if 100 barrels of some commodity were deposited as one lot with a warehouseman to be kept for hire, and he should from time to time permit the owner to withdraw 90 barrels without receiving payment for their storage, he could retain the remaining ten until paid his charges for the whole number deposited. Common-law liens are either *ordinary* (sometimes called special) or *general*. In the case of the *ordinary* or *special* lien the debt or demand must be due for services rendered to or about the very articles themselves which are subject to it. One who has a *specific* lien upon property can not retain it for the payment of other debts due him from the owner without a special agreement to that effect. In the case of a *general* lien the goods may be detained for a general balance due for former services of a similar character rendered in respect of other goods of the same owner. The former is the rule, the latter is the exception; in fact a general lien is permitted only in a very few instances, and usually only by express agreement of the parties.

As a general proposition, the common-law lien thus described arises whenever goods and chattels are received into the possession of a person, in order that he may render some service in respect of them to the owner, upon an express or implied contract for compensation therefor. The service may consist either in the mere care and custody of the articles, or in work and labor expended upon them, or in the advancement of money upon their credit. This description includes all cases of bailments for hire, and also certain other employments which, though not strictly bailments, require that the articles in connection with which the service is rendered should come into the possession of the person employed. The following are the most important and familiar instances of persons who are thus entitled to a lien upon the goods and other articles which come into their possession in the course of their respective employments as a security for the compensation due therefor: warehousemen and wharfingers; innkeepers on the goods of their guests; boarding-house keepers are not entitled to any lien at the common law, but it has been given to them by statute in several States; common carriers; all bailees for hire, who receive the goods of their employers and perform work and labor upon their construction and repair (including tailors and mechanics of every kind); auctioneers, factors, and commission-merchants for their charges, expenses, and advances on goods consigned for sale, and on the proceeds thereof when sold; vendors of goods sold for cash for their price; bankers, on the securities of their customers for any advances made upon the credit thereof; attorneys on the papers of their clients, and also at the common law on judgments recovered by them. Of these only the liens of bankers, factors, warehousemen, and wharfingers, and the attorney's retaining lien on papers belong to the class of general liens. All the others, including the attorney's lien on judgments, are specific. As already stated, the common-law lien allows the holder thereof only to retain possession of the articles until his demand is paid.

II. *Equitable Liens.*—The liens which belong to this class were created, and are exclusively enforced, by courts of equity. They differ in every respect from those already described, since possession is not an essential, nor even an ordinary, element of their existence, and payment of the

demand secured can be directly enforced by their means. An equitable lien is therefore a charge or incumbrance, cognizable in equity, upon property, generally land, not in the possession of the creditor, as security for the payment of a debt or demand, and it may be enforced by an action and a decree made therein, ordering the sale of the subject-matter and payment of the debt out of the proceeds. The following are the most important cases in which such liens exist: (1) Whenever land is sold or conveyed, and the price remains unpaid, and is secured in no other manner than by the purchaser's own verbal or written promise, the vendor or grantor has a lien on the land as security for such unpaid price. (2) When lands are contracted to be sold, but are not conveyed, and remain in the possession of the vendor, the vendee has a lien thereon for the purchase price which he has prepaid. (3) If land is conveyed or devised subject to a charge upon it for the payment of debts or legacies, a lien arises upon it in favor of the creditors or legatees as a security for the payment of their demands. (4) A deposit of title-deeds as a security for the loan of money creates a lien in favor of the lender upon the land described in the conveyances. (5) According to the equitable doctrine which now prevails in many and perhaps most of the States, the right and interest of the mortgagee in an ordinary mortgage of lands is simply a lien on the premises as a security of the mortgage debt. See MORTGAGE.

III. *Maritime or Admiralty Liens.*—The liens of this class are created by the law which is administered in courts of admiralty, and they result as incidents from various species of maritime contracts and torts. In their general nature they resemble the equitable liens, both in not requiring possession of the subject-matter by the creditor, and in being enforceable by a judicial proceeding. They constitute a charge upon the thing, even though in the custody of its owner, and often follow it into other countries and into the hands of subsequent purchasers. These liens may attach to the vessel, to the cargo, or to the proceeds of each, and to the freight earned by the ship. The most important cases are—(1) That of seamen for their wages on the ship and freight, or their proceeds. (2) That of material-men under certain circumstances on the vessel for repairs made or supplies furnished. (3) That of the shipowner on the cargo for the freight earned in its transport. This is, however, not in its full extent a maritime lien, for it is lost if the goods are voluntarily delivered without payment. (4) That of the shipper on the vessel for the value of his goods shipped. (5) That created on the vessel by the execution of a bottomry bond, which is a peculiar form of security given by a master or other agent for money borrowed by them under certain special circumstances upon the credit of the ship. (6) That of salvors on the ship, cargo, or freight which they have rescued from loss by marine perils. (7) In case of a collision the owners of the injured vessel have a lien on the one in fault for the damages caused by the tort. Purely maritime liens are enforceable by a judicial proceeding in a court of admiralty, which results in a sale and payment out of the proceeds.

IV. *Statutory Liens.*—In addition to the foregoing there are various other liens entirely created or regulated by statute. One or two of the most important only need be mentioned. In many of the States, and probably in most, a lien is given by statute to mechanics, builders, and furnishers of materials upon the buildings constructed or repaired by them, in order to secure the cost of the materials furnished and the price of the work and labor done. The statutes conferring these liens greatly differ in their details, but they all authorize a judicial proceeding for their enforcement analogous to that for the foreclosure of mortgages. Judgments are made liens upon the lands of the debtors therein, but the provisions of the statutes in reference to their commencement and duration, and the lands to which they apply, are so various and conflicting that no attempt will be made to enumerate them.

Nothing has been said in respect to those liens which are created by express agreements, because their nature and extent must depend entirely upon the stipulations which the parties see fit to enter into, and they are therefore subject to no general rules, and admit of no general classification.

Revised by GEORGE W. KIRCHWEY.

Lier, leer, ADOLF: painter; b. at Herrnhut, in the kingdom of Saxony, Germany, May 21, 1826; worked as a painter's apprentice in Zittau, and afterward attended the art school at Dresden, the Museum of Art in Basel, and in 1849 went to Munich, where he became the pupil of Zimmermann. In 1861 and later he came under the influence of the French landscape-painter Jules Dupré; in 1865 visited London and vicinity; then returned to Munich, where he rose to the first rank as a painter of landscapes. He excelled in the representation of moonlight scenes, and of clouds and rain-storms. From 1869 to 1873 he was busy as a teacher, and exerted, both then and later, a great influence on the development of landscape-painting at Munich. Some of his best works are *Kanallandschaft von Schleiszheim* (1868); *Landstrasze bei München im Regen* (1872); *Im Eichenwald* (1877); *Abend an der Isar* (1877, in the National Gallery at Berlin). D. Sept. 30, 1882.

Lierre, li-ãr′: town; in the arrondissement of Mechlin, province of Antwerp, Belgium; on the Nethe, at the confluence of the Great and Little Nethe; on a railway junction, 11 miles by rail S. E. of the city of Antwerp (see map of Holland and Belgium, ref. 9–E). It has a Gothic church of the fifteenth century with excellent paintings, a seminary, a high school, large manufactures of shoes, beet-sugar, lace, cotton, woolen, and silk fabrics, and salt-works, breweries, and distilleries. Lierre was famous for its cloth industry in the Middle Ages, and until 1784 was a fortified town. Pop. (1891) 20,133.

Lieutenant [readapted to Fr. < M. Eng. *levetenant* (cf. earlier pronunciation, *leftenant*), from O. Fr. *lieutenant*, liter., place-holder; *lieu*, place + *tenant*, pres. partic. of *tenir*, hold]: one who acts as the representative of another. In the U. S. army and marine corps a lieutenant is a commissioned officer below the rank of a captain. There are two grades, those of first and second lieutenant. Second lieutenants are the lowest in rank of commissioned officers. The first and second lieutenants take rank with lieutenants junior grade and ensigns in the navy. A lieutenant of the U. S. navy takes rank with a captain in the army. His office is next higher than that of lieutenant junior grade, and next below that of lieutenant-commander. A lieutenant-general in the army ranks next below a general and next above a major-general. His rank is equivalent to that of a vice-admiral. Lieutenant-colonels in the army rank next below colonels and next above majors; their rank corresponds with that of commanders in the navy. Lieutenant-commanders in the navy rank next below commanders and next above lieutenants; their office corresponds with that of majors in the army. Revised by JAMES MERCUR.

Life: See BIOLOGY.

Lifeboats: boats constructed especially for the escape of persons from vessels wrecked or in jeopardy. As long ago as 1777 M. Bernières, of Paris, projected a vessel for inland and short sea-voyages, and his experimental craft showed such resistance to capsizing that it must have embraced some of the leading features of the modern lifeboat. The inventor of the latter was Lionel Lukens, who, on Nov. 2, 1785, secured an English patent on his improvements. The invention of Lukens displayed the salient and essential features of the lifeboat of to-day. It was copied in principle by another projector, Henry Greathead, who put the invention into successful use in 1790. Greathead's boat was constructed with cork floats arranged in and around the sides and gunwales.

About 1805 Christopher Wilson proposed to make the gunwales hollow, and to divide them into compartments, so that injury to one portion would leave the other intact. This addition to Lukens's invention was a judicious adaptation of the Chinese system of forming a vessel in a number of water-tight chambers. The same principle is embraced in the lifeboats of Joseph Francis, a native of the U. S., which are made of sheet-metal, and are used at the life-stations on the coasts of the U. S. It is also embraced in the boat of the Royal National Lifeboat Institution of Great Britain (Fig. 1). This craft is about 30 feet in length and 8

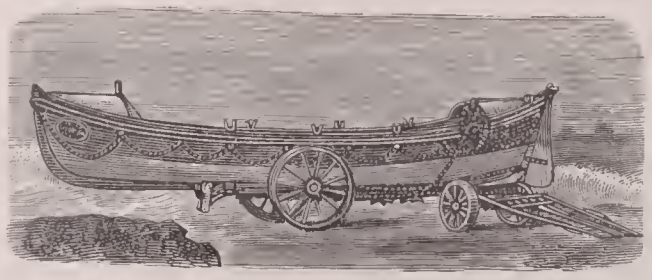


FIG. 1.

feet wide, with its ends 2 feet higher than its central portion. It has, like previous boats, an iron keel. This keel weighs

800 lb. On each side are air-tight chambers. The floor of the boat is about coincident with the water-line, and the space between it and the bottom is filled with cork, etc. The Francis lifeboat is peculiar in the method of its construction, being formed of two pieces of metal, each brought to shape in dies, operated by powerful hydraulic presses, the two

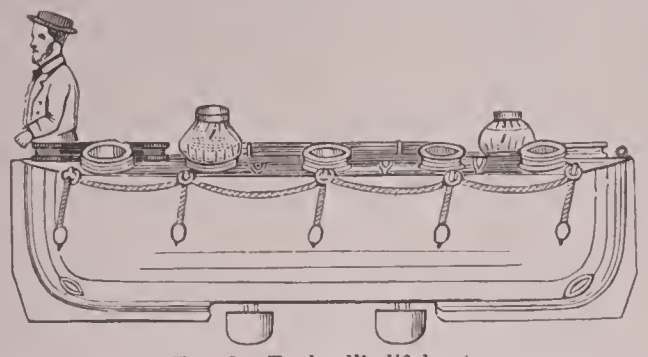


Fig. 2.—Fackrell's lifeboat.

halves being afterward firmly secured together. The material is sheet-copper; it is corrugated by the dies, so as to give great longitudinal strength and stiffness; the boat is provided with a number of water-tight air-chambers or compartments to insure its buoyancy. This is the boat now in use. Francis's original idea, brought forward about 1839, was to construct the craft of copper cylinders firmly bound side by side by metal bands, and the whole furnished with an iron keel. Very many alleged improvements in lifeboats have been brought forward, but few or none appear to have practical utility beyond those just described. An illustration of some of the more noticeable varieties of these may, however, be of interest. For example, Fackrell's lifeboat em-

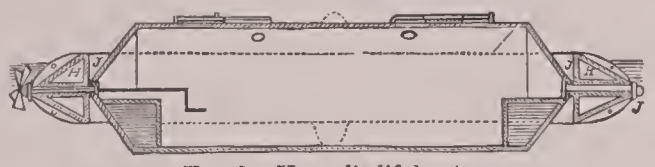


Fig. 3.—Hensel's lifeboat.

braces the principle of the Greenlander's kyak, the passengers being placed in circular openings formed in the closed deck or top of the boat, and closely packed around the middle by suitable water-proof material. Hensel's (1866) embraced an oblong annular raft having a closed cabin suspended longitudinally on gudgeons or spindles within the central space of the raft, and provided with a screw propeller at each end worked by a crank attached to the end of the propeller shaft extended within the cabin for the purpose. Legros (1858) made the outer sides of his boat of metal, while the top and unexposed surfaces are of rubber or other air-proof flexible material. Another unique but impracticable form, proposed in 1859 by W. N. Clark, embodied a combination of water-cask, boat, raft, and lifeboat. It was in effect a cask made on one side with a curve approximating that of a boat, and provided on the other with a covered opening for the admission of the passenger.

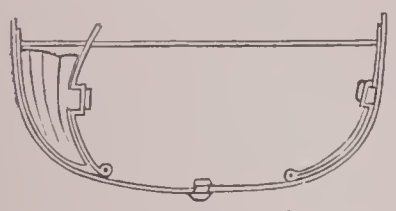


Fig. 4.—Legros's lifeboat.

In cases of emergency an ordinary ship's boat may have its buoyancy very much increased, and be thereby fitted for use as a lifeboat, by tying empty casks at the sides, which serve in a rude way the same purpose as the cork floats or empty chambers in the gunwales of regularly constructed lifeboats. Spars or any other buoyant material may be lashed in place in the same way, and will serve the same purpose in proportion to their lightness.

It has been proposed to employ water ballast in lifeboats, conjoined with proportionate air-chambers to control buoyancy and increase stability of motion. An invention introduced in 1889 comprises among other features a convertible and collapsible life-saving boat, in which a skeleton canvas-covered folding frame is combined with longitudinal mattresses, secured thereto with inflatable air-chambers interposed between the mattresses and the frame, the latter being provided with a keel, a stern, a stern-post, and other suitable adjuncts.

The life-car is a kind of boat, closed in on top, and designed to be drawn through the surf between the vessel and the shore. To do this a hawser is stretched from one point to the other; the car is attached to the hawser by rings provided on the free ends of suspending chains fixed to the

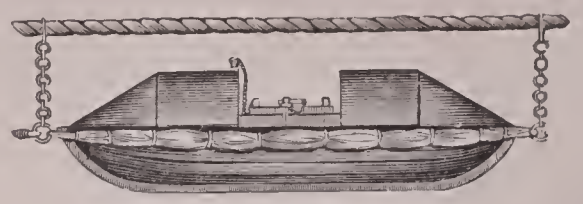


Fig. 5.—Francis's life-car.

ends of the car. A line attached to each extremity of the car enables it to be drawn to and fro. The life-car used in the U. S. was devised by J. Francis, the inventor of the Francis lifeboat. For life-saving apparatus in which the principle of the raft is substituted for that of the boat, see Life-rafts. James A. Whitney.

Life-estate: See Estate, Dower, Jointure, Emblements, Estovers, and Landlord and Tenant.

Life-insurance: the guarantying of money contingently on human life. The guaranty is given by an association or corporation called a *life-insurance company*, and is contained, with its conditions, in a written instrument termed a *policy of insurance*; the person on whose life or death payment of the sum insured is made dependent is the *person whose life is insured*, and the one to whom or to whose representatives the payment is to be made on the happening of the contingency, and who is responsible to the company for the premiums, is the *insured* or *policy-holder*; the consideration to be paid the company for insurance is the *premium*; the chance of death or life in any given year, to the person whose life is insured, is the *risk*.

A life-insurance company may be *proprietary*, *mutual*, or *mixed*. A *proprietary* or stock company is one formed by a number of persons who subscribe a capital (and thus become proprietors) adequate to pay expenses and cover the contingency of early losses before the premiums have accumulated sufficiently. It is organized for dealing in life contingencies as other mercantile companies are for trading in goods. Policy-holders have no voice in the management and do not participate in any profits which may accrue. A *mutual* company is an association of persons, each of whom is insurer as well as insured. Policy-holders exercise control through their votes for managers, and are entitled to all the profits or dividends of the society. A *mixed* company is one formed upon a combination of the principles of the two preceding. A cash capital is raised by a number of subscribers, who agree to assume responsibility for the first expenses and early losses, and at stated intervals to divide among the insured a certain proportion or the whole of the accumulated surplus or profits.

Policies of insurance are of various kinds. The chief are whole life, endowment, endowment insurance, term, joint life, annuity, and survivorship annuity.

Policies which are to be paid on the death of an individual are, in theory, not payable till the end of the year in which the given life fails; but in practice they are usually paid in sixty or ninety days after due proofs of death have been furnished. In other kinds of policy the time of payment is specified in the contract. Whatever the kind of policy, the premium to be paid for it by the holder depends upon the liability of death or life (i. e. the risk), in any given year, of the person insured, and on the rate of interest on money.

Table of Mortality.—This shows, for each year of life, from birth to the highest age attainable, how many persons out of a given number alive at the beginning of any year die by the end of it.

Dr. Price's Northampton table was the first known to have been used to determine rates of premium for life-insurance. (*Walford.*) It had many defects, as might reasonably be expected from the crude state, at the time, of the science of vital statistics. It has been practically superseded in Great Britain, and has never been much used in the U. S., except for certain purposes in courts of law. The tables which have been computed since differ materially from the Northampton, but, with due allowance for such variations as might be expected from the circumstances attending their construction, corroborate each other in a remarkable manner. Since they were prepared by different persons from different data, their general coincidence forms strong proof of their essential accuracy. Two tables largely used in the U. S. by companies and for State supervisory purposes are the actuaries' or combined experience, and the

American experience table. They are here inserted, with the expectation of life as deduced from eaeh :

Actuaries' Table.				American Experience Table.			
Age.	Number of living.	Number of deaths.	Expectation, years.	Age.	Number of living.	Number of deaths.	Expectation, years.
10	100,000	676	48·36	10	100,000	749	48·7
11	99,324	674	47·68	11	99,251	746	48·1
12	98,650	672	47·01	12	98,505	743	47·4
13	97,978	671	46·33	13	97,762	740	46·8
14	97,307	671	45·64	14	97,022	737	46·2
15	96,636	671	44·96	15	96,285	735	45·5
16	95,965	672	44·27	16	95,550	732	44·9
17	95,293	673	43·58	17	94,818	729	44·2
18	94,620	675	42·88	18	94,089	727	43·5
19	93,945	677	42·19	19	93,362	725	42·9
20	93,268	680	41·49	20	92,637	723	42·2
21	92,588	683	40·79	21	91,914	722	41·5
22	91,905	686	40·09	22	91,192	721	40·9
23	91,219	690	39·39	23	90,471	720	40·2
24	90,529	694	38·68	24	89,751	719	39·5
25	89,835	698	37·98	25	89,032	718	38·8
26	89,137	703	37·27	26	88,314	718	38·1
27	88,434	708	36·56	27	87,596	718	37·4
28	87,726	714	35·86	28	86,878	718	36·7
29	87,012	720	35·15	29	86,160	719	36·0
30	86,292	727	34·43	30	85,441	720	35·3
31	85,565	734	33·72	31	84,721	721	34·6
32	84,831	742	33·01	32	84,000	723	33·9
33	84,089	750	32·30	33	83,277	726	33·2
34	83,339	758	31·58	34	82,551	729	32·5
35	82,581	767	30·87	35	81,822	732	31·8
36	81,814	776	30·15	36	81,090	737	31·1
37	81,038	785	29·44	37	80,353	742	30·4
38	80,253	795	28·72	38	79,611	749	29·6
39	79,458	805	28·00	39	78,862	756	28·9
40	78,653	815	27·28	40	78,106	765	28·2
41	77,838	826	26·56	41	77,341	774	27·5
42	77,012	839	25·84	42	76,567	785	26·7
43	76,173	857	25·12	43	75,782	797	26·0
44	75,316	881	24·40	44	74,985	812	25·3
45	74,435	909	23·69	45	74,173	828	24·5
46	73,526	944	22·97	46	73,345	848	23·8
47	72,582	981	22·27	47	72,497	870	23·1
48	71,601	1,021	21·56	48	71,627	896	22·4
49	70,580	1,063	20·87	49	70,731	927	21·6
50	69,517	1,108	20·18	50	69,804	962	20·9
51	68,409	1,156	19·50	51	68,842	1,001	20·2
52	67,253	1,207	18·82	52	67,841	1,044	19·5
53	66,046	1,261	18·16	53	66,797	1,091	18·8
54	64,785	1,316	17·50	54	65,706	1,143	18·1
55	63,469	1,375	16·86	55	64,563	1,199	17·4
56	62,094	1,436	16·22	56	63,364	1,260	16·7
57	60,658	1,497	15·59	57	62,104	1,325	16·1
58	59,161	1,561	14·97	58	60,779	1,394	15·4
59	57,600	1,627	14·37	59	59,385	1,468	14·7
60	55,973	1,698	13·77	60	57,917	1,546	14·1
61	54,275	1,770	13·18	61	56,371	1,628	13·5
62	52,505	1,844	12·61	62	54,743	1,713	12·9
63	50,661	1,917	12·05	63	53,030	1,800	12·3
64	48,744	1,990	11·51	64	51,230	1,889	11·7
65	46,754	2,061	10·97	65	49,341	1,980	11·1
66	44,693	2,128	10·46	66	47,361	2,070	10·5
67	42,565	2,191	9·96	67	45,291	2,158	10·0
68	40,374	2,246	9·47	68	43,133	2,243	9·5
69	38,128	2,291	9·00	69	40,890	2,321	9·0
70	35,837	2,327	8·54	70	38,569	2,391	8·5
71	33,510	2,351	8·10	71	36,178	2,448	8·0
72	31,159	2,362	7·67	72	33,730	2,487	7·6
73	28,797	2,358	7·26	73	31,243	2,505	7·1
74	26,439	2,339	6·86	74	28,738	2,501	6·7
75	24,100	2,303	6·48	75	26,237	2,476	6·3
76	21,797	2,249	6·11	76	23,761	2,431	5·9
77	19,548	2,179	5·76	77	21,330	2,369	5·5
78	17,369	2,092	5·42	78	18,961	2,291	5·1
79	15,277	1,987	5·09	79	16,670	2,196	4·8
80	13,290	1,866	4·78	80	14,474	2,091	4·4
81	11,424	1,730	4·48	81	12,383	1,964	4·1
82	9,694	1,582	4·18	82	10,419	1,816	3·7
83	8,112	1,427	3·90	83	8,603	1,648	3·4
84	6,685	1,268	3·63	84	6,955	1,470	3·1
85	5,417	1,111	3·36	85	5,485	1,292	2·8
86	4,306	958	3·10	86	4,193	1,114	2·5
87	3,348	811	2·84	87	3,079	933	2·2
88	2,537	673	2·59	88	2,146	744	1·9
89	1,864	545	2·35	89	1,402	555	1·7
90	1,319	427	2·11	90	847	385	1·4
91	892	322	1·89	91	462	246	1·2
92	570	231	1·67	92	216	137	1·0
93	339	155	1·47	93	79	58	0·8
94	184	95	1·28	94	21	18	0 6
95	89	52	1·12	95	3	3	0·5
96	37	24	0·99	96			
97	13	9	0·89	97			
98	4	3	0·75	98			
99	1	1	0·50	99			

The manner of reading such a table is apparent. According to the actuaries' table, of 100,000 persons alive at age ten, 676 will die before reaching age eleven; upon their next year will then enter the difference between 100,000 and 676, or 99,324, of whom 674 will die before attaining age twelve, etc. At age ten the expectation of life is 48·36 years; at age eleven, 47·68 years, etc. By the "expectation of life" at any age is meant the mean after-lifetime remaining to persons of that age.

The determination of the expectation of life may be of interest to the general reader, but it is of little or no practical value in insurance business proper. The real use of the mortality table in an insurance office is to find the average chance of death or life in any year of persons of a given age. To obtain the average chance of death, take, for example, a person aged 40. The American table shows that of 78,106 persons alive at that age, 765 died during the succeeding year, or about 98 in 10,000; the chance that *any one* of them will die is expressed by 765 divided by 78,106, or, approximately, by $\frac{98}{10000}$; and similarly for any age in the table. If it is desired to find the average chance that a person aged 40 will survive 41 and die before reaching 42 the process is equally simple. Thus of 78,106 persons aged 40, 774 survive the year immediately following, and die before reaching 42, or about 99 in 10,000; the chance that *any one* of them will do so is therefore expressed by 774 divided by 78,106, or, nearly, by $\frac{99}{10000}$; and so for each succeeding year. The chance of *life* for successive years is also easily deducible. Since a person aged 40 has 98 chances in 10,000 of *dying* during the year, he must have 10,000 *diminished* by 98 chances, or nearly 99 chances in 100, of *living* through the first year; since he has 99 chances in 10,000 of surviving the first and *dying* the second year, he must have 9,901 chances in 10,000, or about 99 in 100 of *surviving* the second year.

In addition to the chance of life or death in any given year, as determined from the mortality table, the premium for insurance depends also, in part, upon the rate of interest on money. The premium is not to be locked up in a company's safe and left unproductive. It is expected to earn interest, and thus assist the policy-holder in carrying out his design. One great function of company officers is to see that the premium does its full share of the work. It is of the first importance, therefore, to determine at the outset how much assistance this matter of interest can be safely counted upon to render—not this year nor next year alone, but always. In mutual companies of the U. S. the rate generally assumed is 4 per cent.; in proprietary companies it is somewhat higher. The rate of interest being fixed and a mortality table selected, the determination of the premium for any kind of policy is simple in principle.

The full or *office* premium in any case consists of two parts—the pure or *net* premium, as it is termed, and a certain addition thereto called the *loading*. The loading and (consequently) expenses and contingencies of business will for the moment be disregarded, and the net premium alone considered. The general method of determining the premium is the same whatever the amount of the policy, the age of the insured, the kind of company selected, the rate of interest, and table of mortality.

I. A *whole-life policy* is a contract in which the company agrees to pay the policy-holder or his representatives a specified amount of money at the end of the year in which the person whose life is insured may die. The net premium may be paid in several ways. First, in one single payment in advance, known as the *net single premium*. It will be observed that while the premium is paid at once, the amount of the policy is not due till the *end* of the year in which the given life fails. If it had *certainly* to be paid at the end of the first year, the premium necessary would be $1,000 discounted for a year at 4 per cent. (i. e. such a sum as, invested at 4 per cent., would amount to $1,000 at the end of the year)—that is, $961.54 nearly; but it has to be paid only on *condition* that the insured shall die during the year. The chance of his death is found from the mortality table (as before explained) to be ninety-eight ten-thousands of certainty, and hence the net premium for the first year should be $\frac{98}{10000}$ths of $961.54, or $9.42. In the same way, if the policy had certainly to be paid at the end of the second year, the premium for this would be $1,000 discounted for *two* years at 4 per cent. compound interest—that is, $924.56; but the average chance that a person aged 40 will survive 41 and die before attaining 42 was found to be ninety-nine ten-thousandths of certainty, and therefore the proper premium for the second year is $\frac{99}{10000}$ths of $924.56, or $9.15. The net charge being, then, $9.42 for the first year and $9.15 for the second, it will for both be the sum of these, or $18.57. Calculate in like manner the requisite premium for the third year, the fourth year, and for every separate year up to and including the last year of life as given in the table, which is 95; add the results for all the separate years together, and

the sum will be found to be $367.58, which is the net single premium required for the policy considered.

The net single premium, being comparatively large, may for various reasons be inconvenient or undesirable. A plan has therefore been devised by which a series of *equal annual* payments, continued for life, may effect the same object. These annual premiums, which are made at the beginning of each year, must have a *present value* equal to the net single payment, for the latter is just sufficient. The present value of a series of equal payments, each of given amount, to be made at stated periods for a specified length of time (money bearing a certain rate of interest), is that sum of money which, invested at the given rate of interest, will produce the given amount at the successive periods for the whole of the time. To obtain the equal annual payment required, find, first, the present value of *one dollar* paid at the beginning of each year by a person aged 40 as long as he shall live. The first payment, being made at once and subject to no contingency, is worth one dollar; the second, due a year after the first, would, if *certain* to be received, be worth one dollar discounted for a year at 4 per cent.—that is, 96 cents; but its receipt depends on a person's being alive to pay it, the chance of which, as before shown, being ninety-nine hundredths of certainty, the second payment is worth $\frac{99}{100}$ths of 96 cents, or 95 cents; the third payment, due two years after the first, would, if certain, be worth one dollar discounted for *two* years at 4 per cent., compound interest—that is, 92 cents; but the chance of its reception being ninety-nine hundredths of certainty, it is worth $\frac{99}{100}$ths of 92 cents, or 91 cents: the three payments are together worth the sum of these, or $2.86. Continue thus to estimate the contingent value of the payment for each successive year of life up to and including 95; add all the results together, and the sum, $16.44, is the present value in one payment of one dollar paid annually in advance for life by a person aged 40. Since, then, $16.44 is the present value of *one dollar* paid as described, $367.58 must be the equivalent of an annual payment made in like manner by the same person, found by dividing $367.58 by 16·44—that is, $22.35, which is the net annual premium sought.

To explain the function of the net premium, let it be assumed at first that the payments for a policy are in equal annual premiums continued for life. The same explanation will serve, *mutatis mutandis*, when payments are otherwise made. The net annual premium being invariable in amount, and the risk of death to the insured increasing from year to year, such premium must accomplish two purposes. It must, in the first place, pay year by year what is technically called the *cost of insurance*. This expression, as used by an actuary, means something quite different from what a policy-holder means by it. To the latter it is the premium; to the former it is the part which that premium must contribute to the death-claims in any year. On the hypothesis that the mortality table is exact (and all the calculations must be made on this supposition), a certain number of policies will annually become claims by death. These must be paid, and as the company is supposed a mutual one, and has no capital beyond what has been and is contributed by the policy-holders, each premium must contribute its just proportion to meet the obligations. Thus of 10,000 persons, aged 40, insured in a company, 98 will die the first year, and, each policy being for $1,000, $98,000 will have to be paid. As provision is made at the *beginning* of the year, and the policies are not payable till the *end* of it, $98,000 discounted for a year at 4 per cent., or $94,230, will be sufficient, which for each of the 10,000 would, if each paid *just enough* to raise the necessary fund, be $9.42 apiece. Each pays a net premium of $22.35, and hence pays $12.93 *more* than is necessary for the current obligations; therefore, each of those who die contributes to his own claim $12.93, which for the 98 amounts to $1,267, leaving the real amount to be provided by the company the difference between $94,230 and $1,267, or $92,963; this for each of the 10,000 is $9.29. This $9.29 is the cost of insurance for the first year, and is actually paid out by the company if the table-mortality is experienced. It is the contribution which each of the premiums under consideration must make for the benefit of the representatives of those of the coinsured who do not survive the year.

The second function of the net premium is to provide a deposit to the credit of each policy at the end of the year. The necessity of this deposit is apparent. If each year's cost of insurance, and that only, were paid each year, the charge to the insured would be lighter in the first years of the policy than under the equal-annual payment system, but it would grow steadily heavier with advancing time, and finally become an intolerable burden. To prevent this, he pays more at first than the risk is worth, that at a later date he may pay less. Entering at 40, and paying each year by itself, his net premium on a policy of $1,000 for the first year would be $9.42; at 58, it would be $22.05; at 70, $59.61; at 95, $961.54; and these charges a company would be compelled to make to be entitled to confidence; yet under the equalized system it is no more at any time than $22.35. It is evident from this that the excess of the payments in the earlier years must be rigorously set aside as a fund, which, with the interest accumulated upon it, will suffice to make good the inadequacy of those of later years. The method of determining the amount of the necessary deposit has just been illustrated. In the case considered the deposit on each policy in force at the end of the first year is $13.58; at the end of the second year it is $27.64; and similarly for each succeeding year. If the insured who entered at age 40 were just entering at 41, his net annual premium would be $23.19; yet he pays but $22.35—84 cents less—because he has on deposit $13.58,* which (4 per cent. interest being assumed) is the present value in hand of 84 cents paid annually in advance for life by a person aged 41. If he were just entering at 42, his net annual premium would be $24.08; but he pays $1.73 less, because his deposit of $27.64 * is the present value of $1.73 paid annually in advance for life by a person aged 42; at the end of ten years the deposit to his credit must be $157.29, the present value of $11.35—the difference between the net premium $22.35, which he pays, and $33.70, which he would be required to pay if he were just taking his policy at age 50. The amount of the deposit on a policy paid for by equal annual premiums, continued for life, must always be the present value of the difference between the net premium paid and that which would be requisite if it were taken by the same person at his then increased age at the beginning of the year next succeeding.

It is evident, from what has preceded, that when a life policy is paid for by annual premiums continued for life, the deposit or reserve is accumulated to *aid* the insured in continuing his insurance from year to year; that when paid for by a single premium such deposit is intended to *effect* his continued insurance; and that when paid for by annual premiums continued for a limited number of years only, the deposit is to aid the policy-holder until the expiration of the given number of years, at which time it must be sufficient to effect the continued insurance.

II. A *term* policy is a contract in which the company agrees to pay the representatives of the insured a specified amount of money at the end of the year in which he may die, provided his death should occur within a certain number of years named in the policy.

III. An *endowment* policy is one in which the company agrees to pay a specified amount to the insured himself at a certain future period (stated in the contract) if he should then be alive to receive it. The net premium may be paid at once or at stated intervals, as may be agreed.

Children's Endowment Policies.—These are promises to pay, on a child's attaining the age of eighteen, twenty-one, or twenty-five years, as may be stated, a certain specified amount. In case of the child's death before the age specified, the premiums paid may be retained or returned, according to agreement. If they are to be returned, the policy is of a mixed character, consisting of a pure endowment for which a certain premium, either single or annual, must be paid, and a term insurance on the child's life of an amount which varies with the premiums paid before the policy becomes a claim, for which an additional premium must be paid.

IV. An *endowment insurance* (commonly called an *endowment*) policy is a combination of a pure endowment with a term policy. By it the company agrees to pay a stipulated sum of money at a certain future period in case the person on whose life insurance is made should then be alive, or at his death if that should happen before the expiration of the period.

V. A *joint-life* policy is a contract to pay a certain amount on the death of one of two or more persons named, on the joint continuance of whose lives insurance is made. There are not usually more than two persons named, though there may be three or more.

* Each of these amounts is, in consequence of the fractions disregarded in the calculation, slightly in error; but here, as in other examples given, accuracy of result is made to yield to simplicity of illustration.

VI. *Annuity.*—This is a contract in which a company agrees to pay a given sum annually, either during the remainder of life, or for a specified number of years if the person on whose life insurance is made should live so long, in consideration of a gross sum paid at once by the *annuitant.*

VII. A *survivorship annuity* is an agreement to pay a specified annuity to a nominee during his survivorship of the person on whose life insurance is made.

The policies which have been briefly explained are the chief and fundamental ones. Other varieties are obtained by variations of conditions as to forfeiture, to mode and time of paying premiums, to distribution of surplus, etc. Only one such variety will be treated of here, viz.:

Tontine Dividend or Savings Fund Policy.—This is an ordinary life policy, or an endowment insurance policy with from ten to twenty years or more to run, in which the tontine principle is applied to dividends. The distinctive features of it are—the holders of such policies constitute a class by themselves; they do not participate in profits till after the lapse of a certain number of years (ten, fifteen, or twenty), specified in the policy; in case of death before the dividend period begins, the representatives of the insured receive the sum secured by the policy, and no more; no surrender value is allowed to any one who may relinquish his policy, and no dividend is credited to such policies as may become claims before the dividend period arrives; all profits accruing from every source within the class are reserved till the arrival of the specified dividend period; the accumulated dividends are then to be equitably divided, on the contribution plan, among such policies as are actually in force. There are, of course, variations in the application of the tontine principle giving rise to variously named policies.

Reserve.—Upon each policy issued a deposit must accumulate in each successive year of its currency, upon the same general principles and for the same reasons as were given under life policies. It may in general be stated that the deposit on a policy at the end of any year must be the present value of the difference between the net premium paid by the insured and that which would be required from him if he were just taking, at his then increased age, a policy of like kind and amount terminable at the period specified in the policy. The sum-total of all the deposits held, with their accumulated interest at the assumed rate, is known as the *reserve.* It is also called *reserve for reinsurance,* inasmuch as it is the amount with respect to each policy which a company, in transferring or reinsuring its individual risks, would be obliged to pay another company to make it safe for the latter to undertake them.

Registered Policies.—In several of the States life companies authorized to transact business therein are permitted by law to make with the State insurance department a special deposit of securities for the protection of certain policies. The policies thus protected are duly registered in proper books kept in the department for that purpose. The securities so deposited must always be kept equal in value to the net present value of the registered policies. The State makes itself responsible for the safe-keeping and proper application of the reserve fund on the registered policies of a company, but does not guaranty the payment of such policies. Very few policies are registered.

Loading.—The premiums so far considered are *net* premiums; that is, premiums calculated with mathematical exactness, on certain assumptions of mortality and interest, to accomplish the payment of the insured sum or sums at the time agreed upon, and nothing else. If the assumptions on which the calculations are made should accord with the facts experienced in a company, nothing would be left for expenses and other necessities of the business. The net premium must be increased by a sum sufficient to provide for expenses and contingencies. This additional sum, obtained by taking a percentage of the net premium, is called the loading; and it, added to the net premium, forms the full or *office* premium. The expenses of conducting the business are many and large. The chief of them is that of agents. Nearly all the business of a life company is obtained through agents, who devote their time to soliciting custom and securing the prompt payment of premiums. For their services they are paid chiefly by "commission," which is a certain percentage of the premiums on policies obtained through their instrumentality. The commission is not uniform, but varies according to the practice and standing of each company. If an agent has an interest in more than one premium paid on a policy, he may dispose of such interest to the company, as he sometimes does, for a gross sum in hand, called in the company's reports a "commuted commission." Besides the agents, a company must pay its general officers and other employees, taxes, bills for advertising and printing, legal fees, etc.

Forfeiture or Lapse.—In all kinds of policy, in which the continuance of life is of pecuniary advantage to a company, there are certain conditions imposed upon the insured, violation of which will work a forfeiture to the company of the policy and of all payments made thereon. Such conditions are with reference to limits of travel and residence, to certain hazardous occupations, to death by suicide or in consequence of the violation of law, to the accuracy of the statements and declarations made in the application for the policy, and to the prompt payment of the premiums on or before the day or days on which they fall due. With respect to the condition in the policy that if the insured shall "die by his own hand" the policy shall be void, there appears to be some diversity of opinion in the courts. The law appears to be well settled in England, and in the States of Massachusetts and New York, that in the event of suicide the representatives of the insured can only recover upon proof that the act of self-destruction was not his voluntary and willful act, and was committed at a time when he had not sufficient power of mind and reason to understand the physical nature and consequences of his act, without reference to his capacity at the time to appreciate its moral character. The Supreme Court of the U. S. has laid down the following rule: "If the assured, being in possession of his ordinary reasoning faculties, from anger, pride, jealousy, or a desire to escape from the ills of life, intentionally takes his own life, the proviso attaches, and there can be no recovery." If the death is caused by the voluntary act of the assured, he knowing and intending that his death shall be the result of his act, but when his reasoning faculties are so far impaired that he is not able to understand the moral character, the general nature, consequences, and effect of the act he is about to commit, or when he is impelled thereto by an insane impulse which he has not the power to resist, such death is not within the contemplation of the parties to the contract, and the insurer is liable. *Life Ins. Co.* vs. *Terry,* 15 Wallace 580; *Insurance Co.* vs. *Rodel,* 95 U. S. 232; *Manhattan Life Ins. Co.* vs. *Broughton,* 109 U. S. 129. Frequently, however, and without reference to the proviso as to suicide or the law on the subject, policies of one or more years' standing, upon which all subsequent premiums have been regularly paid and which are terminated by the self-inflicted death of the insured, are paid in full without contest. For travel or residence beyond the limits assigned in the policy and for hazardous occupations special permits must be obtained from the company; and the extra risk involved in such travel, residence, or occupation will not be covered until the company has agreed in writing to accept it. For violation of the remaining conditions of a policy, forfeiture is in general absolute, though special arrangements or provisions are often made with respect to the payment of premium. The premium should, however, always be paid promptly when due. All the calculations are based upon such payments, which are the very life of a policy, and could not be waived to any extent by a company without danger to all interested in it. The premiums should, moreover, be paid preferably in *cash,* and not partly in cash and partly in promissory notes. There is a growing tendency among the companies to modify the conditions working forfeiture—and there seems to be also a growing inclination on the part of legislatures in the same direction. In many policies it is agreed that after the policy has been in force one or more years, it shall not be forfeited for non-observance of restrictions as to travel, residence, occupation, or payment of premium. After one or more full annual premiums have been paid, and a failure to pay then occurs, provision is not uncommonly made by which the "reserve" upon the policy and dividend additions thereon may be used as a single premium either for a "term" insurance of like amount with the original policy or for a paid-up insurance of equitable amount, payable at the time stated in the original policy—and in some of the States the law requires a provision of this kind. See *New York Laws* of 1892, chap. 690; see also Massachusetts Insurance Act of 1887, sect. 76, and *Revised Statutes of Missouri,* 1879, sect. 5983.

Surrender.—After a certain number of payments have been made by a policy-holder, companies will in general, if he apply in time and surrender his policy, grant him a sum of money called the *surrender* value. The equitable sur-

render value of a policy is a matter much in dispute among actuaries and others interested in the business, and is much misunderstood among the insured. Its small amount as compared with the premiums paid astonishes the policy-holder, and leads him to think he has been imposed upon. It must be remembered that a part of the premium is consumed every year in the payment of cost of insurance and expenses; all that remain are the deposit or reserve, and in mutual companies any dividends which may have accrued. The deposit, called sometimes the "net value" of a policy, is contributed by the policy-holder, and accumulated to aid in his continued insurance; dividends arise chiefly from the over-payments of the insured, and in mutual companies belong to them. So far, therefore, as it can be mathematically determined, the surrender value of a policy at any time is in proprietary companies the deposit on the policy at the time, and in mutual companies the deposit added to dividends credited to the policy. For "surrender value" fixed by law, see Massachusetts Insurance Act of 1887, sect. 76.

Surplus, Profits, or Dividends.—Each of the assumptions made in calculating the *net* premium gives rise to surplus. That premium is estimated on the supposition that the death-rate in the company will be that called for by the mortality-table, and that but 4 per cent. interest will be realized on money. No properly managed company experiences the assumed death-rate. The "new business" furnishes every year a number of carefully selected lives, which, being better for some years than the average, diminish the company's mortuary-rate. The ratio of the estimated to the actual mortality varies in different companies and in different years, and depends in great measure upon the skill and care with which the risks are selected. It is safe to say, further, that the companies get more than *four* per cent. on their investments. The *loading*, added to the net premium for expenses, also provides surplus. The average loading is about $33\frac{1}{3}$ per cent. of the net premium. The average expense of management does not exceed 18 per cent. of the gross amount of premiums received.

The above-enumerated sources of surplus or dividends are the chief, and are likely to be the enduring ones. There is another, however, which is mainly due to instability of purpose or of fortune on the part of policy-holders—viz., *surrender* and *lapse* of policies.

Distribution of Surplus.—In proprietary companies the surplus belongs to the stockholders, and is their profit. In mutual companies it belongs to the policy-holders, from whose necessary overpayments it chiefly arises, and represents to them, not profit, but *savings*. The proper mode of its distribution in mutual companies is a somewhat vexed question, upon which many opinions have been expressed. The plan in general use in the U. S. is the "contribution plan," devised in 1862 by Messrs. Sheppard Homans and D. Parks Fackler. The design of this plan is to divide the surplus among the policy-holders in proportion to their individual overpayments or contributions to the surplus fund.

The method of determining these "proportions overpaid" is, briefly and without the use of equations, as follows (it is assumed that the policy is a whole-life one, paid for by equal annual premiums): At the *beginning* of the year, the company had to the credit of the policy the deposit or reserve upon it at the end of the preceding year and the full annual premium then just paid. From the annual premium must be taken the proportion of actual expenses properly chargeable to the policy; the remainder, added to the reserve, must then be increased by interest at the rate actually received by the company. From the amount thus obtained must be taken—(1) the actual cost of insurance for the year; (2) the reserve necessary to be held at the close of the current year: the remainder is the contribution to surplus. This contribution, added to the policy's share in the "miscellaneous profits," if any, constitutes the estimated dividend in favor of the policy. In mutual companies a portion of the total surplus is retained as a contingent fund.

Modes of Applying Dividends.—There are in common use two ways of applying the dividend credited to a policy—viz., to the purchase of an additional amount of insurance, and as cash in payment of premium. Assume, for illustration, a life policy of $5,000 taken out at age 30 and paid for by an equal annual premium of $113.50; and further, that after it has run four years a dividend of $64.17 has been credited to it. The holder may use the dividend —First, to purchase an addition to the amount of the policy. At age 34, to which the insured has then attained, the net single premium for a policy of $1,000 is $321.86; the dividend of $64.17 will therefore purchase an addition of $199.37, no expense or commissions being charged to the dividend. This addition, sometimes called a "reversionary dividend," of $199.37 is a paid-up policy for that amount, and earns dividends: it is payable with the original policy, and is in general subject to its terms. *Second*, as cash, to diminish by $64.17 the premium then just due. Other methods of application have been and are still employed; such as to the purchase (the insured being in sound health at the time) of a temporary insurance for one or more years; to the reduction of all subsequent premiums; to limit the number of premiums required; but the two first given are the principal methods.

Industrial Insurance.—Industrial or "prudential" insurance is life-insurance in which the policies are for small amounts paid for by weekly installments of premium. It is designed particularly for persons of narrow means, who can spare, or feel disposed to spare, but a few cents weekly from their income. The general principles on which the business is based and conducted are those which govern ordinary life-insurance business and need no separate explanation. It is life-insurance at retail. Of the nine companies in the U. S. issuing industrial policies, four transact also ordinary life business, and these four had in force, at the close of the year 1891, more than 96 per cent. of all the industrial business written. (*The Insurance Year-book* for 1892, New York.) The average amount of each such policy in the U. S. is $112. (*Ibid.*) The following information and tables of rates are furnished by the company transacting the largest industrial business in the U. S.: "It costs 5 cents per week and upward. No initiation-fee is charged. No increase of payments is required. Premiums are collected weekly at the homes of policy-holders. All ages from one to seventy are taken. Claims are payable promptly at death. Males and females are taken at same cost. Only healthful lives are insured."

TABLES OF RATES.

Table for Infants.

Amounts payable for each 5 cents of weekly premiums.

Age next birthday.	Amount payable provided death occur after 3 calendar months from date, and after the policy has been in force for the following period, viz.:											
	Under 1 year.	One year.	Two years.	Three years.	Four years.	Five years.	Six years.	Seven years.	Eight years.	Nine years.	Ten years.	Eleven years.
2	$15	$17	$20	$24	$29	$35	$42	$50	$60	$75	$95	$115
3	17	20	24	29	35	42	50	60	75	95	115	
4	20	24	29	35	42	50	60	75	95	115		
5	24	29	35	42	50	60	75	95	115			
6	29	35	42	50	60	75	95	115				
7	35	42	50	60	75	95	115					
8	42	50	60	75	95	115						
9	50	60	75	95	115							
10	60	75	95	115								
11	75	95	115									
12	95	115										

When the amount of insurance, according to the terms of this table, reaches $115 (for each 5 cents of weekly premium), it will continue at that amount during the lifetime of the person insured, subject to the terms and conditions of the policy.

For 5 cents per week above amounts will be paid.
For 10 cents per week twice above amounts will be paid.
For 15 cents per week three times above amounts will be paid.
For 20 cents per week four times above amounts will be paid.
Under age 6 no higher premium than 10 cents will be taken.

Table for Adults (whole of life).

Amounts payable for each 5 cents of weekly premiums.

One-fourth only of these amounts payable if death occurs after 3 and within 6 calendar months from date, one-half only if death occur after 6 calendar months and within 1 year, and the full amount only if death occur after 1 year. No benefits will be due or payable if death occur within 3 calendar months from date.

Age next birthday.	Amount.	Age next birthday.	Amount.	Age next birthday.	Amount.	Age next birthday.	Amount.
13	$115	28	$77	43	$45	58	$25
14	110	29	75	44	43	59	23
15	107	30	72	45	42	60	22
16	104	31	70	46	40	61	21
17	102	32	67	47	39	62	20
18	100	33	65	48	37	63	19
19	98	34	63	49	36	64	18
20	95	35	61	50	35	65	17
21	93	36	59	51	33	66	16
22	90	37	56	52	32	67	15
23	88	38	54	53	31	68	14
24	86	39	52	54	30	69	13
25	84	40	50	55	28	70	12
26	81	41	48	56	27		
27	79	42	46	57	26		

Co-operative or Assessment Insurance.—"An assessment insurance society is one which promises to pay, on the death of a member, as many dollars as its members shall then contribute. In some cases its laws provide a limitation beyond which the amount shall not go; so that, the limit being fixed at $1,000, the balance paid in beyond that goes to a general fund for the reduction or extinction of future assessments. No definite promise other than this is made as to the amount. So long as the money paid in remains above that sum, the sum is paid, but when the amount received falls below it, only so much is paid as the assessment realizes. This is what may be defined as the legitimate and proper assessment plan. All other devices are outside of it, and when engrafted upon it are delusive. As a rule, there are no assets, and there is no particular responsibility. As the payment of the assessment is absolutely voluntary, so the payment of the benefit is practically voluntary." (*N. Y. Ins. Report*, 1882.) These remarks apply particularly to pure assessment. The "assessment" or co-operative companies that report to State insurance departments often conduct the business in a way different from that indicated, as follows: The management expenses are provided for by an annual charge to each member, which is the same for all members irrespective of age, and is called the annual dues. An initiation or entrance fee may be required, and is called membership fee. The claims arising annually by the death of policy-holders are provided for by yearly charges to the members, which charges (they are really net annual life premiums) are graduated according to age, and are called mortuary assessments. By a percentage added to each mortuary assessment a fund is accumulated to be held as a reserve or emergency fund, to guard against the danger of excessive mortality in any one year, and other untoward contingencies. The membership fee when exacted is of course paid at entrance. The annual dues may be paid at the beginning of the year, and the mortuary assessment in weekly, monthly, quarterly, or other installments; or the annual dues and mortuary assessment of a member may be added together, and the sum resulting paid by him in periodic installments. The business thus conducted is practically one of pure, or net, insurance, whereby the necessary expenses of conducting the business year by year and the net cost of insurance each year are paid annually by the insured. The cost of insurance constantly increases with the age of the insured, and in the later years of life must become an excessive burden. To obviate this difficulty in part some of the companies have a plan, which they commend to the public, by which the annual cost of insurance for each of several years, computed from a table of mortality, is increased by a certain amount for expenses, and the sum so obtained divided in such a way as to make the payment required of a member the same for each year of the period. At the end of the period, the necessary equal annual charge (it will, of course, be larger than before owing to the increased age of the insured) for another period is fixed in like manner. A policy for which the payment is so arranged is merely a renewable term policy, and should the term be extended to include the whole of life would be the ordinary whole life policy of the ordinary life company. There is, apparently, a tendency in companies, as their age increases and their operations extend, to assimilate their methods with those of the ordinary life company; and it would appear but reasonable that the requirements of law applicable to them should be also assimilated.

Government Supervision.—A few of the U. S. have no laws regulating life companies further than may be necessary for purposes of taxation. The most of them, however —and all of them in which the business has grown to be of any importance—have made special provisions for the protection of policy-holders and the supervision of companies by a State officer. The following brief abstract of the insurance law of New York will well illustrate the kind of supervision exercised and of protection afforded to policy-holders. (See *N. Y. Laws*, 1892, chap. 690.) In New York a State superintendent of insurance has supervision of companies; before beginning business each such company must have at least $100,000 invested in stocks or bonds of the U. S. or of the State of New York, or of any county or incorporated city of the State authorized to be issued by the Legislature, such stocks or bonds not to be received at a rate above their par value or above their current market value, or in bonds and mortgages on improved and unincumbered real estate within the State of New York worth 50 per cent. more than the amount loaned thereon, such securities, to the amount of $100,000, to be deposited with the superintendent, and held by him for the security of policy-holders; a company chartered by another State and wishing to transact business in New York must have the same amount of actual assets securely invested as companies chartered by New York; the superintendent being satisfied of a company's compliance with the law will issue it a certificate of authority to begin business; each company chartered by the State must invest, by loan or otherwise, its funds or accumulations in any of the securities in which deposits with the superintendent are required to be invested, in the public stocks or bonds of any one of the U. S., or in the stocks, bonds, or other evidence of indebtedness of any solvent institution incorporated under the laws of the U. S. or of any State thereof, except its own stock, or the stock of any other insurance corporation, or in such real estate as it is authorized to hold, in the bonds issued by any city, county, town, village, or school district of the State pursuant to any law of the State; such company may invest any amount of its surplus moneys or funds not exceeding one-half of its annual premium receipts upon its outstanding policies in any other State of the U. S., upon bond and mortgage security, upon real property in such State which shall be unincumbered, improved, and worth double the sum loaned thereon; policies are not to be declared forfeited for non-payment of premium unless at least fifteen days' notice to pay the same has been given without effect; a policy that has been in force three full years, should it become forfeitable for non-payment of premiums, is entitled, under specified conditions and for its continuance, to the reserve on such policy, including dividend additions; a detailed statement, on blanks furnished by the superintendent, must be made of its affairs by each company transacting business in the State on the first day of January in each year, or within sixty days thereafter showing its condition on the thirty-first day of December then next preceding; the information obtained from the annual reports of the companies must be arranged and tabulated by the superintendent and presented by him, with such remarks and recommendations as he may deem proper, to the Legislature in his annual report; the superintendent must make annually valuations of all outstanding policies and other obligations of every domestic life company doing business in the State—the valuation of the policies to be made according to the actuaries' or combined experience table of mortality and an assumed rate of interest at 4 per cent.; the superintendent is empowered to address inquiries to any company on any matter connected with its transactions, reply to which must be promptly made in writing under pecuniary penalty; the superintendent may, in his discretion, appoint one or more competent persons, not officers of or connected with or interested in any insurance corporation doing business in the State, other than as a policy-holder, to examine into the affairs of any such company, and for purposes of such examination, the examiners must have free access to the books of the company, and are authorized to examine officers and agents under oath, the result of the examination to be published in one or more newspapers of the State, whenever the superintendent shall deem it for the public interest to do so; if it shall appear from examination that a company has assets insufficient to justify its continuance in business (reinsure its outstanding risks) the superintendent must determine the amount of such deficiency and call upon the officers of the company to make it good within a specified time, and should it not be made good within the time set, the corporation must be deemed insolvent, and may be proceeded against by the attorney-general as an insolvent corporation; when a company intends to discontinue business it must give notice to the superintendent, who will cause notice of such intention to be published in the paper in which State notices are inserted at least twice a week for six months, and after the superintendent, upon full examination of the affairs of such company, is satisfied that all its debts and liabilities of every kind are paid and extinguished that are due, or may become due upon any contract or agreement made within the U. S., he is then to deliver up to the company the securities held by him belonging to it.

Life companies transacting business upon the co-operative or assessment plan must obtain a license from the insurance superintendent, and must have at least 200 persons insured for an amount not less than $400,000, on which 2 per cent. of the amount of insurance severally subscribed for must be paid in cash and deposited in bank to the credit of the mortuary fund before it can begin business; such com-

pany must make to the superintendent on or before Mar. 1 in each year a detailed report of its affairs and operations during the year ending Dec. 31 preceding; it need make no deposit of securities with the superintendent, must accumulate and maintain a reserve or emergency fund of an amount not less than the proceeds of one death assessment, and at least equal to the amount of its maximum certificate or policy; it is subject to the visitation of the superintendent at any time, and must answer any inquiries of the superintendent as to any matter connected with its transactions; every policy or certificate issued must specify the sum of money which it promises to pay upon the contingency insured against, and the number of days after proof of the happening of the contingency on which payment will be made, and failure to make payment for thirty days after it becomes due, will deprive the company of license to issue new certificates till payment is made; each notice of assessment, premium, or periodical call must state the cause and purpose of the same; whenever the superintendent is satisfied that such a company is insolvent, has exceeded its powers, or is conducting business fraudulently, he is to report the facts to the attorney-general, who may present the company in the Supreme Court for trial, and after hearing, the court may order a receiver appointed and an equitable distribution of its property among its creditors and members.

Statistics.—In Great Britain the amount of insurance, other than "industrial," in force in 72 British companies at the close of the year 1890, was £490,000,000 (approximated), to which must be added the amount in force in 3 U. S. companies transacting business there, £401,675,494, making a total, at the close of 1890, of £891,675,494; the amount of "industrial" insurance in the British companies in force at the same time was £130,000,000, giving a total sum of £1,021,675,494. (*The Insurance Register*, 1892, London.) In Canada there were 47 companies, 31 of them foreign (British and U. S.), which had in force at the close of the year 1890 policies 157,878 in number, insuring $282,778,331; in addition, there were in force at the same time 23,995 industrial policies, insuring $1,474,385. *The Insurance Year-book* for 1892, New York.

From a synopsis of the principal continental life-insurance business in 1890, contained in *The Post Magazine Almanack*, the *Insurance Directory, Reference, and Year-book*, 1892, London, the following abstract is taken:

COMPANIES.	Number.	Amount of insurance in force.
Austrian	19	678,972,099 florins
Dutch	9	142,100,511 "
German	49	4,230,825,481 marks
Russian	5	176,894,418 roubles
Scandinavian	13	343,727,695 kronen
French	17	3,255,601,658 francs
Swiss	8	275,212,982 "
Belgian	2	25,742,923 "
Italian	2	60,293,276 lire

In 1859 the insurance department of the State of New York was created by act of the Legislature, and was organized in Jan., 1860. Massachusetts had a few years previously established a department of supervision, and subsequently other States followed the example. The healthful influence exercised by State laws in shaping and developing the business, the public confidence begotten of State supervision and the publication of detailed annual reports, the activity produced by the personal solicitations of numerous agents, extensive advertising through newspapers, circulars, and pamphlets, the unsettled state of monetary values in the country near the close of and after the civil war, together with the intrinsic value of the institution itself, caused the business to grow with great rapidity, and to assume in a few years astounding proportions. In 1868 there were 55 companies represented in New York State, which together issued more new policies in that one year than the total number of policies issued by all American companies combined for the seventeen years 1843–59. The business steadily increased till 1873, at the end of which year there were 56 companies represented in New York, having in force 817,081 policies, assuring $2,086,027,178. (*N. Y. Ins. Report*, 1874.) In the whole of the U. S. there were at the same time 108 existing companies, 74 of which had in force 870,876 policies, insuring $2,191,230,995. (*Life Ins. in the United States*, by Walter C. Wright, before the American Statistical Association, Oct. 26, 1888.) From 1873 to 1879 the business steadily decreased, and at the close of the latter year there were 31 companies in New York, with 595,486 policies in force, assuring $1,439,961,165. (*N. Y. Ins. Report*, 1880.) In the U. S. at large there were in 1879 63 ("ordinary") life companies existing, 49 of which had in force 655,129 policies, insuring $1,511,235,317. (W. C. Wright before American Statistical Association, Oct. 26, 1888.) This was the lowest point reached.

At the close of the year 1891 there were in the U. S. 48 "ordinary" life companies (4 of which issued industrial policies also) and 5 companies transacting "industrial" business only—in all 53 companies; there were 1,464,799 policies (excluding industrial) in force, insuring $3,965,380,862; the number of industrial policies in force was 4,309,862, insuring $481,925,977; these 53 companies had an aggregate income for the year 1891 of $213,444,589, disbursed a total of $144,557,932, and had, Jan. 1, 1892, gross assets to the amount of $859,408,114. *The Insurance Year-book* for 1892, New York.

With regard to the business of co-operative or assessment companies in the U. S., it has been found impracticable to get full and reliable statistics. There reported in 1891 to the Insurance Department of the State of New York 119 co-operative companies and 36 fraternal beneficiary societies or orders (which are also assessment companies)—in all, 155 companies. A number of these were engaged in casualty as well as life insurance, and it has not been practicable to separate satisfactorily the amounts due respectively to each kind of business. With this statement the returns as they appear from the *N. Y. Ins. Report* of 1892 are here given for the year ending Dec. 31, 1891:

Co-operative companies (119) had in force 503,397 policies.
Fraternal " (36) " " 755,256 "
Receipts of co-operative companies for the year, $20,206,074, of which the sum of $19,465,446 was contributed by members.
Receipts of fraternal companies for the year, $20,095,596, of which the sum of $19,676,880 was contributed by members.
Disbursements of co-operative companies for the year, $18,513,106, of which the sum of $13,060,700 was paid for claims.
Disbursements of fraternal companies for the year, $19,698,611, of which the sum of $18,966,580 was paid for claims.

"Our life companies are becoming vast financial corporations, and may become a source of danger to the commonwealth by reason of the vast money powers lodged in the hands of a few men—possibly only one man in each company. The assets of great railroad and manufacturing corporations are practically all planted, while those of life companies are in marketable securities which can be converted into cash in 10,000,000 lots, and be used to influence legislation or to affect the money-market. It is easy to imagine very startling possibilities when our life companies shall attain their probable future size." D. P. Fackler, at the annual meeting of insurance commissioners and supervisors, 1892.

J. H. Van Amringe.

Life-preserver: a small buoy designed for attachment to the person, and made of canvas or of some other fabric stuffed with cork, or of India-rubber and inflated with air. Many different varieties of life-preservers have been devised, among which the following are the most notable.

Annular Life-preservers.—These are simply large rings, either of inflated rubber or cork-stuffed canvas, the hole in

Fig. 1.—Cork jacket with supplemental floats.

the center being large enough to receive the waist of the wearer, the device being worn beneath the arms. This is a clumsy form, and, although calculated to keep the head and shoulders above water, must materially interfere with any freedom of movement of the arms. Nevertheless, from its simplicity and strength, it is in very common favor. The

best, instead of a canvas covering filled with granulated cork, are made of solid cork blocks securely fastened together, and then turned in a lathe to the required size and form. This construction is very firm and durable, and the solid annulus, being covered with canvas waterproofed by painting, retains its buoyancy during long immersion.

Block Life-preservers.—Commonly made of blocks of cork inclosed in canvas, two blocks being hinged together by a sewn joint in the fabric. These may be used as simple buoys. A more elaborate construction makes the space of fabric between the blocks large enough for a hole through which the head may be thrust, the fabric resting on the shoulders of the wearer, and the blocks, one on the breast and one at the back, being held close to the body by suitably arranged strings.

FIG. 2.—British gold-medal life-preserver.

Life-floats. — Hollow drums, provided with straps and buckles for attaching the apparatus to the person; the more complete have receptacles for saving papers, socket for staff of a signal flag, etc. Buckets, stools, mattresses, etc., have frequently been made buoyant with a view to their use as life-preserving floats when thrown upon the water. Life-preservers have also been made in the form of jackets, which are readily placed and retained in proper position upon the person. Cork jackets were known to the Romans, and air-inflated jackets to the English as long ago as 1724. An improved cork jacket (Fig. 1), devised about 1873, was constructed with supplemental floats at front and back, which depend like the skirts of a coat except when the wearer is in the water, when the floats rise by their own buoyancy against the breast and behind the shoulders, and thereby assist the flotative action. A belt stuffed with granulated cork is attached to the waist of the jacket, and the arms and collar are also filled with the same material, quilted in to keep it in place. Rubber vests, to be inflated with air through a tube and mouth-piece, like the rubber float, have been devised. The combination of a bust and waist float constitutes a European life-preserver (Fig. 2) which has secured several gold medals, and appears to have met with much favor.

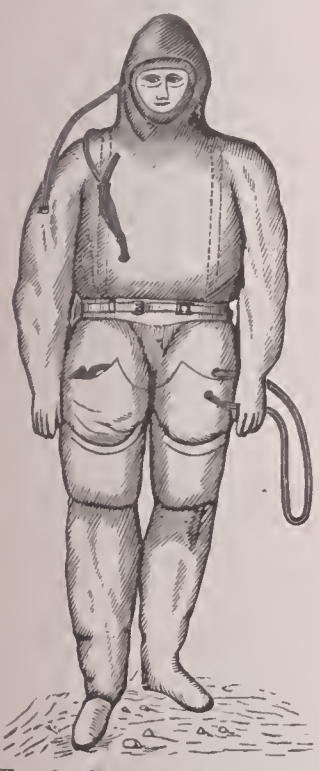


FIG. 3.—Merriman's life-preserving suit.

Life-preserving Trousers.—These comprise trousers, boots, and annular life-preserver, all in one, and the first projector of them appears to have been J. Macintosh, whose patent was dated Nov. 11, 1837. The wearer places his feet and legs in a pair of sack-like pantaloons closed at the lower extremities, with an air or cork-stuffed annulus arranged to be placed beneath the armpits, the trunk being inclosed within a sack-like body connecting the annulus to the trousers. In 1840 R. Porter added to the feet portions of the device a pair of feathering propellers.

Life-preserving Suits. — The success achieved by Capt. Paul Boyton with an air-filled waterproof dress (Fig. 4) has given to this variety of life-preservers a prominence never before attained. He crossed the British Channel in it in 23½ hours May 28 and 29, 1875. The apparatus (Fig. 3) used by Boyton was that patented by Clark S. Merriman, of Vallisca, Ia., July 16, 1872, and its object, as set forth by the inventor, "is to provide a water-proof life-preserving dress sufficiently inflated with air to sustain the weight required, while the limbs are allowed full freedom of action in swimming; and the vital heat is retained in the body, the intervention of a stratum of air between the body and the dress acting as a non-conductor of heat." The dress is made of India-rubber, and comprises a head-dress, jacket, and trousers, the whole so connected as to form an air-tight suit which can be inflated, like an ordinary India-rubber life-preserver, with the breath. Boyton attached a sail to the suit to assist his progress while at sea.

FIG. 4.—Paul Boyton at sea.

JAMES A. WHITNEY.

Life-rafts: rafts constructed for the purpose of saving life, when boats or other means are not available. The oldest form of life-raft, and that still frequently employed, consists of spars, doors, etc., bound together as firmly as possible. Many plans for their improved construction have been proposed. Some of these combine some ordinary use, as that of a mattress, settee, bench, or the like, with those of a life-preserver on a large scale. A life-preserving mattress, weighing 17 lb., capable of sustaining in the water 284 lb., was manufactured some years ago in London. Among the most recent of such devices is one in which a water-proof canvas sack has its lateral edges secured along the centers of two mattresses in such manner as to provide an open chamber between them capable of holding several persons, while the downward strain upon the mattresses, being exerted centrally and longitudinally thereon, insures their retention in a horizontal position. The best buoyant material is undoubtedly cork soaked in linseed oil, the oil preventing the absorption of water by the cork, which reduces the flotative power of the material rapidly to a degree estimated at

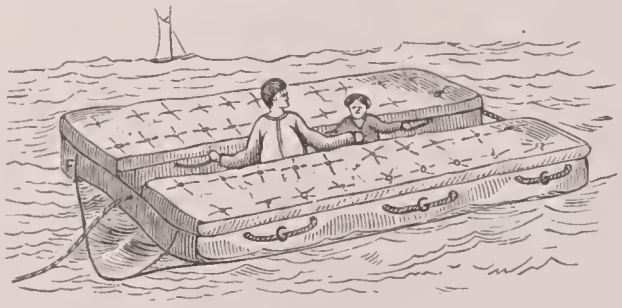


FIG. 1.—Mattress life-raft.

40 per cent. On the other hand, the oil is found to rot the canvas. A fabric at the same time water and oil proof would add very much to the utility of this class of apparatus.

Fig. 2.—Combined life-raft and settee.

Another idea is that of a bench, which has the form of a boat divided in vertical longitudinal sections, with longitudinal flotative seats, two adjacent ends being hinged together. When the apparatus is opened out, it presents the appearance of two settees ranged in line, and can be used as such. When folded together and fastened, a boat is formed, needing only thwarts and oars.

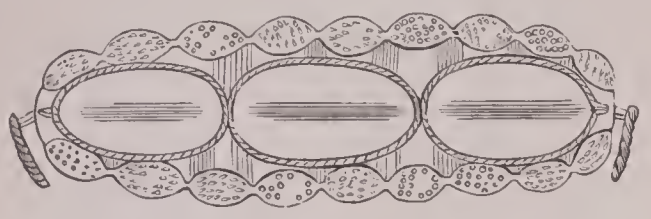


Fig. 3.—Combined air-float and cork life-raft.

Of rafts to be carried on deck, there have been numerous modifications. Among these is one arranged to be grasped from the water, in which a number of air-filled floats are surrounded by an outer casing of cork, inclosed in canvas, ribbed or corrugated to form the cork into sections.

One apparently effective form of life-raft, several examples of which were shown at the Fisheries Exhibition in London in 1883, comprises an oblong annulus of cork provided with numerous trailing ropes.

A favorite plan with projectors, though seldom or never adopted by ship-builders, is that of so constructing the cabins of a vessel that they may be readily detached in case of accident to the hull. Even less feasible than this is the idea of making the upper deck itself detachable; the deck requiring a firmness of fixation to strengthen the vessel inconsistent with its ready and hurried detachment.

Catamaran life-rafts, composed of two or more oblong or cigar-shaped floats, firmly connected, are carried on ocean-going and other vessels. The floats are frequently of sheet-metal, and owe their buoyancy to their contained air. One of the latest patented improvements of this class includes the construction of each float with an internal rigid longitudinal brace, an impervious canvas covering, and a stuffing of buoyant material interposed between the cone and the covering, the object being to combine lightness, strength, and non-liability to injury from punctures or fracture during the vicissitudes of use. The catamaran is said to be more easily managed than any other form of craft.

Life-buoys are made circular in form and flat, and are provided centrally with an elevated light provided by chemicals, the combustion of which is not extinguished by water. Circular life-rafts have also been constructed with a mast and sail and other conveniences, and some have given excellent results in long experimental trips.

In cases of emergency very efficient apparatus may be improvised from spars, canvas, and empty casks, according to Cook's invention, which consists of a square frame with canvas nailed across it, and with a closely buoyed cask lashed at each corner. In tolerably smooth water ten men may be supported by a large cask provided with ropes for holding on. It would be well for every vessel on the occurrence of danger to have all empty casks well stoppered and tied with loose-lying ropes, for use in event of disaster.

James A. Whitney.

Life-saving Service: a term specifically used to designate organized equipment and effort for the saving of life in case of wrecks upon the seashore, or upon the shores of lakes or rivers. With the exception of about fifty stations supported by the Danish Government, mainly on the coast of Jutland, and a few on the coast of Belgium, the life-saving service of the U. S. is the only government establishment of the kind in the world. The task of marine life-saving in Great Britain, France, Germany, and other European countries, is left entirely to private societies, except that in Great Britain the coast-guard, under the direction of the Board of Trade, is charged with the operations at rescues attempted by the use of line-carrying rockets.

An effective life-saving service has been maintained in China for centuries by benevolent institutions, chiefly on the Yang-tse and other great rivers. Besides succoring those in danger this service endeavors to prevent casualties by ferrying passengers and accompanying junks across the rivers in stormy weather. It also provides "rest-houses," where shipwrecked persons may stay until they can be supplied with means and sent on their way. Their "red-boats" are specially built for this service, and are well manned and managed. With this lifeboat service associations for providing coffins and decent interment for persons found drowned also co-operate.

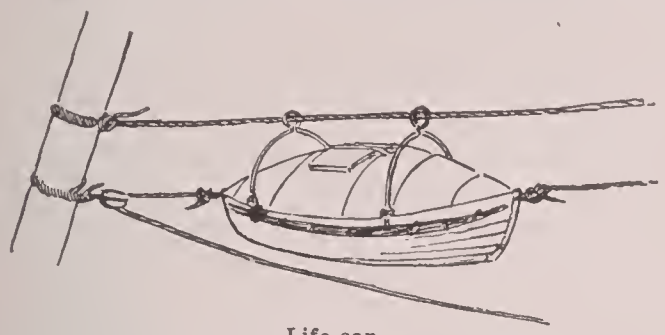
The institution in the U. S. gradually grew out of the sentiment created by the terribly fatal disasters which took place on the Atlantic seaboard, more particularly those on the coasts of Long Island and New Jersey during the first half of the nineteenth century. For nearly fifty years these frightful wrecks, often of the emigrant ships of those days, occurred without remedy. In 1848, following some grievous disasters, an appropriation of $10,000 was made, with which eight buildings were erected on the coast of New Jersey and equipped with boats and some other life-saving appliances. These, and other stations established shortly afterward, were without crews, but their value became so evident that crews were provided for them, and their number and the completeness of their equipment have been gradually increased, until in 1900 there were 268 stations fully supplied with the best-known appliances.

Under the organization effected by the years of effort since 1871, the ocean, lake and Gulf coasts of the U. S., covering an extent of 10,000 miles, are laid off into twelve life-saving districts. Each of these is governed by a local superintendent responsible for its operations. Over all are a general superintendent, and an assistant general superintendent, stationed at Washington. Officers of the revenue marine service are detailed as inspectors in the several districts, and the same service furnishes a general inspector of stations. These stations are houses a story and a half in height, specially designed for the purpose, having six, and sometimes seven, rooms, and furnished with every known appliance that can aid in saving life—life-boats, surf-boats, life-cars, breeches-buoys, wreck-ordnance for effecting line-communication with wrecks, hawsers, hauling-lines, etc. On the Atlantic beaches they are located at distances averaging 5 miles apart, and at points periodically liable to wrecks, mainly wild and desolate places, and often far removed from habitations. On the coast of Florida, with one exception (a fully equipped station at Jupiter Inlet), the stations are simply provisioned houses of refuge severally inhabited by a keeper and his family, the peculiarity of the beach enabling wrecks to drive close ashore and the people on board to land easily without assistance, the main danger to the latter being of death from hunger and thirst, as the region is mostly uninhabited and desolate. All the stations, except these houses of refuge, have severally a keeper and a crew of seven, in some cases eight, surfmen, a hermit-group residing on duty at their lonely lodge for the eight most inclement months of the year. They are the best of the professional surfmen and salvors of the coast, elected solely on the ground of their ability to be of service to seafarers in times of peril.

The most important of the ordinary station-duties is the unremitting watch kept upon the beach. If a vessel can be seen driving, crippled, for the land, or near the time of her stranding on a bar, 200 or 300 yards away, operations can be prosecuted for the rescue of those on board before the surf has time to tear her to pieces. Hence the emphasis placed upon the requirement of this watch. Between station and station the beach is steadily patrolled by the crew every night from sunset to dawn; if the weather be thick, it is equally patrolled all day; and at all times, in the fairest weather, a lookout is kept from the station. The period of the night-patrol is divided into four watches, each kept by two men of the crew, each carrying a beach lantern and pouch of Coston signals, which are cases of combustibles, capable of being ignited at will by percussion.

If a ship be seen heading for the breakers, the patrolman strikes his Coston cartridge, letting the red blaze free, and the warned vessel stands away from the dangerous shore. If the vessel is seen to be aground the Coston light reddens the darkness to let those on board know that they are seen, and the patrolman hastens to the station to summon the crew. If the surf is at all within bounds, however dangerous, they fetch the boat—this being the quickest mode of rescue—put out, and perhaps within an hour bring back all

on board in safety. If it is plain that boat-service is impracticable, resort is had to the wreck-ordnance. The gun, trained with skill and judgment, fires a slender line over the hull. This line has been previously coiled over a frame of pins, which, now withdrawn, leaves the line in layers of loops or fakes arranged to pay out freely and fly to the wreck without entanglement or friction. A shank protrudes from the end of the cylindrical shot in the gun, to the extremity of which the line is tied. Once on board, the



Life-car.

line is hauled upon by the sailors, and brings out to them an endless rope, called the whip-line, reeved through a pulley-block, to which is attached several feet of rope, called a tail. This tail is made fast to a mast. One side or part of the whip is then hauled upon by the life-savers, and the other side takes out to the sailors a hawser which has been attached to it. The hawser is then fastened to the mast a couple of feet above the whip, the shore-end drawn over a wooden crotch 10 feet high, and fastened in the sand by a buried anchor. Upon the slender bridge of rope thus constituted is suspended the life-car if the number on board is large. The life-car is a sort of covered boat of galvanized iron capable of containing six or eight persons. Hung to the hawser by bails and rings, it can be worked out to the vessel by the whip, and drawn back again when it has received its load. Sometimes, however, the hawser is dispensed with, and the car is dragged back and forth through the water by the whip-line alone. If there be only a few persons on board, a lighter contrivance, called the breeches-buoy, is brought into play. It consists of a circular cork

Method of using breeches-buoy.

life-buoy, to which is attached a short pair of canvas breeches, and is suspended by lanyards to a traveler-block on the hawser. It is worked back and forth by the hauling-lines, bringing in one man at a time, who gets into it, his legs dangling through the breeches, sustained by the canvas saddle. By such methods the lives are saved. Often, after suffering great hardships, persons reach the shore seemingly lifeless from exhaustion, or apparently drowned. For such cases the station medicine-chest is on hand, containing appropriate remedies.

Besides the saving of life, the rescue of property is a conspicuous though secondary feature of the service. The surfmen are experts in floating stranded vessels, extricating them from dangerous situations, relieving leaking vessels, running lines where it can not be done with ordinary boats, and rendering assistance in various ways. In the majority of cases they succeed in saving the vessels and cargoes without any other aid than that of the ship's crews, and often alone. Their unremitting watch enables them to warn off numerous craft in imminent danger. The number of such warnings in the year 1892–93 was 235, and in no recent year have they been less than 200. The connection of the telephone lines with telegraph stations enables the service to give to the maritime exchanges and underwriters prompt notice of disasters, with a statement of the condition of the vessels, the nature and extent of additional aid required, if any, and to send directly for the nearest tugs and other necessary help, thus securing early assistance when serious or fatal consequences might result from delay.

The operations of 1899–1900 are summarized as follows:

Number of disasters	364
Value of property involved	$9,470,190
Value of property saved	7,234,690
Value of property lost	2,235,500
Number of persons on board	2,655
Number of persons lost	48
Number of persons succored at the stations	673
Number of days succor afforded	1,447
Number of vessels totally lost	61

The contrast between the showing made by this summary and the frightful fatalities of the years before the present life-saving organization is sufficient to make evident the value of this branch of the public service.

Revised by S. I. Kimball.

Liffey River: a stream about 70 miles long, which rises in the mountains of Wicklow, Ireland, and flows easterly through the city of Dublin into Dublin Bay. Dublin is divided by this river into two nearly equal parts, lined with spacious and substantial quays, and connected by bridges.

Lifts: See Elevators.

Ligament [from Lat. *ligamen'tum*, tie, band, deriv. of *liga're*, tie, bind]: any one of many structures in the animal organism whose function it is to hold other organs in their places. The *articular* ligaments are found in most of the movable joints. They consist in most cases of white fibrous tissue, which is very flexible, tough, and inelastic. Some, like a part of the ligaments of the vertebræ, are partly of yellow fibrous tissue, which is very elastic. Articular ligaments are *capsular* when they invest a joint on all sides; *fascicular*, when they are flat bands of fibrous tissue passing from bone to bone; *funicular*, when they are rounded cords. Many of the viscera (as the liver, mammary gland, uterus, bladder, etc.) have ligaments holding them in place. Some are *suspensory*, receiving the weight of the organ; others are *lateral*, acting as guys or stays to prevent lateral displacement. Folds of peritoneum, aborted fœtal vessels, or slips of fascia are made to serve as ligaments for the viscera.

Ligan [etymology unknown]: goods that have sunk in the sea, but are attached to a buoy, in order that they may be recovered. Bracton applies the term to goods found in the sea so far from shore "that it can not be proved to what land or district they are to be referred," and declares that they "belong to the finder, because they may be said to be no man's goods." (*Liber* 3, c. 3, fol. 120.) Before the time of Lord Coke the doctrine was well established that such goods were not abandoned or derelict, but could be recovered by the owner upon paying reasonable salvage if any one had become entitled thereto, and if he did not claim them they belonged to the crown. Actions relating to such goods were brought in the admiralty and not in the common-law courts. If the goods, though buoyed, were washed ashore, they became Wreck (*q. v.*). See Flotsam and Jetsam.

Francis M. Burdick.

Ligation and **Ligature** [deriv. of Lat. *ligare*, to bind]: in surgery the operation, and the cord or band used in the operation, of tying blood-vessels, to prevent hæmorrhage, or in the strangulation of a tumor or the like. The ligature was described long before the circulation of the blood was discovered, the first account of its use having been given by Susrutas, B. C. 1500. Hippocrates alludes to it, and

Celsus (contemporary with Christ) refers to it as a well-known remedy. Galen, 200 years later, often mentioned it. The Arabian physicians were familiar with it. After them the Italian surgeons continued to use it, and to describe its applications and modifications. Its use is generally ascribed to the celebrated French surgeon Ambroise Paré (1517–90), who championed its more extended use and made it indispensable, but he was not its discoverer. Previous to his time ligatures had been used for the purpose of tying an artery or large blood-vessel in its continuity, as for aneurisms, secondary hæmorrhage, etc. During this period fresh wounds were seared with red-hot iron, the "actual cautery," in order to check bleeding. It was Paré's inestimable service to show how easily the ligature could be applied to the ends of the divided vessels, and with what security the bleeding could thus be stanched. His method soon won general favor as against the horror of the cautery, and the employment of the ligature became universal.

Ligatures are made of metallic substances, as silver or iron wire; of vegetable material, as of rubber, hemp, or linen; and of animal tissues or products, as silkworm gut, catgut, and silk. Strips of kangaroo tendons or of ox aorta are occasionally used by surgeons. Whatever material is employed must needs be first aseptic, surgically clean, or free from all infectious material, otherwise there is danger of suppuration or of blood-poisoning. Wires may be heated before use, but the preparation of vegetable, and particularly of animal, material requires great care. They will be used by the conscientious surgeon only when they are absolutely *sterile*—i. e. clean as above.

Metallic ligatures are rarely used. They may be left buried in the deep tissues, there to remain, but will never become absorbed. On the other hand, vegetable fiber very slowly disappears, often at least, if not invariably; the same is true in less degree of silkworm gut. Catgut is the most readily absorbable of all material used for ligature, though it can be made more resisting when so desired.

Ligation of vessels is resorted to (*a*) in an open wound for the checking of primary or secondary hæmorrhage. In this case the individual vessels are seized and tied a short distance from their divided ends. In case of the larger arteries it is necessary to tie both their upper and lower ends, since bleeding from below might otherwise occur. (*b*) For aneurisms or other tumors connected with blood-vessels ligation of the vessel involved, or its main stem, is performed at some point where it may be conveniently reached; when this is above the lesion it is known as *proximal* ligation; when on the side away from the heart it is called *distal*. (*c*) The same measure is practiced for secondary hæmorrhage when the bleeding vessel can not be easily found at the point where bleeding is occurring. (*d*) It is occasionally done by surgeons as a preliminary to a more serious operation, in order to make hæmorrhage less severe during the performance of the latter, as when the carotid artery is tied before removing the jaw. (*e*) Finally, it is rarely done with a view of shutting off main blood-supply from a rapidly growing tumor or other morbid growth—e. g. elephantiasis. These are the principal purposes for which surgeons nowadays tie blood-vessels.

Occasionally ligature is applied only for a short time, as during an operation, or as safeguard against possible accident; this is known as *temporary ligation*. *Ligature en masse* is a name given to the inclusion within the loop or knot of a small mass of tissue in which there is a bleeding vessel which can not easily be found or grasped. For further information the reader should consult treatises on surgery.

ROSWELL PARK.

Light [M. Eng. *liht* < O. Eng. *lēoht* : O. H. Germ. *lioht* (> Mod. Germ. *licht*) : Goth. *liuhaþ*, light < Indo-Eur. *leuk-* : *louk-* : *luk-* > Sanskr. *ruc-*, *shine* : Gr. λευκός, white : Lat. *lux*, *lu'cis*, light]: light is that agent by which bodies are seen. A little careful study of our every-day experience shows that we see bodies by the aid of something which comes from them to the eye; that this agent is thrown out from the sun and other bright objects; that it generally seems to fly instantaneously in straight lines; and that it is reflected from one body to another or away into space.

The present article is confined to the general nature, properties, and laws of this agent, and the reader is referred to OPTICS, PHOTOMETRY, and other articles for special details.

Sources of Light.—So far as experiment shows, light emanates permanently and in large quantities only from hot bodies. Whenever a solid body is heated to nearly 1,000° F., it begins to emit red light, and is said to be "red hot." If the temperature is raised still further, the color of the light gradually changes toward white, until a "white heat" is reached. The sun, the great source of light to our planet, is, according to all physical laws, intensely hot. Artificial light, from the combustion of gas or other substances, emanates from intensely heated particles in a state of combustion. The luminosity of the electric spark is due to the momentary heating of the air in front of it, as it passes from one electrode to the other. There are, however, certain sources of light which have not been traced to the actual heating of matter, of which the following are the principal:

1. *Phosphorescence.*—When certain bodies are exposed to intense light, especially that of the sun, they are found, when taken into a dark place, to emit a certain quantity of light for a short time without being apparently heated. In this case we may have something analogous to a molecular heating of the intimate particles of the body. See PHOSPHORESCENCE.

2. *Oxidation.*—The slow oxidation of organic matter, as decaying wood, and of certain chemicals, as phosphorus, is sometimes accompanied by an appreciable amount of light, although the bodies do not become hot. Here also we probably have to do with a condition of the molecules analogous to those of a heated body.

3. *Vital Activity.*—Matter becomes luminous under certain forms of vital action, as in the case of the common firefly. No explanation of this by known physical laws has yet been given.

4. *Obscure Electric or Magnetic Action.*—The light of the aurora has not been referred to the effect of high temperature, and the same may be true in certain luminous effects produced in an exhausted bulb which were first discovered by Crookes.

Propagation and Reflection of Light.—Light which emanates from any source whatever proceeds in straight lines, with a definite velocity, until it meets some body or some form of matter. It apparently suffers no loss in passing through a vacuum to any distance. It is true that its intensity, or the quantity of light which falls upon a unit of surface, diminishes inversely as the square of the distance from the source. This, however, is not owing to any diminution in the total quantity of light, but only to its being spread over a greater surface. Imagine several hollow spheres or spherical surfaces at distances 1, 2, 3, etc., around a luminous point as a center. The surfaces of these spheres will be in the ratios of the numbers 1, 4, 9, 16, etc. Each surface would receive all the light emanating from the point were those inside of it removed; but, since the light on the second sphere is spread over four times the surface of the first, each unit of its surface receives only one-fourth as much light; each unit of the third one-ninth as much, etc.

So far as observation has shown, light comes to us through the immense intervals which separate us from the fixed stars, without any loss whatever. A celebrated theory of the extinction of light in its passage through space was, indeed, formulated by the eminent Struve, early in the nineteenth century; but he derived it from a theory of the order and arrangement of the fixed stars which has not been shown to have any certain foundation. We may therefore say that if there is any extinction it is still to be detected.

When light strikes a body, one of three things may happen: it may be reflected from the body, pass through it, or be absorbed by it. One portion may be reflected, another portion absorbed, and another portion transmitted. The rule is, however, that in all cases a greater or less amount of the light will be absorbed; no body either transmits or reflects all the light which falls upon it. In the case of most gases, when in a state of purity, the quantity of light reflected or absorbed is so minute as to escape detection, except when the light passes through great distances in the gas.

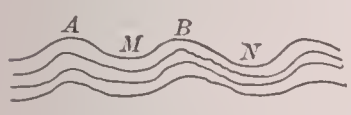
In entering a transparent body obliquely, an exception is found to the rule that light is propagated in straight lines, because refraction then occurs. See REFRACTION.

Nature of Light; the Undulatory Theory.—Two views of the nature of light have been held by philosophers. One is that this agent consists of corpuscles ejected by the luminous body. This theory explains the salient phenomena very clearly. The corpuscles move in straight lines, in accordance with the motion of solid bodies; they are reflected as solid bodies are when they strike an impenetrable obstacle; the change of course in refraction by a transparent body is produced by the attraction of the body upon the corpuscles;

absorption occurs when the body neither reflects the light nor transmits it. Sir Isaac Newton was the great supporter of this emission theory, and the weight of his name long gave currency to it; but it is now universally rejected.

The undulatory theory of light attributes that agent to undulations in an elastic medium, known as the luminiferous ether, filling all space. This theory has been found to account so completely for the phenomena exhibited by light that it is now accepted as one of the fundamental conclusions of physics; but in studying the theory, the word "undulation" must not be understood to necessarily imply an actual wave-motion of the parts of the ether, nor must the ether itself be regarded as a form of matter. In fact, the remarkable coincidence between the velocity of propagation of light and that of electro-magnetic effects has recently led to the conclusion that light is really in the nature of a periodical electro-magnetic polarity of the luminiferous ether. What we can certainly say is that light consists of an alternating action of two opposite kinds; that these two opposite actions, when equal, will annihilate each other if combined at the same point and the same moment, as two opposite motions would; and that the alternation takes place with exceeding rapidity, millions of millions of times in a second, and within the space of less than one-thousandth of a millimeter. In these respects it is quite analogous to a wave-motion, and may be represented by it.

The following figure will illustrate the wave theory of light. It is supposed to represent waves in a medium which is itself at rest, while the waves move from left toward right, as in the ocean.



At the points A B, etc., the displacement of the medium is upward, and here the crests of the two waves are found at the moment; at M and N the displacement is downward, and here are depressions in the waves. Thus each particle of the ether, considered in itself, is conceived to be simply moving up and down. On the electro-magnetic theory, however, no actual motion of the ether takes place, but the ether at A and B is polarized in one way, and at M and N in the opposite way. Whatever theory we adopt, the distance A B or M N is called a *wave-length*.

Now imagine the waves to be in motion from left toward right. This will mean that the particles between A and M are undergoing elevation, those between M and B depression, etc., at the moment represented in the figure. Thus all of the particles are continually in motion, making a complete vibration down and up again in the time in which the wave moves over one wave-length. This is called the *wave-time*, and if the wave-length and the velocity of propagation are known, it is easily found by dividing the wave-length A B by the velocity. It is thus found that the vibrations or changes of polarity at one point occur millions of millions of times in a second.

Relation of Color to Wave-length.—The fact that light is something composite in its nature was first clearly proved by Newton, when, by the action of a prism, he resolved a ray of white light into lights of the various prismatic colors, and by recombining these colors reproduced white light. It is now found that these differences of color arise from the fact that the light which emanates from the sun, and indeed from any incandescent solid body, is not of one wave-length, but is composed of a confused mixture of waves of every length down to a limit depending on the temperature of the body, and that differences of wave-length affect the optic nerve so as to produce a sensation of difference of color. The relation between color and wave-length may be stated somewhat as follows: Let us take as a unit the 10,000th part of a millimeter. Then light of wave-length 7 units will appear intensely red, and will suffer a certain refraction on entering a prism or other transparent substance. If the wave-length is gradually diminished to 6, the effect on the eye will change to salmon yellow. As the length diminishes from 6 to 5, the yellow effect will change to green. Diminishing the wave-length from 5 to 4, the optical effect will change from green to blue and violet. As the wave-length becomes less than 4, the color will change to lavender, and then the light will entirely disappear. With every diminution of the wave-length, the amount of refraction by a prism or other transparent body will continually increase.

Polarization aside, two kinds of light of the same wave-length and of the same intensity are perfectly alike in all of their properties, just as two specimens of any elementary substance would be. It follows that one light can differ from another only in intensity and wave-length. All ordinary kinds of light which come from incandescent substances are formed of a mixture of light of all wave-lengths, and not merely of a certain, definite number of such lengths. There are sometimes supposed to be exactly seven prismatic colors; this, however, is not the case; by observing the spectrum thrown by a prism, it will be seen that there is every gradation of color from the extreme red to the extreme violet without any break whatever. See COLOR.

Identity of Light and Radiant Heat.—The wave-lengths of light, so far as the eye can show, do not extend beyond the longest limit that we have just mentioned; that is to say, so far as optical observations go, no light has a greater wave-length than seven and a half of the above defined units, or about 0·000750 of a millimeter. There is no evident reason, however, why the undulations or polarizations of the ether produced by the action of heat or other causes should be limited to this wave-length; in fact, they are not so limited. The actual wave-lengths of the undulations of the ethereal medium have a range so wide that it has not yet been determined; but when the length exceeds 7·5 units, it no longer affects the optic nerve, so we do not have the sensation of light. Still we have the sensation of heat, and are therefore led to inquire into the relation between light and heat.

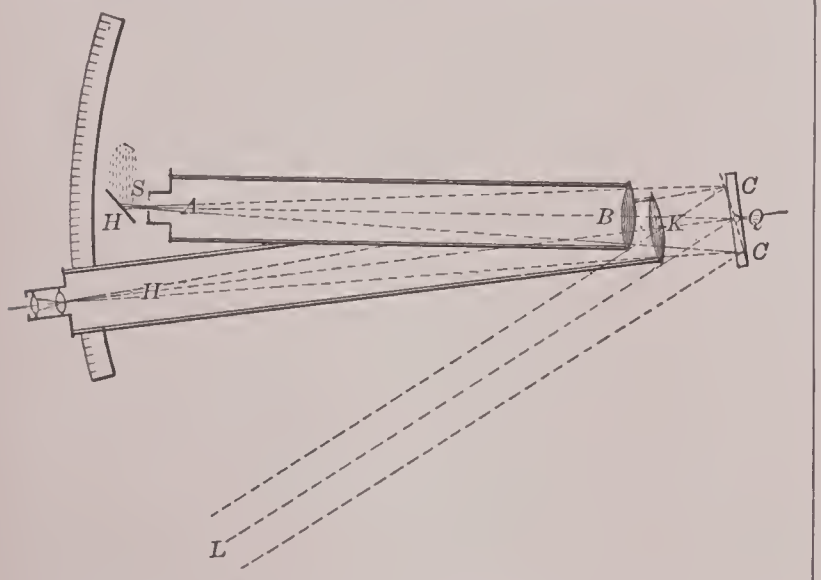
Let us study the phenomena of the latter from another point of view. We all know that the sun is continually sending us heat through space; that if any substance is exposed to the sun's rays it becomes warm. We know that the same thing is true of a fire; by standing before it we are heated, and we can easily convince ourselves that this heat does not arise from any warming of the air. If we suddenly make a hot fire in a cold room, we shall feel the heat before the air gets warm, and by merely holding a screen before our face, we can cut the heat off. This shows that the heat which comes from the fire proceeds in straight lines, like light. Suppose now that instead of a fire we take simply a piece of hot iron. On holding the hand very close to the iron, we shall find heat is radiated from it in the same way, although there is no luminosity. By a careful study and generalization from such cases, the conclusion is reached that all bodies radiate heat at all temperatures. If we hold the hands near a mass of ice, we shall feel a sensation of cold, an effect which arises, not from cold passing from the ice to the hands, but from the hands radiating heat to the ice. The analogy thus shown between heat in the act of being radiated and light has long been the subject of inquiry. The nature of the relation was formerly expressed by saying that both light and heat were radiated; but the view now universally accepted is that the two agents are identical. The proofs by which this view is sustained are too numerous to be detailed at length. It will suffice to say in a general way that heat is found to have a wave-length, like light, and that at any given wave-length light and heat are strictly proportional. It is therefore logical to suppose that only one agent is concerned in both. This agent may be called *radiance*. The theory of the relation, as now understood, may be expressed as follows: Although bodies emit radiance at all temperatures, yet the wave-length of the radiation varies with the temperature. The rule is that we always have the longer wave-lengths however high the temperature, but that rays of the shorter wave-lengths are radiated only when the body reaches a certain temperature corresponding to them. For example, we may imagine that at the temperature of boiling water the radiance is of all wave-lengths exceeding, we may suppose, ten or twelve of our units, but of none shorter than this; and as the body becomes hot and hotter radiance of wave-length is continually added, until at a temperature of 980° F., waves of a length as short as 7·5, or 750 millionths of a millimeter, are emitted. Then for the first time we have an agency which will affect the optic nerve, and produce what we call light. The color is a dull red. As the temperature of the body is raised still higher, waves of yet shorter length are produced; thus we have light which appears not merely red, but of a color resulting from a mixture of the red light with light of shorter wave-lengths, yellow, green, blue, etc., being successively added. The successive addition of these colors gradually changes the color of the mixture to white, which is a mixture of light of all visible wave-lengths.

Velocity of Light.—To all appearance the motion of light is instantaneous. By no ordinary experiment which we can make can we detect any interval of time between the moment when light is allowed to escape from a luminous

source and the moment when it affects the eye, either by direct propagation or by reflection from a distant object. That the motion is not instantaneous was first shown by the eclipses of the satellites of Jupiter. It was found by Roemer about two centuries ago that when the earth and Jupiter were on opposite sides of the sun the eclipses of the satellites seemed to occur too late, while when on the same side they occurred too early. The extreme deviation from the mean time was found by Roemer to be eleven minutes. It is now, however, known to be about eight minutes twenty seconds; that is to say, light crosses the interval which separates the earth from the sun in a little more than eight minutes. This speed is such that it would make a complete circuit of the earth seven times in a single second. During the nineteenth century various experimenters have found the velocity of the surface of the earth to be nearly 299,860 km. per second. Knowing this velocity and the time required to cross the orbit of the earth the distance of the sun can be calculated. See SOLAR PARALLAX.

Method of Measuring the Velocity of Light.—With such a speed as carries a ray of light around the earth seven times per second, this is a very difficult problem, of which the solution must rest upon the possibility of sending a ray of light to a distant mirror, seeing it by reflection on its return, and determining the time which it took to go and come. This has been done with entire success in two different ways. The simplest method consists in sending the rays through the apertures between the teeth of a rapidly revolving wheel, and concentrating them by means of a telescope on a distant mirror, which may be several miles away, but which reflects the light back to the starting-point. When the wheel is set in rapid rotation, each flash of light passing between a pair of teeth may be caught, either on the adjoining tooth or on one of several teeth following, according to the distance and the speed with which the wheel revolves. The flashes are then invisible. When the wheel turns more rapidly the return ray passes through between some pair of teeth, and so becomes visible.

A much more accurate method is, however, that of the revolving mirror, invented by Foucault. The principle of the method may be understood by the accompanying figure, which shows the arrangement of the apparatus used in Washington during the years 1880–82. A B is a part of



a telescope, of which B is the object-glass. By a heliostat mirror, H, a beam of sunlight is thrown through the slit G. The rays emerging parallel from the objective B fall upon the polished face of the revolving mirror C C, from which they are reflected in the direction L to a distant mirror not shown in the figure. In the Washington experiments the apparatus was at Fort Myer, a hill in Virginia, overlooking the Potomac and the city of Washington, while the distant mirror was at the base of the Washington Monument, more than 2 miles away. The rays return from the distant mirror along the line L, again strike the mirror C C, and are reflected back from it. To receive them a second telescope, H, is used, having its object-glass K below that of the other telescope. The faces of the mirror C were 4 inches in length, so as to be large enough both to receive the rays from the one telescope, A B, and reflect them back into the other, K H. Were the mirror perfectly at rest, the return ray would be reflected into the receiving telescope H K, when it was parallel with the other; they would, in fact, be sent out in a direction parallel to that from which they came; but when the mirror is set in rapid rotation, then every time it passes the position shown in the figure the sunlight flashes upon the distant mirror, and the return flash comes back. The mirror C having revolved through a small angle between the time that the flash is reflected to the distant mirror and the time that it returns, as shown by the dotted line, the return ray is no longer reflected in the same direction, but in the direction K H, or toward the point Q, according to the direction in which the mirror is revolving. Supposing the mirror to have equal speeds in the two directions, the deviation of the lines K H or K Q from the medial line B A would be double the distance which the mirror revolves while the ray is going and coming. Knowing the exact velocity of revolution of the mirror, the time each ray requires to go and come is exactly determined. It was thus found that a ray of light went from Fort Myer to the Washington Monument and back in about twenty-five millionths of a second, or somewhat less than the forty-thousandth part of a second. The distance between the two points was determined with great accuracy by triangulation. It was thence concluded that light moves in the air with a velocity of 299,780 km. per second, and in a vacuum with a speed of 299,860 km.

Actinic Effect of Light.—It has long been known that light is capable of producing certain chemical changes, especially in the salts of silver, a property which is now utilized in photography. This effect is sometimes called actinic, and was once attributed, like heat, to a separate kind of radiation. It is now found that the actinic effect is merely the action of light itself; and since light is nothing but radiant energy, it follows that all the effects of heat, light, and chemical action are due to the one agent which we call radiance. The idea that the actinic effect was not due solely to the light was first suggested by the fact that only the blue and violet rays of the spectrum, or those of shortest wave-length, produced any actinic effect. This, however, does not show that any separate cause has acted; it merely shows, what is now well understood, that the rays of short wave-length are those which are most powerful in producing chemical action.

The action, properties, and applications of light give rise to a number of branches of research, the principal of which may be classified as follows:

(1) *The Undulatory Theory.*—To work out the results of this theory requires a mathematical investigation of the laws of vibration of an elastic medium, as the ether was supposed to be. This branch of the subject is too abstruse to be treated in a popular cyclopædia. The mathematical student who wishes to pursue it will have to consult the original memoirs of Cauchy, Hamilton, and other writers, or Mascart's *Traité d'Optique* (3 vols., Paris, 1890–93).

(2) *Geometrical Optics.*—This branch of the subject is concerned with the laws of the reflection and refraction of light by transparent substances, and especially with the application of these laws to the construction of optical instruments, telescopes, microscopes, spectroscopes, etc. A *résumé* of these laws will be found under OPTICS.

(3) *Physical optics*, which is concerned with the laws of the action of light of different wave-lengths, the measurement of these wave-lengths, diffraction, polarization, etc. The division of this subject which offers the most interesting field of study is that of diffraction. The measurement of the refractive indices of various transparent substances may be included in the same general category.

(4) *Spectrum analysis*, and the study of the light emitted by incandescent bodies, or absorbed by transparent gases, as indicated by their spectra. This subject is treated under SPECTRUM and SPECTROSCOPE.

(5) PHOTOMETRY (*q. v.*), or the measurement of the total intensity of light emitted by or reflected from bodies.

(6) *Physiological optics*, or the laws of vision based upon the action of light on the optic nerve. This subject is treated under VISION.

See J. Tyndall, *Six Lectures on Light* (1885); G. G. Stokes, *On Light* (1887); P. G. Tait, *Light* (1889); E. Lommel, *The Nature of Light* (1892).

S. NEWCOMB.

Lightfoot, JOHN, D. D.: Hebrew scholar; b. at Stoke-upon-Trent, England, Mar. 29, 1602; was educated at Christ's College, Cambridge; took orders in the Church of England; became chaplain to Sir Rowland Cotton; was minister at Stone in Staffordshire and at Ashley; was a member of the famous "Assembly of Divines" at Westminster (1643); became in 1644 rector of Much Munden, Hert-

fordshire; in 1650 master of Catharine Hall, Cambridge; and in 1654 viee-ehaneellor of the University of Cambridge. At the Restoration he was deprived of his mastership, but it was subsequently restored to him, and he also obtained a canonry at Ely, where he died Dec. 6, 1675. Dr. Lightfoot was probably the most learned Hebrew scholar that England has ever produced, and his great work, *Horæ Hebraicæ et Talmudicæ* (1658; new and improved ed. in 4 vols., by Gandell in 1859), is still a standard authority for the illustration of the Gospels by means of the Talmud and Midrash. He eontributed much to Walton's *Polyglot Bible*, Castell's *Heptaglot Lexicon*, and Poole's *Synopsis Criticorum*. He maintained the inspiration of the vowel-points in the Hebrew Bible. His miseellaneous works were eollected after his death, together with the work mentioned, in two volumes (London, 1684), and were several times reprinted, the best edition of his eomplete works being that of Pitman (London, 13 vols., 1822–25), whieh eontains a life and an elaborate bibliography. Revised by S. M. Jackson.

Lightfoot, Joseph Barber, D. D., D. C. L.: biblical seholar; b. in Liverpool, England, in 1828; graduated at Trinity College, Cambridge, in 1851 with high honors in classics; beeame a fellow in 1852, tutor in 1857, Hulsean divinity professor in 1861, canon of St. Paul's in 1871, and Bishop of Durham in 1879. His commentaries on the Pauline Epistles display great learning and ability; they eomprise *Galatians* (1869); *Philippians* (1870; 6th ed. 1881); and *Colossians* (1875), eaeh with a revised Greek text. He has published the *Two Epistles to the Corinthians of St. Clement of Rome* (1869); with an appendix eontaining the newly recovered portions in 1877); *Epistles of St. Ignatius* (2 vols., 1885); he was one of the New Testament company of Bible revisers, whose work he explained in an essay *On a Fresh Revision of the English New Testament* (1871); also wrote magazine artieles, of whieh the most notable were direeted against the anonymous author of a work on *Supernatural Religion* (1875). D. at Bishop's Auekland, Durham, Dec. 21, 1889. New volumes and new editions of Bishop Lightfoot's important theologieal and exegetieal works are being published under the direetion of his literary exeeutors. The following have appeared: *Dissertations on the Apostolic Age* (1892); *Apostolic Fathers*, part i., *S. Clement of Rome* (2 vols., 1890); part ii., *S. Ignatius, S. Polycarp* (3 vols., 2d ed. 1889). Shortly before his death the bishop printed a statement of his views on *The Threefold Ministry*, consisting of the latest referenees to this subjeet found in his eollected writings. This is reprinted in the prefaee to the third edition of Canon Maleolm MaeColl's *Christianity in Relation to Science and Morals* (3d ed., pp. xxiv.-xxxvii.). Among the bishop's writings are *Sermon before the Representative Council of the Scottish Episcopal Church* (1882); *Sermon before the Church Congress at Wolverhampton* (1887); and *Address at the Reopening of the Chapel, Auckland Castle* (1888). Revised by W. S. Perry.

Lighthall, William Douw: See the Appendix.

Lighthouse: an elevated strueture, usually tower-shaped, containing a light or lights. It is designed to serve as a guide at night to mariners, who in the daytime, when within sight of shore, make use of landmarks as guides, and when on the open sea find their way by means of the compass, and determine their positions by astronomical observations.

Lighthouses seem to have been known from very early times. The first of whieh we have certain information was the one at Alexandria in Egypt. This lighthouse was built about 300 B. C., probably by Ptolemy Soter. It stood on the island of Φάρος, just in front of the eity, and henee received its name, whieh has become generic in the languages derived from the Latin (Lat. *pharus*; Fr. *phare*; Sp. *faro*), and even in English the word *pharo* was once used. This lighthouse was destroyed during the fourteenth eentury, probably by an earthquake. Although the Faros of Alexandria is the most eelebrated of the towers of antiquity, in all probability it was not the first. There is evidence that as far back as the Trojan war a tower supporting a light for the guidanee of mariners stood on Cape Sigæa, a little S. of the entranee to the Dardanelles. Other towers on the Dardanelles, the Sea of Marmora, and the Bosphorus, may also have antedated the Alexandrian Faros.

Allard mentions* twenty-seven lighthouses of aneient times, all of which have disappeared with the exception of the one at Coruna. This tower was built originally with an exterior stairease. When it was restored in 1797, "in order to preserve as far as possible the remembrance and appearance of the Roman strueture, a wide projecting stone band was built on each of the four faces of the new tower, following exaetly the slope of the ancient outside stairway."

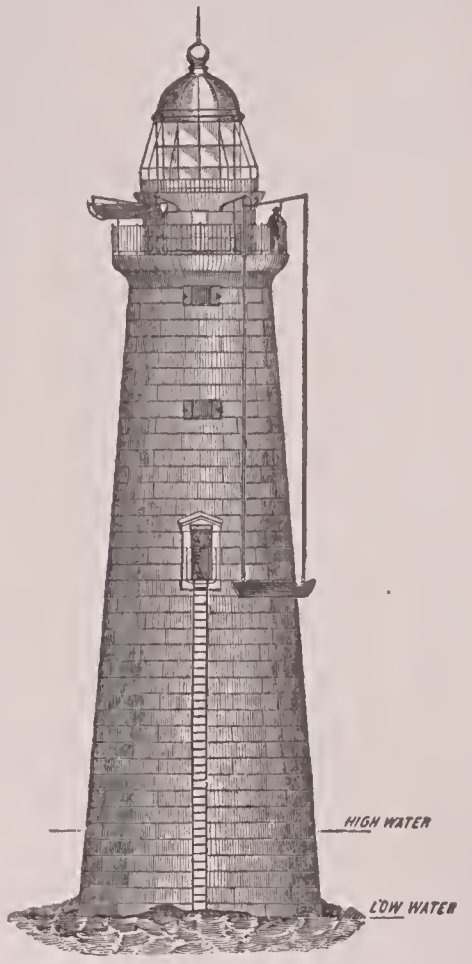


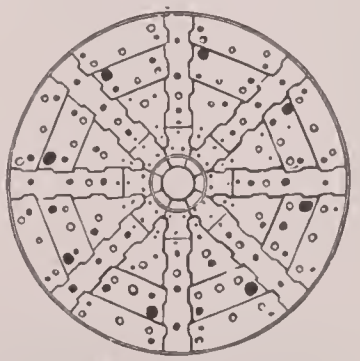
Fig. 1.—Minot's Ledge lighthouse, near Boston, Mass.

During the Dark Ages lighthouses followed the fate of all other results of earlier eivilization. With the Renaissaneè they began to appear again. Many were built on the Freneh coasts in the seventeenth and eighteenth centuries. The Trinity House corporation was organized in England early in the sixteenth century, and in the following century it was in charge of the lighting of the English coasts. The first lighthouse built within the limits of the U. S. was the Boston light on the north side of the entrance to Boston harbor. It was ereeted in 1716.

After the formation of the U. S. Government, early attention was given to the construetion of lighthouses, and the care of these aids to navigation was vested in the Treasury Department. The service was under the control of the fifth auditor until the lighthouse board was organized in 1852. This board is composed of the Secretary of the Treasury as president, of two naval officers of high rank, of two officers of the corps of Engineers of the army, of two eivilians of high scientific attainments, a third naval offieer as the naval secretary, and a third engineer offieer as the engineer secretary.

Fig. 2.—Minot's Ledge, as prepared to receive the foundation-stones.

Lighthouse Construction.—Mariners when approaehing a coast are always on the lookout for something whereby to determine their exaet position. If the approach be made at night a light first strikes the sight; if it be by day some day-mark serves the same purpose. A light so seen is called a "land-fall" light. The farther out at sea it is seen, the better its serviee is performed. It is put, therefore, on top of a structure of greater or less height, aeeording to its importance. These struetures are called towers, the heights of which vary greatly. If built near the level of the sea, it is rarely less than


Minot's Ledge.

* *Les Phares; Histoire, Construction et Éclairage.*

150 feet for land-fall lights. Other lights are used to guide the mariner through special channels, or to mark special dangers. Such lights are placed in towers of less height, but rarely less than 35 or 40 feet above the sea-level. In some cases the land-fall lights also perform these secondary duties. The lights on the outlying rocks of the coast of Maine, and the lights on Northwest Seal and Tillamook Rocks on the Pacific coast, are examples of lights for land-falls and for special dangers.

Two things determine the dimensions of a tower: (1) the distance from which it is to be seen; (2) the character of the light to be shown. The former determines the height, the latter the diameter at the top. Starting with these data, the dimensions of the tower are calculated so that it shall be safe to stand under its own weight, and so that it shall not be moved by any force of wind or wave which may attack it. This calculation is made with comparatively little trouble. The great difficulty in lighthouse construction is the foundation. This once obtained, the rest goes on with little delay.

The preparation of a foundation on a sea-swept rock taxes all the powers of the engineer. Every minute is of value. Alert watchfulness is the ruling feature. Every chance, no matter how slight, for advancing the work must be seized.

This is well illustrated in the construction of the tower at Minot's Ledge, near Boston, Mass. (Figs. 1 and 2). It stands on the outermost of a number of rock ledges near Cohasset. The rock which supports it rises but 3½ feet above water at low tide. At high tide the highest point is 7 ft. 2 in. under water. At lowest water a space of 30 feet in diameter only is bare. A landing could be made only when the sea was calm and smooth and the tide was at its lowest. For weeks at a time it was impossible to land. As some of the work of leveling and shaping the rock had to be done 2¼ feet below low water, it can easily be realized how little time was disposable at this point. Three summers were spent in preparing the rock for the foundation before a single stone was laid. Ten to twelve hours of work was required for each cubic yard removed. The tower was finished just five years after the first landing was made on the ledge.

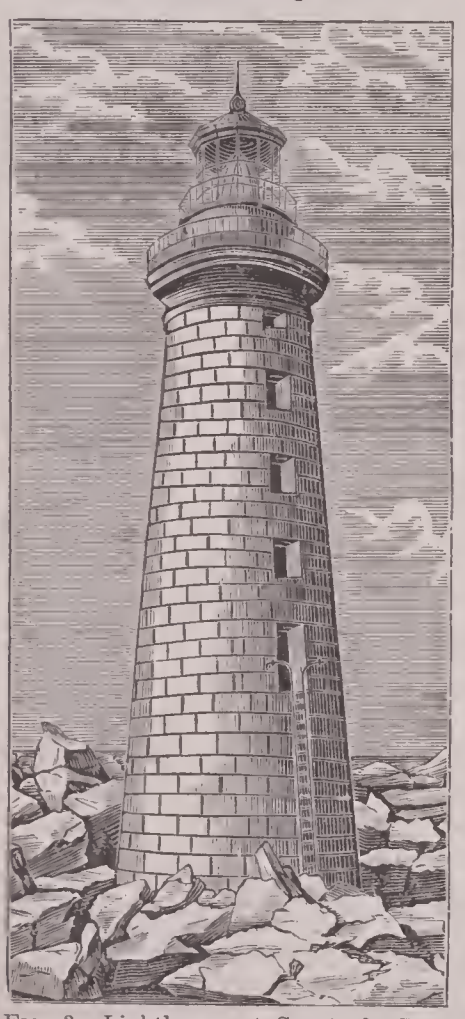


Fig. 3.—Lighthouse at Spectacle Reef, Lake Huron (in an ice-floe).

A direct descendant of the Minot's Ledge light is the one at Spectacle Reef in Lake Huron (Fig. 3). It stands in 11 feet of water, on a rock ledge over which lies a covering of bowlders 2 feet thick. No great waves were to be anticipated. Currents are found here at times with velocities of 2 or 3 miles an hour. During the winter these currents carry back and forth fields of ice thousands of acres in extent, and 2 feet thick. This ice formed in fresh water is exceedingly solid and firm, and when it moves in such masses and with such velocities as those named its living force is well-nigh irresistible. The structure was intended to offer such a resistance as would crush the ice first and then impede its motion so as to cause it to ground on the reef, and by piling up on itself form a barrier which should relieve the tower from the pressure of the mass behind.

The tower is founded on the bed-rock of the reef. Its shape is that of a frustum of a cone, 32 feet in diameter at the base and 18 feet in diameter at the spring of the cornice. The total height of the masonry is 93 feet. The tower is solid for the first 34 feet. Above this it is hollow, and divided into five stories or rooms. The walls are 5 ft. 6·3 in. thick at the base of the hollow portion, and 18 inches at the spring of the cornice. The tower is lined with a brick wall 4 inches thick, between which and the outer wall is an air-space of 2 inches.

Two important lighthouses have been built on the Pacific coast: one on Tillamook Rock, off the coast of Oregon, and one on Northwest Seal Rock, off the extreme northern end of the coast of California. These rocks lie exposed to the full force of the winds sweeping across the Pacific Ocean. The waves caused by gales break completely over them. While work was under way on each it was frequently interrupted by reason of the impossibility of reaching the site or of remaining on the rock when a landing had been made. Tillamook Rock is a bold basaltic mass, lying about 20 miles S. of the mouth of the Columbia river and about a mile from the promontory called Tillamook Head. The depth of water around the rock varies from 16 to 40 fathoms. Rising from the sea the west side of the rock slopes eastwardly, so that at the height of 40 feet the recession is about 30 feet; in the next 40 feet of rise the slope changes to an overhang of 25 feet; in the last 40 feet the rock again recedes. The appearance of the overhang is somewhat like that of a huge burl on a tree. The top of the rock is 120·55 feet above the lowest spring tides. From the top the rock slopes very abruptly to the eastward to a point 30 feet down, and from this point it runs down gradually to the sea at a slope of 1 vertical to 5 base. On the south side is a deep fissure about 25 feet wide, which divides the rock into two unequal parts. Waves break violently into this fissure during storms, and at times sweep down the opposite slope.

The principal division of the rock, before its surface was disturbed, was of exceedingly irregular shape, and about 100 feet square. Little needles projected everywhere above the surface, forming narrow and deep crevices, in and through which was a mass of large and small cubical blocks from 3 to 12 inches on a side, cemented together by a tough and unyielding matrix. The original columnar formation had been destroyed, and these were the remains.

The first landing for work on the rock was made on Oct. 21, 1879, and on Jan. 8, 1881, everything was finished, including the adjustment of the illuminating apparatus. Thirteen days later the light was shown for the first time. The great difficulty in the way of building this light was the great waves which rise on the Pacific without the slightest warning. Early in Jan., 1880, the water from the rebounding waves was carried up to and over the rock in such quantities and with such violence as to destroy the storehouse, which was at 30 feet above the level of the sea. The men's quarters were higher up. Although they were not destroyed, they were in great danger.

Fig. 4.—Tillamook Rock light.

The light at Tillamook Rock is 136 feet above the level of the sea.

Northwest Seal Rock is the outermost of a dangerous reef of rocks, called St. George's Reef, extending 6 or 7 miles into the ocean off the extreme northern end of California. The shape of the rock is a rough oval, with a ridge running from E. to W.; its area at the level of low water is about 40,000 sq. feet; the highest point is 54 feet above low water. The water around the rock is about 30 fathoms deep. The rock is exposed to the waves from any direction from the S. by way of the W. to N. It is very difficult to land at the rock. The structure proposed and adopted for the station is a pier of irregular oval form, having its top 70 feet above

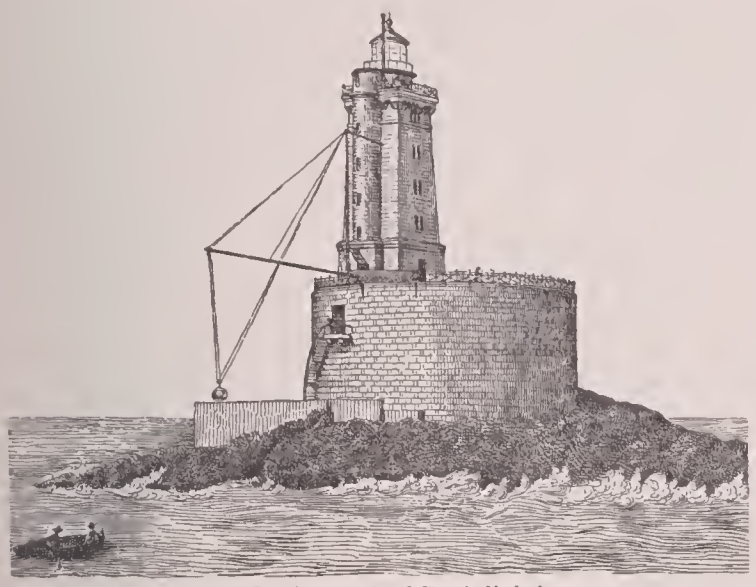


Fig. 5.—Northwest Seal Rock lighthouse.

the sea (Fig. 5). On this pier stands the keepers' dwelling, in the cellar of which are placed the fog-signal machinery and the hoisting-engines. In one side of the building stands the stone tower, from the top of which the light is shown, at a height of 145 feet above the sea. To receive the pier the outside of the rock had to be cut into four benches, and the part of the rock left standing had to be so prepared that the surrounding masonry could be bonded into it. The rock gave every indication of being, at times, completely swept by the waves, yet in order to have the area required for the pier the first benches had to be cut less than 25 feet above low water. There was no point of the rock where men or materials could find even a temporary lodgment beyond the reach of waves. As neither men nor materials could be kept on the rock, and as the nearest landing-point was 13 miles away, a vessel was used as a living-place for the men and as a storehouse for the tools, etc., required for the work. The vessel was moored a short distance from the rock by two lines leading to ring-bolts in the rock and by four lines fastened to mooring-buoys. A $2\frac{1}{2}$-inch wire-rope was made fast at one end to a ring-bolt in the rock, and at the other end to a mooring-buoy 180 feet from the vessel. The fore and main throat halyards were made fast to the strap of a block over which the wire-rope could work easily. By means of the halyards the part of the rope at the vessel could be raised or lowered. A traveler block moved by an endless rope was used to send the men and materials to the rock, and to bring the former back. The men were generally carried in an iron cage. In spite of all these difficulties the benches for the foundation courses were cut in the rock, and the cistern, of a capacity of 77,000 gal., was excavated, all during the season.

To prepare the rock for the bottom courses of the pier a bench 10 feet wide, having four different levels, was blasted out and accurately finished with patent hammers. The center cone was roughly stepped to receive the masonry. The outside courses of the pier are 2 feet and 2 ft. 6 in. high, built in Flemish bond. The headers are 5 feet long by 2 ft. 6 in. width of face; the stretchers are 5 ft. 8 in. long by 2 ft. 6 in. bed. All horizontal beds are connected by a 2-inch diameter dowel of gun-metal in each block, projecting half its length into the course below, except in the upper course, in which the dowels are omitted, but all the vertical joints of the outside stones of this course are dovetailed or joggled into each other. The top of the pier is laid with stone flagging 12 inches thick, finished with eight-cut patent hammers. This serves as a water-table with 3 inches fall from the center to gutters cut in the stone at the outer rim, whence the water is carried by a 4-inch pipe to the cistern in the base of the pier. To prevent leakage, all the joints in the top of the pier were cleaned to a depth of 2 inches, and thoroughly calked with sand and cement moistened with boiled linseed oil.

The lighthouses considered so far have been all founded on rock. We come now to foundations more or less unstable. These foundations may be divided into three classes: (1) Where the substratum may be regarded as stable so long as it is protected from the action of the sea; (2) where it is so soft that the pressure must be spread over a large area, so as to reduce that on the unit of area to a minimum; (3) where the material of the substratum is liable to be attacked by water.

As examples of the first class may be mentioned the towers at Cape Hatteras and Body's island, N. C., and at Mosquito Inlet, Fla. The first two rest each on a grillage which, at Hatteras, is 6 feet below the surface of the beach, while at Body's island it is 7 feet below. In each case the grillage is made of two courses of 6-inch by 12-inch timbers laid at right angles to each other, the timbers of each course being set close. At Hatteras there was laid on this grillage a massive octagonal foundation of large granite blocks set in cement mortar, the interstices being filled with smaller stones of the same kind. At the proper height the octagonal plinth courses were placed. At Body's island one course of dimension stone 18 inches thick was laid on the grillage. On this was set coursed rubble in large blocks, thoroughly breaking joints, and all grouted with one part of Portland cement to two parts of clean, sharp sand. At Mosquito Inlet the excavation for the foundation was carried to 12 feet below the level of the surface. In this excavation was placed a circular bed of concrete 48 feet in diameter. As the concrete foundation was built up, its diameter was reduced 2 feet at each 2 feet of height. On top of the concrete foundation was laid a belt course all around the base of the tower. From this belt course starts the tower proper, which is the frustrum of a cone of 30 feet outside diameter at the bottom and 18 feet outside diameter at a height of 120 feet.

As an example of the second class of foundation, the Southwest Pass lighthouse may be taken; it is the most important light in the Gulf of Mexico. The soil where this light stands is the mere sedimentary deposit of the Mississippi river, its components being clay, very fine sand, and vegetable matter. It is too soft to sustain any considerable weight. To obtain the foundation, piles were driven in rows over an area 60 feet in diameter. The piles in each row were $3\frac{1}{2}$ feet between centers, the rows being the same distance apart. The piles were all driven to a depth of 50 feet and cut off at 2 ft. 6 in. below low water. In the center of each of the squares thus formed was driven another pile to a depth of 50 feet, and cut off at 1 ft. 6 in. A grillage of 12-inch square timbers, laid at right angles and halved to each other, was laid on the first set of piles. The grillage was built up to a height of 1 ft. 6 in. above low water. The pockets of the grillage were filled with concrete, and the whole space occupied by the grillage was covered with 4 feet of concrete. To this concrete mass are anchored the socket disks from which the legs of the skeleton tower rise.

Under the third class may be grouped two kinds of structures: those in exposed positions where great strength is required, and those in safer places, or where the light required is such that a heavy structure is not needed. Those in exposed positions have either tubular or caisson foundations. The tubular foundation was first proposed by Maj. (now Colonel) G. H. Elliot, corps of Engineers, while he was engineer secretary of the lighthouse board. The lighthouse at Old Orchard Shoal, New York harbor, is constructed in this way. It consists of a cast-iron cylinder, open at the bottom, 33 feet in diameter and 45 feet high. A hole 7 ft. 8 in. deep was dug in the shoal by means of a dredge. The cylinder, made of seven courses of thirty-two plates in each, was set in the hole dredged for it. The bottom of the cylinder for a height of $13\frac{1}{2}$ feet was filled with concrete laid under water. Above this level the concrete was laid after the water in the cylinder had been removed. The concrete was continued up solid to a height of 3 ft. 10 in. above high water, except the hollow left for the freshwater cistern. The remaining height of the cylinder, 10 ft. 9 in., is occupied by the cellar, its floor, and the masonry which supports the superstructure. The top course of plates curves outward, so as to give a support to the balcony which surrounds the structure. When the concrete filling

was finished a mass of riprap was piled around the cylinder to give greater stability.

The best example of a caisson foundation in the U. S. is that of the Fourteen Foot Bank light in Delaware Bay, about 22 miles from its mouth. It is an important light, as it marks a turn in the channel. It is exposed to heavy shocks from ice when the latter goes out of the bay after a hard winter; hence it must have great stability. It stands on an oval-shaped shoal, on which the least depth of water at low tide is 20 feet. The foundation for the light is a mass of concrete which rises to a height of 13½ feet above high water. The bottom of the mass is 23 feet below the surface of the shoal. The difference between high and low water is 6 feet. The concrete mass is inclosed in a cast-iron cylinder, 35 feet in exterior diameter and 73 feet high; the top of the cylinder is 10½ feet above the top of the concrete. This part of the cylinder is lined with masonry and concrete, and forms the cellar of the lighthouse. The cylinder is made of twelve courses of cast-iron plates, thirty-six plates in each course. The plates are 1½ inches thick, 6 ft. 1 in. high, with horizontal and vertical flanges, 6 inches wide and 1¾ inches thick, on each plate.

The second kind of these foundations is found in the numerous forms of iron piles, which are much used at points where ice is rarely found. There are cases, however, where these structures have stood severe attacks of ice, but in other cases some have been carried away. If a tower be erected on this class of foundation, it is almost invariably what is known as a skeleton structure.

The first of these structures in the U. S. was the light at Brandywine Shoal, 8 miles from the mouth of Delaware Bay. The site is much exposed to waves from the ocean. The depth of water on the shoal being comparatively slight, 6 feet at low water of spring tides and 13½ at high water, the light is not exposed to serious attacks from ice, which generally grounds on the shoal above, and below the site. As this lighthouse was built before the lighthouse board was formed, nothing is known about the details of its construction except that it is founded on nine screw-piles. An ice-breaker also resting on screw-piles was added after the construction of the lighthouse. The top of the ice-breaker is planked over and forms a platform about the lighthouse.

Another sort of foundations of this class is that adopted for some of the towers of the Florida keys. The tower at Fowey Rocks may be taken as a model. The depth of water where it stands is 5 feet at low tide and 8 feet at high tide. The ground is coral rock. The structure stands on nine piles of solid wrought iron 12 inches in diameter, set at the center and angles of a regular octagon. The piles are pointed. A shoulder is made on each pile 10 feet above the point. Each pile is driven through a cast-iron disk, accurately placed on the bed of the ocean, until the shoulder rests on the disk. The piles are securely fastened together by braces and tie-rods, and on them the superstructure, a skeleton tower, is raised.

The foundation of the lighthouse at Race Rock, at the eastern entrance to Long Island Sound, presents some features peculiar to itself. The site is exposed to heavy wave-action from the E. and S. E. The tidal currents run with great violence in each direction; hence the name, "The Race," given to the waterway between Little Gull island and Fisher's island. The ice from the Thames river and from the adjacent waters of the Sound is also to be feared. For these reasons a large mass of riprap, 100 by 150 feet on top, was formed, the sides being protected by blocks of stone of 8 or 10 tons weight. The interior of this mass was removed and the concrete foundation laid in its place. The foundation was laid in steps 2 feet high, each layer being shaped by means of a cast-iron ring, which was placed in position by a diver.

The superstructures of lighthouse towers present no special difficulties. Where they are exposed to the violent action of waves, as at Minot's Ledge, they are built of masonry, the stones being cut so that each one has a firm hold on those on each side of and above and below it. Great dowels of metal also pass from one stone to those next above and below. Every means which ingenuity can suggest is used to insure the solidarity of the mass.

There are many points of the coast where the sea is encroaching rapidly. At some of these places towers have been built of such construction that they can be taken down if necessary and removed to safer sites. The tower at Hunting island, S. C., is a specimen of this sort of structure. It is built of cast-iron panels, each of which is flanged on all four sides, so that it can be bolted securely to those around it. This iron tower has a brick lining 9 inches thick. The lighthouse at Cape Canaveral, Fla., which is of similar construction, is (1894) in course of removal to a new site, about a mile farther inshore.

An iron skeleton superstructure presents many advantages in its lightness, the quickness with which it can be built, and its comparatively small cost. The lighthouse at Cape Charles, Va., has a tower 175 feet high from the top of the concrete blocks which form the foundation to the focal plane of the lens, and 192 ft. 7¼ in. to the top of the pinnacle of the lantern. The tower has a central cylinder, 9 feet in external diameter, made of cast-iron plates, and supported by eight hollow cast-iron legs. The cylinder contains an elevator, in which a load of 250 lb. can be carried to the watch-room, and a stairway surrounding the cylinder. The external diameter of the bottom sections of the legs is 13 inches. The remaining six sections have this diameter reduced successively by an inch, so that the top section is of 7 inches diameter.

The cost of these different structures is:

Minot's Ledge	$332,000
Spectacle Reef	406,000
Tillamook Rock	123,300
Northwest Seal Rock	730,000
Cape Hatteras	222,500
Body's island	177,200
Mosquito Inlet	135,600
Southwest Pass	270,700
Old Orchard Shoal	57,500
Fourteen Foot Bank	124,400
Brandywine Shoal	160,600
Fowey Rocks	163,000
Race Rock	285,700

Lighthouse Illumination.—It will be well to lay down a few principles before describing the apparatus used for lighthouse illumination. Any brilliant body emits rays of light which, if not arrested, go out in all directions. As an observer goes away from the body its brightness diminishes, as he comes near it increases. This change of brightness in an absolutely transparent atmosphere takes place according to "the law of the inverse squares," i. e. if the light be seen from a distance of 2, 3, 4, 5 . . . yards, its brightness at these distances is ¼, ⅑, 1/16, 1/25 . . . of what it is at a distance of 1 yard. In an ordinary atmosphere this law holds good only in part, because of the absorption of the light by particles of all sorts, vapor, dust, etc., which are in the air. The loss of light then becomes greater than the law of inverse squares indicates. In order to overcome this loss it is necessary to concentrate and make parallel with each other the rays of light given off by the body. This may be accomplished by a lens which refracts or bends the rays passing through it. This way is called the "dioptric" system. It may be accomplished by reflecting the rays back from a properly shaped mirror. This is called the "catoptric" system.

The simplest reflector which sends out the rays parallel to each other is that made by revolving a parabola on its axis. A parabola (Fig. 6) is a curve of which each point is situated at equal distances from a given point, called the focus, and from a given straight line. In Fig. 6 Y O Y is the given straight line, and F is the given point or focus. The curve A B C is a parabola. The straight line O A X is called the axis. If the curve be made to revolve about the axis it will make a hollow surface, which, if cut by any plane passing through the axis, will always show a line shaped like B A C. A marked character of this sort of mirror is this: every ray of light coming from the point F is reflected back in a line parallel with the axis O A X. Thus the rays F B, F*a*, etc., F C are reflected at B, *a*, etc., C, in the directions B*b*, *ab*, etc., C*b*.

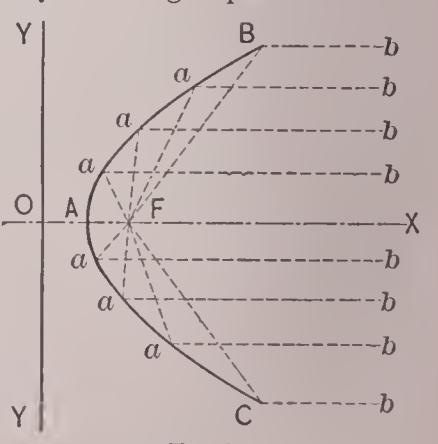


FIG. 6.

In Fig. 7 the small circle represents the flame of a lamp so placed that its center is at the focus of the reflector.

The rays from the side E of the flame are reflected along the lines E_1 and E_2; those from the side F are reflected along F_1 and F_2; the angle $Ea_1F = E_1 a_1 E_1$ is called the divergence of the reflector. It varies slightly from point to point of the curve, as the distance of each point from the flame changes.

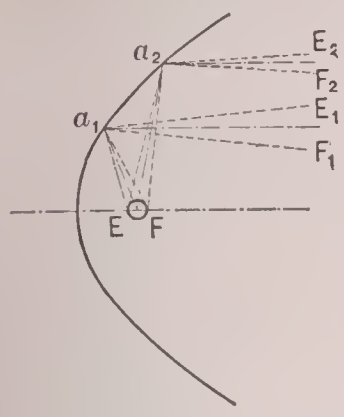


FIG. 7.

A third way of changing the direction of the rays rests on the optical fact that rays of light striking the plane face of a transparent body under a certain angle, which varies with the composition of the body, are totally reflected. This is called the principle of total reflection. The ray starting from F, Fig. 8, strikes the side of the triangular prism, of which A B C is a section, at L; here its course is changed to the direction L M; at M it is totally reflected from the face C B, and takes the direction M N; at N its course changes again to N H. By giving a proper position to the prism the final direction F H of the ray may be made parallel to the horizon. This system being a combination of reflection and refraction is called the "catadioptric."

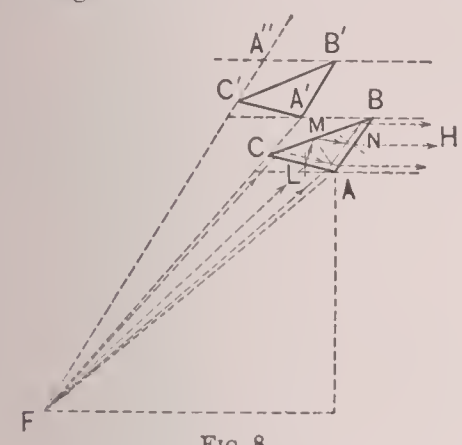


FIG. 8.

All three of these systems find their application in lighthouse illumination.

Nothing certain is known about how the lighthouses of ancient times were illuminated. It is probable that it was by means of burning wood, although some writers think that in the following lines of Lucanius's *Pharsalia*

> Sed prius orta dies nocturnam lampada texit
> Quam tutas intraret aquas . . .

the word *lampada* points to the use of some other illuminant. It is more likely that this is only a poetic expression for the tower and the light it carries. Pliny, in speaking of the lights at the tops of the towers, expresses the fear that the steadiness of these lights may cause them to be taken for stars, as they look much alike, "Periculum in continuatione ignium ne sidus existimetur, quoniam e longinquo similis flammarum aspectus est," and it has been thought that this fear would apply better to the light of a lamp than to the waving and unsteady flames of a wood fire. Outside of these vague presumptions there is nothing to show that the ancients used oil-lamps in their lighthouses. Be this as it may, it is well known that wood and coal were the usual illuminants for lighthouses until after the middle of the eighteenth century.

In the early part of 1674 the sum of 1*s.* 6*d.* was paid by the town of Hull, in Massachusetts, "for making fire-balls of pitch and oakum" wherewith to light the beacon.

When the Eddystone tower (Rudyerd's) was destroyed in 1755, the light was given by 24 candles weighing 2½ lb. each. It is not known certainly whether candles were used from the beginning of this light's service in 1708, but such is thought to be the case. The Cordouan light, one of the most celebrated on the French coast, was lighted by coal burned in a large open basket, until 1782, when the coal-basket was replaced by Sangrain reflectors. These were segments of spheres with an oil light given by one, two, or three flat wicks placed in the horizontal axis of each.

The Sangrain apparatus was so weak that great complaints were made, and mariners desired to have the old illuminant restored. M. Teulère, a distinguished engineer, was sent to examine into and report upon the defects, and to present a project for removing them. He showed that the Sangrain reflectors were defective in that the rays of light were greatly scattered; then he discussed the various methods for concentrating light into beams visible at great distances. He proposed a series of 24 lamps "of which the wick, instead of being flat, forms a cylinder of 2 inches diameter and 3 lines thick, leaving a tube through the middle for the passage of air"; these lamps to be placed each at the focus of a parabolic reflector, the reflectors to be distributed in three circles, one above the other, so as to spread the light uniformly over the horizon; the whole to be made to revolve by clockwork. The idea of the circular hollow wick had occurred to Argand between 1780 and 1782. Teulère made his report in 1783. There are strong reasons for believing that he knew nothing of Argand's invention, but if he did he at least deserves the credit of taking in at once its advantages.

The apparatus proposed by Teulère was made by Lenoir in 1790 under the direction of Borda. He made cast-steel parabolic reflectors 812 mm. wide and 325 mm. deep, the inside surface being covered with several sheets of silver. The lamp had a tubular wick 35 mm. in diameter, and a crystal chimney. The reflectors were put in place in 1791. The adoption of this apparatus (parabolic reflectors and Argand lamps) was an important advance. The system soon spread not only in France, but also in neighboring countries. It held its ground for years, and it is in use yet for the smaller range-lights and for lightships; but a reflector is inefficient and wasteful of light. Little more than half the strength of the rays which strike the reflector is given back, the rest being absorbed. All the light thrown out between the lines F B, F C (Fig. 6) is diffused rapidly, and produces but little effect.

On June 21, 1819, there was appointed to the French lighthouse commission a man, Augustin Fresnel, whose mission it was to revolutionize the lighthouse service of the world, and to found the principles on which the construction of lighthouse apparatus rests. He was led, by reason of the great absorption of light by reflectors, to propose lenses, because glass of ordinary thickness does not absorb more than one-tenth of the light which passes through. A lens made in a single piece would be of immense weight, and its great thickness would absorb much light. "But," he says, in his memoir of 1822, "if the lens were divided into concentric rings, and all the useless thickness of the small center lens and of the surrounding rings were removed, enough being left to admit of fastening their edges firmly together, it may be seen that the parallelism of the rays coming from the light may be obtained by giving to the surface of each ring a proper curve and inclination." Buffon had suggested this way of constructing ordinary lenses, but nothing seems to have been done with the idea. Condorcet had suggested a similar method of making large burning-glasses. Fresnel propounded the same idea in ignorance of the labors of the others, and to him is due the honor of finding the use to which it was best suited—the construction of lighthouse apparatus.

There is a limit to the useful size of a lens, because if the light strikes the surface of the lens at too small an angle

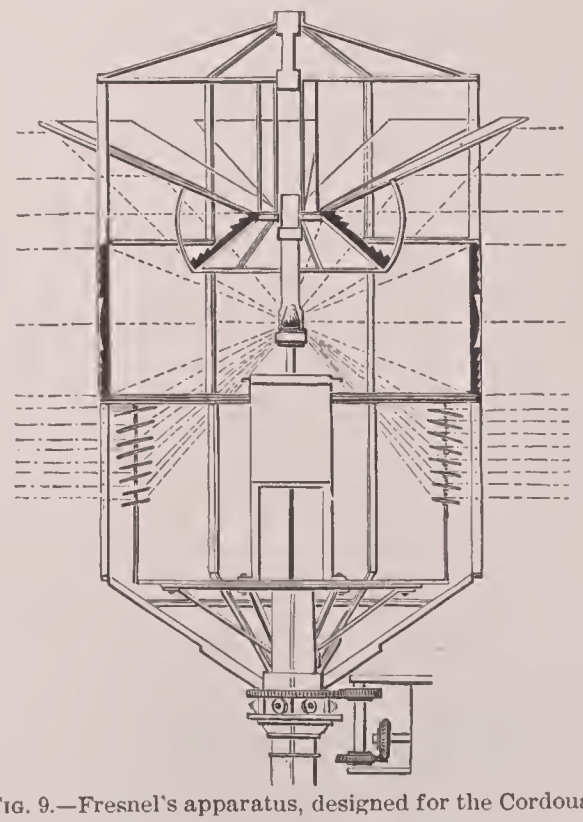


FIG. 9.—Fresnel's apparatus, designed for the Cordouan.

much of it will be lost by reflection. Fresnel thought of and actually used mirrors above and below the lens proper to utilize this light, which would have been lost without

them. Figs. 9 and 10 show the application of such reflectors to the light of the Cordouan tower, which replaced the reflectors in use up to 1823. This apparatus shows an octagonal frame supporting a middle belt of eight lenses,

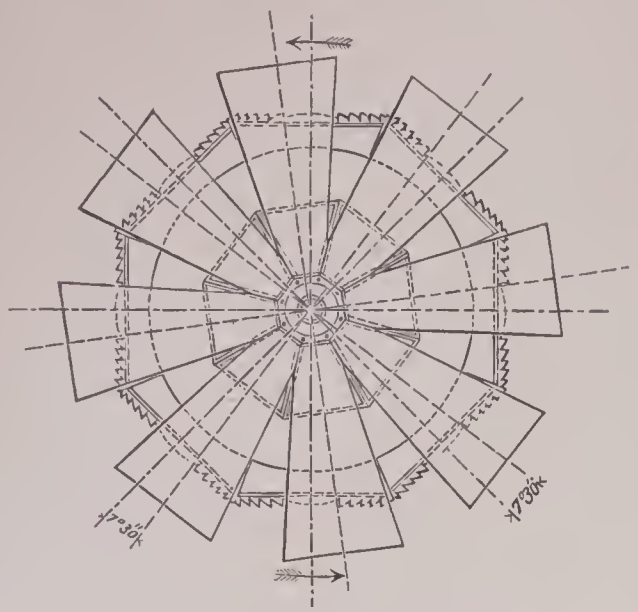


FIG. 10.—Plan of the Fresnel apparatus designed for the Cordouan.

eight small lenses above to catch the overhead rays and send them in parallel lines to the mirrors above, and eight series of small mirrors below to catch and send to the horizon the rays which would be lost below the central belt. Such an apparatus required a powerful lamp, and Fresnel was led to the construction of one with four concentric wicks, and to devising mechanical means to keep the wicks saturated with oil.

The lenses used for ordinary optical purposes have a focal length which is great when compared with their other dimensions. The lenses used for lighthouses are very different; their focal length is small. If in Fig. 11 the central lens A*l* B*m* be taken it will be seen that its height A B is small compared with its focal length F*l*. If a lens be taken like H*h i*I, its height is great in comparison with the focal length. With the increased height comes increase of thickness. With increase of thickness come loss of light, while

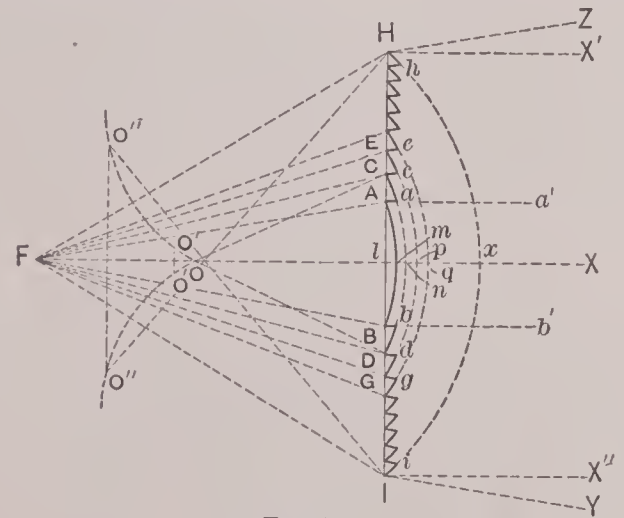


FIG. 11.

the ray traverses the glass, and increase of weight. With the lens of large dimensions the phenomenon of spherical aberration becomes more marked. The rays F H and F I, instead of taking the directions H X′ and I X″ parallel to F X, would take the directions H Z and I Y after passing through the lens. As the great thickness *lx* is only hurtful, it should be reduced to just what is necessary for proper strength and stiffness. The height A B of the central lens is such that no spherical aberration shall be evident; in other words, that the rays F A, F B shall take the directions A*a*′ B*b*′ parallel to F X after leaving the lens. If the next series of rays—those included in the angles A F C and B F D—be considered, they will be found to diverge a little from parallelism with F X. To correct this the shape of the next adjacent part of the apparatus is somewhat changed, and the face C*a* of the small triangle C*a* A is made with a curve, of which the center is at O′ below the axis of the apparatus. In like manner the center of the face D*b* of the triangle D*b* B is at O′ above the axis. Successive triangles are added. The outside face of each is constructed with a different radius, the centers of the arcs being on the line O O′ O″. The height of the dioptric belt is given by the condition of having the angle H F*l* one of 38°. This lens could be extended theoretically to an indefinite extent on each side of the axis, but as the distance therefrom is increased the rays from the source of light strike the inner face of the lens under a constantly decreasing angle, so that most of the light is reflected from the lens instead of passing through it. Hence after reaching a certain limit some other way of sending the rays to the horizon must be used. The catadioptric rings give the means of doing this. These rings are triangular in shape, as shown in Fig. 8. A luminous ray starting from the focus F strikes the surface C A of the ring at L; it is refracted along L M, and strikes the upper face at M, whence it is reflected away at an angle 80° to 84° along M N without experiencing appreciable loss; it goes out by the face A B in a horizontal direction if the cross-section be made with this in view. All the rays included in the triangle A F C act in the same way. If the dioptric belt end at A, A B C would be the first catadioptric ring. The next ring would be so placed as to catch the next ray above F C, and to send it out horizontally just above B. The proper position for A′ is therefore at the intersection of F C prolonged, and of a horizontal line through B. In like manner a third ring would have its summit at A″, and so on. A similar series of catadioptric rings is placed below the dioptric belt. In small apparatus the lower prisms are located in the same way as are the upper. In large apparatus they are placed vertically one below another. This arrangement must be made so that the keeper can enter the apparatus in order to clean it. All parts of the small apparatus can be cleaned from the outside.

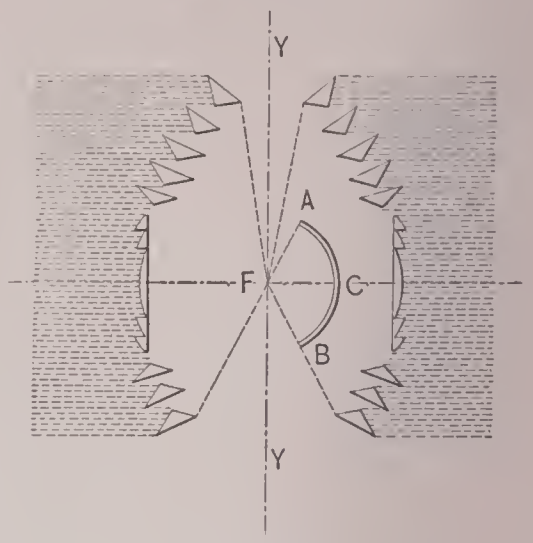


FIG. 12.

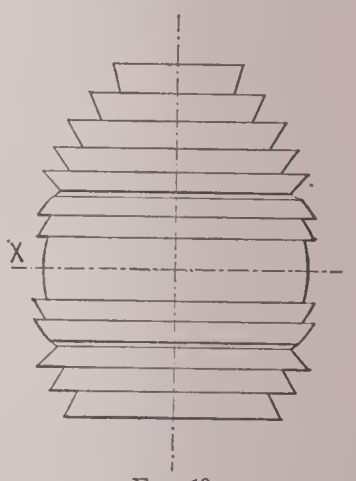


FIG. 13.

If all the dioptric and catadioptric sections mentioned above be assembled there will result a figure similar to Fig. 12, which is a section of a fourth-order apparatus. The rays of light after passing through the lenses and prisms follow the directions of the horizontal lines. If this section be revolved about the line F Y it would give a figure shown in elevation in Fig. 13. If revolved about F X the elevation would be as in Fig. 14. In the former case there would be a broad band of light distributed equally over the horizon; in the latter case there would be one large beam going out on each side. These two dis-

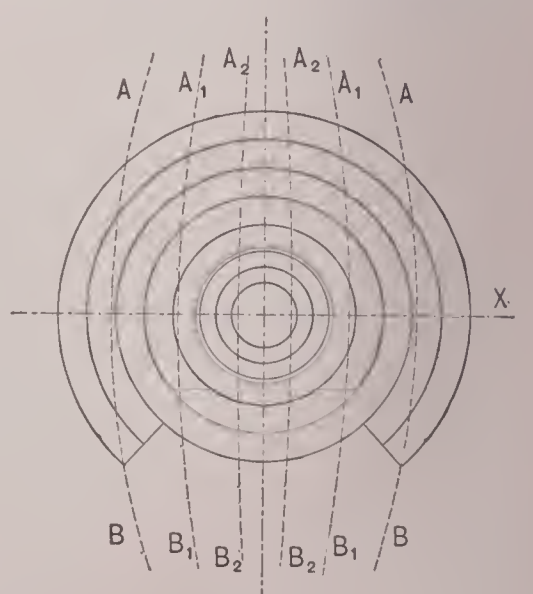


FIG. 14.

tributions of light are shown in Figs. 15 and 16. If a reflector, as A B C, Fig. 12, be placed so as to cut off and send back the rays going to the right, the apparatus standing still, the light would be called a range-light. If this apparatus with a reflector and one beam, or the one with a beam on each side, be made to revolve about a vertical axis, so that the beam or beams of light should fall successively on each point of the horizon, the light is called a flashing light. If the light be distributed steadily and constantly over the entire horizon the light is called a fixed light.

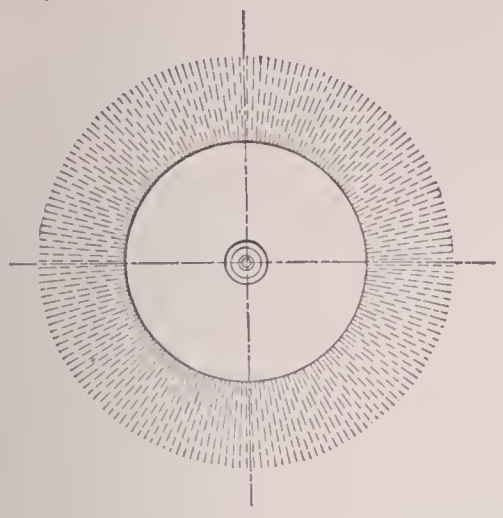


Fig. 15.

In the case of the flashing light it may be desirable to have the flashes succeed each other more rapidly than those given by the two beams. In such cases a part of the lens is taken. For example, if there are to be four beams of light, the part of the elevation, Fig. 14, included between the lines A B, A B only would be considered; if eight beams be desired, the part between A_1 B_1, A_1 B_1 would be used; if sixteen beams, the part between A_2 B_2, A_2 B_2.

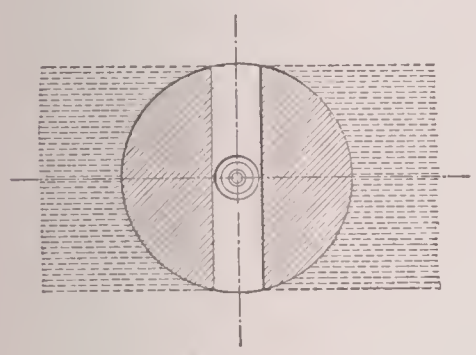


Fig. 16.

Each of these parts is called a panel. It is easily seen that with every increase in the number of beams the intensity of each is reduced. Each of the four beams has one-half the intensity of either of the two beams and double that of either of the eight beams.

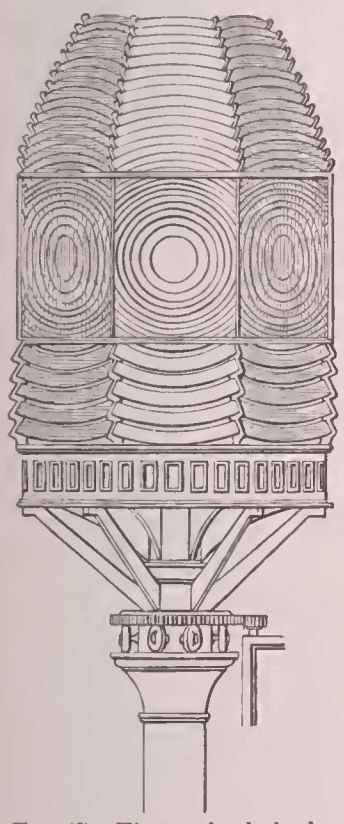


Fig. 17.—First-order holophotal catadioptric apparatus.

In order to turn the apparatus around it is mounted on a frame, called a chariot, which rests on rollers. (See Fig. 17.) This is driven by a clockwork. In small apparatus the chariot and rollers are replaced by a pivot. The friction is great in either case, and the motion is slow. One revolution in four minutes is about the fastest for a first-order light. If the interval between the flashes is to be short a number of panels has to be used; for example, to have a flash once in 15 seconds 16 panels are required if a revolution in 4 minutes be the rate of speed. Such flashes have long been recognized as lacking strength; but to increase the strength the number of panels has to be reduced, hence the speed of rotation has to be increased. New means of support are required for this. The solution of the problem has been found in the mercury float.

The frame supporting the apparatus rests on a vertical shaft firmly held at two points. Attached to the shaft is a collar which rests on and is securely fastened to a circular float, which is borne by quicksilver confined in a circular trough which surrounds the shaft. Fig. 18 shows this arrangement. L is the apparatus mounted on a plate, P, which is supported by the shaft S. The shaft is held securely in a vertical position by the sleeves C and D. The float F is fastened securely to the shaft by the collar K. It is set inside of the trough T, in which is placed sufficient quicksilver to support the whole apparatus. M is the clockwork which causes the plate P to revolve and carry with it everything attached to the shaft.

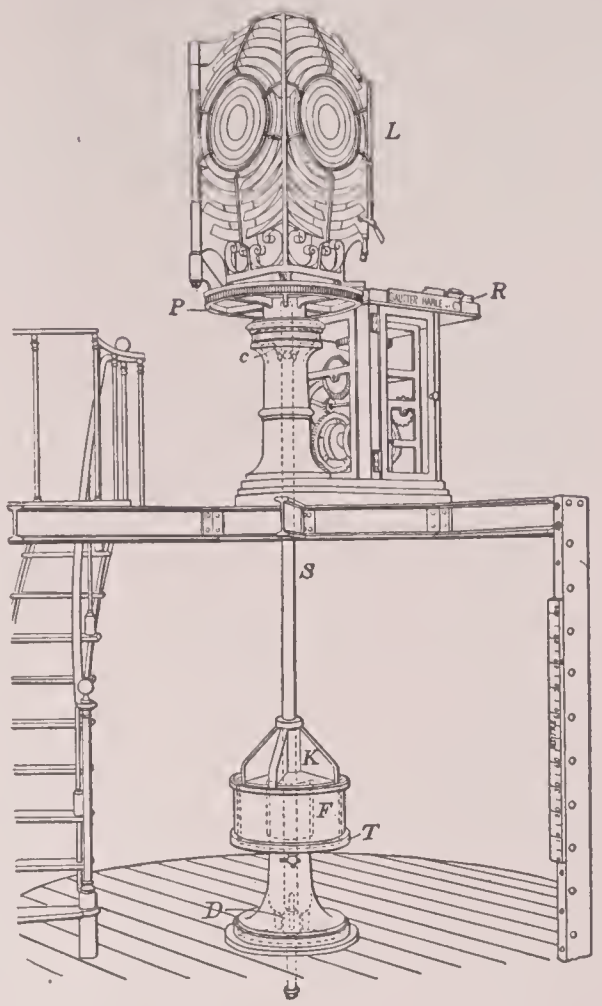


Fig. 18.—Apparatus with four lenses for lightning-light illumination.

Lighthouse apparatus is divided into several orders, depending on the focal length in each case. The orders are 1st, 2d, 3d, 3½, 4th, 5th, and 6th. Their use is governed by the importance of the site occupied by the lighthouse. The first-order lens is the largest. A light of this order is placed on very important points of the coast, such as a marked headland, the entrance to an important harbor, to mark some special obstacle, etc. The second and third order lenses are placed at less important points. The third-and-a-half and lower orders are rarely used as coast lights. They come under the general head of interior or harbor lights. The focal length of each size of lens is: Of the first order, 36·25 inches; of the second, 27·58 inches; of the third, 19·70 inches; of the third-and-a-half, 13·78 inches; of the fourth, 9·35 inches; of the fifth, 7·39 inches; of the sixth, 5·91 inches. Before the principles of illumination became so well understood as they are now increased brilliancy was sought by means of larger lamps. Larger lamps caused too great a divergence of the rays when used with the ordinary lenses, hence a large lens of 52·40 inches focal length was devised. It is called a hyper-radiant lens. Prof. Wigham, of Dublin, after increasing the size of his gas-burner (which is mentioned later), caused to be constructed what he calls a "giant" lens of 78·72 inches focal length. He uses only the dioptric belt of this lens, however, and therefore he wastes one-third of the light furnished by his burner. These immense affairs are very expensive. The new method of flotation on mercury, giving great speed of rotation, the exact suiting of the lamp to the lens, and the greater spread given to the latter, are gradually causing the old apparatus to disappear.

Until about a hundred years ago fires burning at the tops of lighthouses were the accepted guides for night. With the changes recommended by Teulère came the use of oil as an illuminant. The first oil burned in the U. S. was fish oil. This was succeeded by sperm oil in 1812. Sperm oil was the standard illuminant when the lighthouse board was organized in 1852. Its constantly increasing price caused the board to investigate the question of replacing it with some other. Careful analyses were made of sperm, whale, shark, fish, seal, colza, olive, lard, and mineral oils. Tests

of all sorts were applied to prove their adaptability to the use of the lighthouse service. The results of these analyses and tests showed that colza oil was undoubtedly the best. It was adopted in 1862 to a great extent, as much as 12,000 gal. having been bought in that year. Experiments were carried on with lard oil, and it was soon found that it was superior to the colza in some respects, while in price it was cheaper. Lard oil was then the standard illuminant until 1878–79. Since that time it has been displaced gradually by mineral oil, which is now universally adopted for all the lights of the U. S. In addition to the great brilliancy of its flame, the low price of this oil makes it an exceedingly economical illuminant. The consumption of this oil increased from 48,000 gal. in 1880 to 350,000 gal. in 1894.

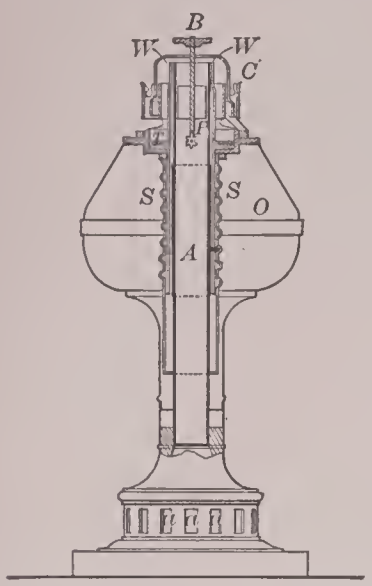


Fig. 19.—Funck-Heap fourth-order mineral oil-lamp, vertical section.

The lamps used in the lighthouse establishment of the U. S. are very simple. In the 4th, 5th, and 6th order lamps but one wick is used. This style of lamp is shown in Fig. 19. In this figure O is the oil-reservoir. The wick occupies the space W W. The lower end of the wick is attached to a brass tube, which carries a stud working in a spiral channel, S S. The pinion P moves the wheel T, and causes the tube to turn. The spiral channel causes the tube to move up or down. The flame is made to spread by the button B. Air for the inside of the flame enters through the openings *a a a* in the base of the lamp, and rises through the tube A. C is the chimney support.

Gas is used to only a limited extent in the U. S. It has practically no advantages over oil. If the place where it is used be not near a city or town whence the gas can be supplied, the construction of a special plant for making it would be so expensive as to put its price at a prohibitory figure. It is used, however, in a state of compression at some points—e. g. on Dry Romer Shoal, at the entrance to New York harbor, and at the Christiana beacon, mouth of Christiana creek, Del. At these places the gas-supply is compressed into tanks, which are securely fastened to the beacon. The illuminant is fed gradually to the burner by means of a special device.

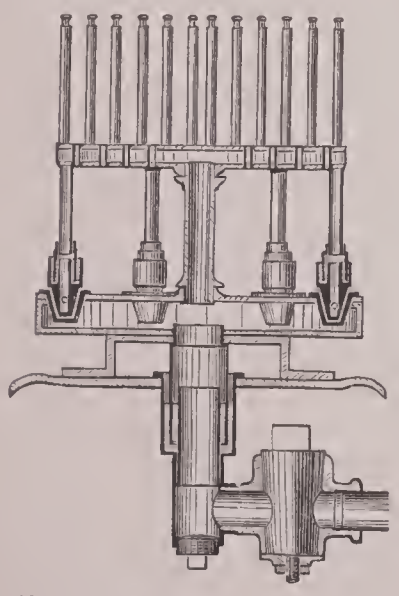


Fig. 20.—Wigham's gas-burner.

Prof. J. R. Wigham, the adviser of the Irish Lights Commission, has constructed a special burner, Fig. 20, composed of five series of jets arranged in five concentric circles, of which the innermost contains 28 jets. Each circle outside contains 20 additional jets, so that the total number of jets in use may be 28, 48, 68, 88, or 108, according to the number of series used. The diameter of the rings varies from 4 to 11¼ inches. The candle-power according to the jets in use is 250, 680, 990, 1,400, and 2,300. The jets are provided each with a fish-tail burner. The flame is 14 inches in diameter and 6 inches high. There is no glass chimney. The heat from the burner is so intense that the lenses and prisms of the apparatus are sometimes cracked. In order to increase the power of his light Mr. Wigham has proposed to superpose the dioptric portions of several flash panels in two, three, or four tiers, with a separate burner in each. These he calls his bi-form, tri-form, or quadri-form light, according to the number of tiers. Fig. 21 shows a vertical section of a tri-form apparatus.

Compressed gas is coming into extensive use in France for use in buoys. There are nearly a hundred of these lighted buoys on the French coasts. The French lighthouse board has recommended the replacing of six lightships by a large number of these buoys. The recommendation has been approved, and the replacement is now in course of execution. There are but few of these buoys in the U. S. They are run down so constantly through the carelessness of masters and pilots of vessels as to make their maintenance exceedingly expensive.

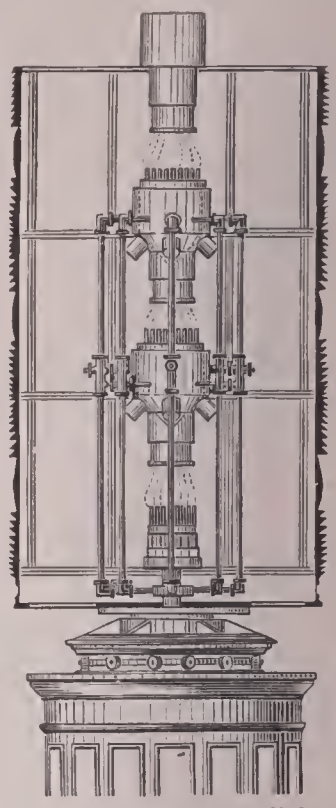


Fig. 21.—Tri-form gas-light apparatus.

The application of electricity to the lighting of lighthouses has received an immense development in recent years. The first attempt was made in France in 1863 at the La Hève light-station. Since then this kind of light has come more and more into use. It is extensively used in France and England. Even Italy and Spain have introduced it. Fig. 22 shows the essential arrangement of this kind of light, which is simply an arc light placed inside of a lens.

The whole theory of lighting a coast has changed greatly since 1889. Up to that time the changes made were very gradual. After the invention of the catadioptric apparatus by Augustin Fresnel, who died before he could see the full fruit of his labors, his work was carried on by his brother, Léonor Fresnel, who succeeded him in the French lighthouse establishment. The first lights made were fixed lights—i. e. lights which shine with a fixed intensity and illuminate equally all parts of the horizon. As it was manifestly impossible to tell one fixed light from another, duplicate and even triplicate lights were used to indicate certain places more clearly. Examples of this system are seen in the double first-order lights of Thatcher's island, Mass., and of the Navesink Highlands, N. J., and in the treble fourth-order lights of Nauset Beach, on the eastern side of the peninsula of Cape Cod, Mass. This method of distinguishing places was expensive, inasmuch as it required the duplication of everything, towers, lanterns, lenses, lamps, etc. It also requires double supplies of oil, wicks, chimneys, and other furnishings. With the introduction of flashing lights it was possible to do away with the cumbersome system of double and treble towers. By varying the number of panels in a flashing apparatus, or by changing the speed of revolution, it was possible to vary the rapidity with which the flashes were seen. The enormous friction developed by the great weight of the apparatus prevented a rapid motion of rotation, and this varied between 4 and 8 minutes to a revolution. This required a large number of flash panels if the flashes were to succeed each other rapidly. At Barnegat, N. J., for example, the lens revolves once in 4 minutes; as there are 24 panels the flashes follow each other at intervals of 10 seconds.

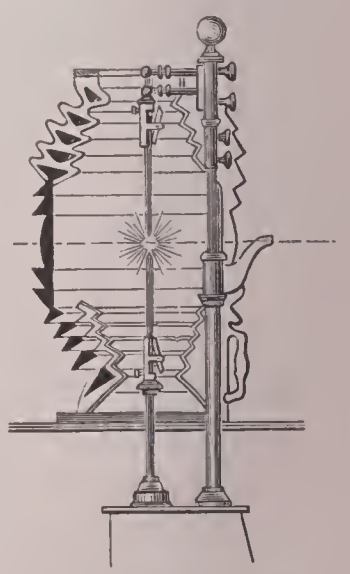


Fig. 22.—Electric-light apparatus.

Léonor Fresnel considered that the flashes should be about eight seconds in length from the time they began to show until they disappeared. A wide dispersion had to be given to the beam in order to make it last so long. Its power was therefore dissipated over a wide space. This dissipation, added to the small amount of light used by a narrow panel, caused the flash to be weak.

Studies made by Dr. Charpentier, of Nancy, in France, on the duration of impressions on the retina show that after the maximum impression is produced it is a waste of energy to hold that impression on the retina. Experiments in the laboratory and in the field show that as a rule so short a

space as 0·003 second is sufficient to produce a distinct impression on an acute eye, and that one-ninth or one-tenth of a second is sufficient for the average eye. The experiments have also shown that the more powerful the light the shorter the time required to produce the impression. As a lighthouse must be used as a point on which to take bearings, it is essential that the light shall be of such a nature that the bearings can be taken. A French nautical commission gave great attention to this subject during a period of many months. One result of their work was that it was perfectly practicable to take bearings with flashes of one-tenth of a second, provided that the interval between them was not more than five seconds.

These considerations of sharp, quick flashes coming at short intervals led to the devising of the lightning lights (*feux éclairs*) by M. Bourdelles, the present director of the French lighthouse service. The characteristics of these lights are an exceedingly small divergence of the beam, a wide opening of the panel, a swift revolution rendered possible by the mercury float, and a careful adjusting of the diameter of the burner to the focal length of the lens. These lights are the most scientific and carefully wrought out apparatus yet introduced into the lighthouse service. As yet they are little known outside of France, a country which has always been in the van of lighthouse improvement.

The lightning lights are made in many different forms. In some cases there is but one large lens with an opening of 180°. A reflector placed on the side of the focus opposite the lens prevents any waste of light. In this case the apparatus is said to be univalve. There may be a lens of 180° opening on each side of the focus, in which case the apparatus is bivalve. Three and four panels are sometimes used, as in the case of the new light at La Hève (Fig. 18), where there are four. The source of light may be either a lamp or an electric light. The flash of the La Hève apparatus, which is lighted by electricity, is of 23,000,000 candle-power. This power is obtained by a current of 45 volts and 100 ampères.

The subject of lighting the apparatus has also received great attention. The earlier idea was to obtain a great quantity of light. Large lamps were brought into use. The number of wicks was increased in some cases to ten and even twelve. Two objections to these lamps were found to exist. First, the great diameter of the burners placed so much of the flame outside of the focus that much of the light was useless. Second, the comparative lack of transparency of the flame of each wick caused the light of the inside wicks to be almost wholly lost. These large burners were fully tested in England and Scotland, and were finally abandoned in favor of the more compact flame of the five-wick burner. The same objection of size exists to the gas-burner of Mr. Wigham. The diameter (14 inches) of its flame is far too great for any ordinary apparatus. An enormous lens of 2 meters focal length (6·56 feet) has been constructed for use with this burner. Apparatus of such dimensions is exceedingly expensive and unwieldy.

In addition to these objections to the use of large burners, research has shown that the illuminating quality of a flame depends not on the total quantity of light given off, but on the intrinsic brilliancy; that is, on the brilliancy per square unit of surface. This has been shown in several ways. When tested in a heavy fog it was found that the great Wigham burner of 2,500 candle-power became visible at a distance of 80 feet, while a single jet of the burner was visible at 70 feet distance. Furthermore, when the gas-burner and a 100-candle-power electric incandescent lamp were tested in the same lens it was found that the resulting flash from the incandescent lamp was more than half as powerful as that from the gas-burner, and when a 50-candle-power incandescent lamp was used its flash had more than one-third the strength of the gas-flash. This arises from the fact that the incandescent lamp could be placed more nearly at the focus of the apparatus than could the gas-burner; the flash it threw was therefore more compact from having less divergence.

The electric arc-light has the double advantage of great brilliancy and concentration in small space. Its intrinsic brilliancy is great, and it is an exceedingly effective illuminant for lighthouses. A common objection has been raised against it on the ground that it is not able to penetrate fog so well as the light from an oil-lamp. The theory advanced is that the electric light possesses more blue rays than the oil light, and that these rays are more readily absorbed by fog than the red rays. Those making such an objection lose sight of three points: (1) The yellow ray enters into white light to the extent of 75 per cent., and is the predominant color, while red scarcely furnishes 11 per cent. (2) That light is merely a manifestation of energy, and in the gradual development of this energy the red light appears first, and when the development is greatest the blue comes in; but the blue does not destroy the red rays. They remain and produce their effect in the general whole. (3) The very great initial power of the electric light will admit of much loss and still leave the remaining power far greater than that of either an oil or a gas light. For example: A four-lens lightning light of 9·39 inches focal length gives a flash from an oil light of about 5,000 candle-power; the same lens with an electric light of 45 volts and 25 ampères would give a flash of 12,000,000 candle-power. Again, when the question of the diminution of light by atmospheric absorption is considered it is found that under all circumstances the electric light carries farther than any other. It is the illuminant recommended by the greatest lighthouse authorities for use at all important points. It has not yet been adopted in the U. S., except at the beacon at Sandy Hook and for the lighted buoys at the entrance to New York harbor.

At present (1894) oil is used almost exclusively in the U. S. for lighthouses. The following table gives data as to apparatus, oil-supply, etc.:

TABLE GIVING CANDLE-POWER OF EACH OF THE LAMPS USED IN THE LIGHTHOUSE SERVICE AND APPROXIMATELY ITS INTENSITY WHEN USED IN ITS APPROPRIATE LENS APPARATUS.

ILLUMINATING APPARATUS. Order.	NAME OF LAMP.	Candle-power of lamp.	Candle-power of fixed light.	Candle-power of flashing light.	No. of wicks.	SIZE OF WICKS IN INCHES. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	EXPENDITURE OF OIL PER QUARTER. 1st Qr.	2d Qr.	3d Qr.	4th Qr.	CONSUMPTION OF OIL. Per hour.	Per annum.
															Gills.	Gal.
1st	Funck's float lamp	500	8,780	63,830	5	1″	$1\frac{3}{16}$″	$2\frac{5}{16}$″	$3\frac{7}{16}$″	$4\frac{5}{16}$″	596	443	475	642	16·0	2,156
2d	" " "	163	4,790	33,350	3	1″	$1\frac{3}{16}$″	$2\frac{5}{16}$″	....	....	182	135	145	195	4·80	657
3d	" " "	163	2,240	19,040	3	1″	$1\frac{3}{16}$″	$2\frac{5}{16}$″	....	....	182	135	145	195	4·80	657
$3\frac{1}{2}$	" " "	78	1,620	11,720	2	1″	$1\frac{3}{16}$″	....	....	....	75	54	60	81	2·0	270
4th	Funck-Heap lamp	52	598	2,842	1	$1\frac{1}{2}$″	....	....	....	....	$55\frac{1}{2}$	$41\frac{1}{2}$	$44\frac{1}{2}$	$60\frac{1}{2}$	$1\frac{1}{2}$	202
5th	Funck's tubular lamp.	38	298	1,200	1	$1\frac{3}{16}$″	....	....	....	....	37	28	30	40	1·0	135
Lens lantern	" " "	32	203	.....	1	$1\frac{3}{16}$″	....	....	....	....	26	20	$21\frac{1}{2}$	$27\frac{1}{2}$	0·70	95
No. 1 range lens	" " "	38	3,915	.....	1	$1\frac{3}{16}$″	....	....	....	....	37	28	30	40	1·0	135
Locomotive headlight lantern	Funck-Heap lamp	52	3,092	.....	1	$1\frac{1}{2}$″	....	....	....	....	$55\frac{1}{2}$	$41\frac{1}{2}$	$44\frac{1}{2}$	$60\frac{1}{2}$	$1\frac{1}{2}$	202
Tubular lantern	....	....	12	.....	1	$\frac{7}{8}$″	....	....	....	....	$10\frac{1}{2}$	$8\frac{1}{2}$	$9\frac{1}{2}$	$11\frac{1}{2}$	0·30	40
Light-vessel lantern / Lamp with reflectors	Funck's tubular lamp.	38	1,275	.....	1	$1\frac{3}{16}$″	....	....	....	....	37	28	30	40	1·0	135
Old light-vessel lamp with reflector	.....	18	760	.....	1	$1\frac{1}{8}$″	....	....	....	....	19	13	16	20	0·50	68

Light-vessels.—There are many places where lights are needed, but where the construction of a lighthouse would be impracticable or impossible. Such points are banks lying far out at sea or places near the entrance to a harbor whence vessels can take a good departure to make the mouth of the channel leading in. At such places the lights are shown from vessels of a certain class called light-vessels or light-ships. As the first condition of a light is that it shall remain constantly in one position, it follows that a light-ship must remain always at one spot; hence it must be anchored. Lying constantly at its moorings and exposed to the most severe gales, the hull of the vessel must be of the strongest possible build. As lights must have a certain elevation above the sea, there must be masts on which to carry them; and to distinguish the vessels at a distance by day they carry on the masts certain marks in the shape of disks, cages, or other easily recognized forms.

The hull of a light-vessel is arranged with quarters for the officers and crew and with storerooms of various sorts. There must always be carried spare lamps, chimneys, wicks, etc., and all the provisions required for the people on board. The crew of such a vessel includes generally a keeper, an assistant keeper, six or eight seamen, and a cook.

The illuminating apparatus is composed of a series of lamps with parabolic reflectors encircling the mast, and so arranged as to throw their light all over the horizon. To obtain a flashing light on a light-ship has always been a difficult problem, but the introduction of the electric light has given a simple solution. The only electrically lighted light-vessel in the world is the one off Cornfield Point, near the eastern entrance to Long Island Sound. On this vessel the ordinary apparatus has been replaced by four-lens lanterns on each mast. The lanterns are hung on gimbals, and each contains an incandescent lamp of 100 candle-power. The lantern increases the power of the light by ten, consequently the light from each of the four is about 1,000 candle-power, or 4,000 for the whole number. A duplicate electric plant on the vessel furnishes the current for the lamps. An ingeniously arranged four-armed cam makes and breaks the current alternately, and thus lights and puts out the lamps.

Light-vessels are expected to remain at their stations until they go down or are torn away from their moorings. In order that the mooring-chain can not be detached from the vessel by intention, its end is securely bolted to the keelson and no tools whereby it can be cut are allowed on board. If the vessels break adrift their only motive-power, as a rule, is their sails. The new vessels lately built in the U. S. have been provided with steam-propellers which can move them through the water at a speed of about 8 knots an hour.

Whenever it is possible to do it these vessels are provided with a sound-signal. In the U. S. the signal is generally a powerful steam-whistle; in France it is a siren. Every vessel carries a loud-toned bell to be rung by hand in case of accident to the more powerful signal.

Fog-signals.—Lights lose much of their efficiency in heavy weather. In a dense fog they may be so completely obscured as to become invisible at less than a quarter of a mile away from the observer. Signals which appeal to the ear are used under these circumstances. These signals are sirens or trumpets driven by compressed air, whistles blown by steam or compressed air, or bells. Signals have their special characteristics in their peculiar sounds: the length of the blast of the siren, trumpet, or whistle, and the length of the interval between the sounds. The siren is the most powerful and the bell the least powerful of all these instruments. The trumpet, for the same sonorous intensity, requires the development of less energy, but there is a pressure and consumption of air and an intensity which can not be exceeded. In other words, the trumpet, being a reed instrument of enormous size, should not be foreed. The reed is a steel plate from 8 to 12 inches long, 2 to 3 inches wide, and $\frac{1}{4}$ to $\frac{3}{8}$ inch thick. On the other hand, the air pressure and consumption of the sirens may be varied at will. In them the sonorous intensity can be increased and with it the range. Bells are useful only for short distances. Guns, rockets, and explosives of various sorts are not used in the U. S.

Buoys.—Buoys are small floating aids to navigation which mark the sides and turning-places of channels. They guide by sight and by sound. All buoys are sight-buoys. They direct by their shape and color. Those which appeal exclusively to the sight are the "can," or cylindrical, the "nun," or conical, the "spar," shaped like a ship's spar, and buoys lighted by gas or electricity. The U. S. alone has electrically lighted buoys. The electric buoy is a "spar" having a 100-candle-power incandescent light at its upper end. The current is supplied from a shore station. Buoys which appeal to sound as well as sight are the "bell" and "whistling" buoys. The former carries a bell at the top of an iron frame. As the sea tumbles the buoy about, a ball, carried on a plate or in a trough, strikes the side of the bell. The more violent the motion of the sea the louder the sound. The whistling-buoy has a pear-shaped body which floats on the large end; on top is an ordinary whistle; to the bottom is attached a long tube. Waves on the ocean are only superficial. At a depth of 30 or 35 feet the water is almost always still. This water is a fixed piston on which the tube of the buoy works up and down. As the buoy is raised by the waves a vacuum is formed by pulling away from the piston. Air rushes in through properly constructed valves. When the buoy descends the air drawn in is compressed by the water-piston and forced out through the whistle. This makes the whistle sound.

The following table shows the aids to navigation maintained by the U. S. lighthouse bureau on June 30, 1893:

AIDS TO NAVIGATION MAINTAINED BY THE LIGHTHOUSE BOARD, JUNE 30, 1893.

AIDS.	Atlantic coast.	Pacific coast.	Lake coast.	Western rivers.	Total entire coast, 1892.	Total entire coast, 1893.	Increase or decrease.
Electric lights	2	....	2	.....	4	4	....
First-order lights	40	16	....	.....	55	56	1
Second-order lights	16	1	3	.....	20	20	....
Third-order lights	27	4	21	.....	52	52	....
Three and-a-half order lights.	3	....	7	.....	11	10	−1
Fourth-order lights	158	17	90	.....	261	265	4
Fifth-order lights	107	7	34	.....	151	148	−3
Sixth-order lights	53	....	63	.....	118	116	−2
Lens lanterns	58	10	56	.....	88	124	36
Range lenses	16	....	....	.....	16	16	....
Reflectors	37	....	8	.....	46	45	−1
Tubular lanterns	289	81	86	1,389	1,761	1,845	84
Light-vessels in position	28	1	4	.....	32	33	1
Electric buoys	7	....	13	.....	7	20	13
Gas buoys	2	....	....	.....	2	2	....
Total lighted aids	843	137	387	1,389	2,624	2,756	132
Fog-signals operated by steam or hot air	50	23	41	.....	107	114	7
Fog-signals operated by clock-work	162	10	17	.....	187	189	2
Day beacons	315	103	1	.....	420	419	−1
Whistling-buoys	44	20	....	.....	62	64	2
Bell-buoys	79	9	2	.....	89	90	1
Other buoys	3,626	309	380	.....	4,286	4,315	29
Total unlighted aids	4,276	474	441	.....	5,151	5,191	40
Total number of aids	5,119	611	828	1,389	7,775	7,947	172

F. A. MAHAN.

Lightning (atmospheric electricity) [deriv. of *lighten*, flash, deriv. of *light*]: the disruptive discharge occurring between clouds and the surface of the earth, or between two clouds, whenever sufficient differences of electrical potential arise. The connection between lightning and the electrostatic sparks obtained by artificial means were suspected at a very early day, but no definite evidence of the identity of the two phenomena was obtained until about the middle of the eighteenth century, when Benjamin Franklin undertook experiments for the purpose of verifying his hypothesis concerning the nature of lightning. The first actual attempts to carry out Franklin's suggestion were made in France in 1752. During the spring of that year sparks were drawn from the collector of atmospherical electricity which had been erected at Marly, near Paris.*

FIG. 1.

This collector was an iron rod 40 feet long, mounted upon a stool with glass legs and carefully supported by means of silk cords. In the same year a still longer collecting-rod, consisting of an iron bar 99 feet high, was used in Paris under the direction of the naturalist Buffon, by means of which sparks were obtained. Both of these experiments were quickly followed by Franklin's famous experiment with the electrical kite. Owing to the slow rate of ocean communication in those days, Franklin had not learned of the success obtained with the collectors erected in France at the time when he made his experiment.

From the time of Franklin atmospheric electricity has been persistently studied by means of a great variety of apparatus. The most successful methods were those of de Saussure, who made use of a collector consisting of a conductor ending in a metallic point exposed at a considerable elevation above the surface of the ground. With this instrument it was found that there were at all times indications of electrification of the atmosphere. Volta modified de Saussure's apparatus by attaching to the point a slow-burning match, as shown

* See *Report of Studies of Atmospheric Electricity*; Mendenhall, *Transactions of National Academy of Sciences*, vol. v. (1889).

in Fig. 1. The indicator used with these collectors was simply an ELECTROSCOPE (*q. v.*), of the type devised by Peltier. Improvements upon de Saussure's method were made by Dellmann, Lamont, and others; but all modern study of atmospheric electricity depends upon the much more refined method devised by Lord Kelvin (Sir William Thomson), whose apparatus has been used at the Kew Observatory since 1861. Kelvin's apparatus consists of a water-dropping collector (Fig. 2) and the Thomson quadrant electrometer. The former instrument consists of a metallic reservoir, carefully insulated from the earth, with a long nose or spout. The apparatus is so placed that the end of this spout extends into the open air, the electrification of which is to be investigated. The succession of drops issuing from the water-dropper serves to charge the reservoir. The electrometer, which is maintained in a constant condition of sensitiveness by means of a water-battery, or other convenient source of electromotive force, is used to measure the differences of potential between the collector and the earth, and affords an indication of the potential of the atmosphere.

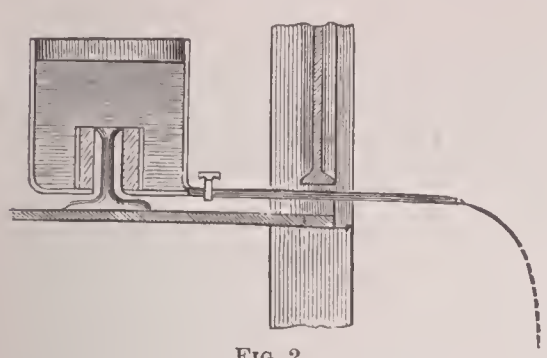


FIG. 2.

The Kew observations, together with those made at the meteorological observatory on Mt. Vesuvius, by Quetelet in Brussels, by Lamont in Munich, and by Dellmann, in Kreuznach, afford data concerning the electrical state of the atmosphere in various parts of Europe for a period of many years. In the U. S. Dr. Wislizenus began observations at St. Louis in 1861, and maintained a continuous record for eleven years. The work of these observers seemed to show a distinct connection between the electrical state of the atmosphere and the weather; but it was evident from the conflicting character of the data that the problem must be attacked in a more systematic manner. In 1884 the U. S. weather bureau, under the direction of Prof. T. C. Mendenhall, and with the co-operation of Johns Hopkins, Harvard, Yale, Cornell, and the Ohio State universities, undertook systematic observations of atmospheric electricity. It was the purpose of these researches to determine whether there was a sufficiently simple relation between the electrical condition of the atmosphere and the weather to make the indications of use in prognostication. The apparatus used in these experiments consisted of the water-dropper (Fig. 2), previously devised by Lord Kelvin, and of a modified form of the quadrant electrometer (Fig. 3). The large number of observations made at the stations just mentioned are recorded in Dr. Mendenhall's report, already cited. They establish many interesting facts, for the most part confirmatory of those already obtained at European stations. On account of the complexity of the phenomena observed, however, and the failure to discover an obvious and simple relation between the fluctuations in the electrical condition of the atmosphere and the weather, the Government abandoned the work. Of the results obtained by the study of atmospheric electricity, the following are perhaps the most important: (1) A collector of any form properly exposed will show marked electrification at all times. (2) The electrification is sometimes positive and sometimes negative. (3) Quiescence of electrical condition accompanies stability of weather. (4) Periods of storm are almost always accompanied by very marked fluctuations in the electrical potential in the atmosphere. (5) Nothing corresponding to the uniformity observed over wide ranges of territory in the records of fluctuations of the magnetic condition of the earth is met with in the comparison of the observations at the various stations for the study of atmospheric electricity.

That there is connection between weather disturbances and the electrical condition of the atmosphere seems to be well established, but it is unlikely that definite results will be attained until we have long-continued records from a large number of stations widely distributed over the world. Lightning is generally considered to be a phenomenon attending those fluctuations in the electrification of the atmos-

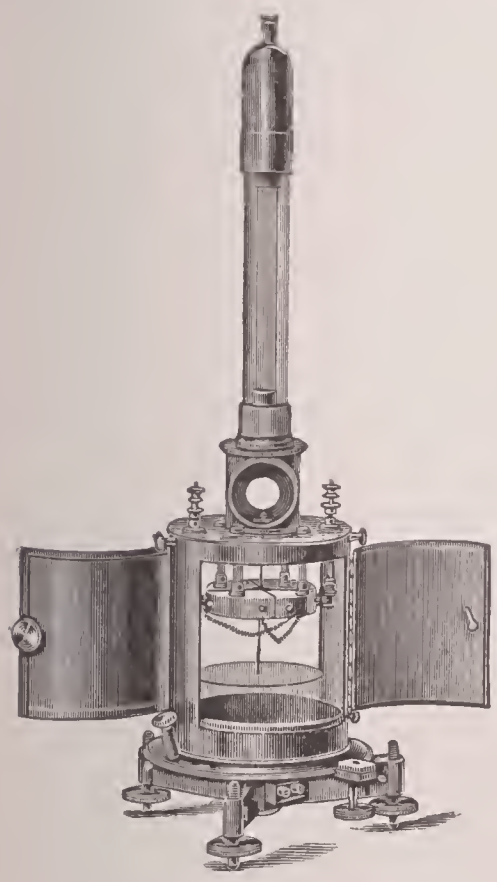
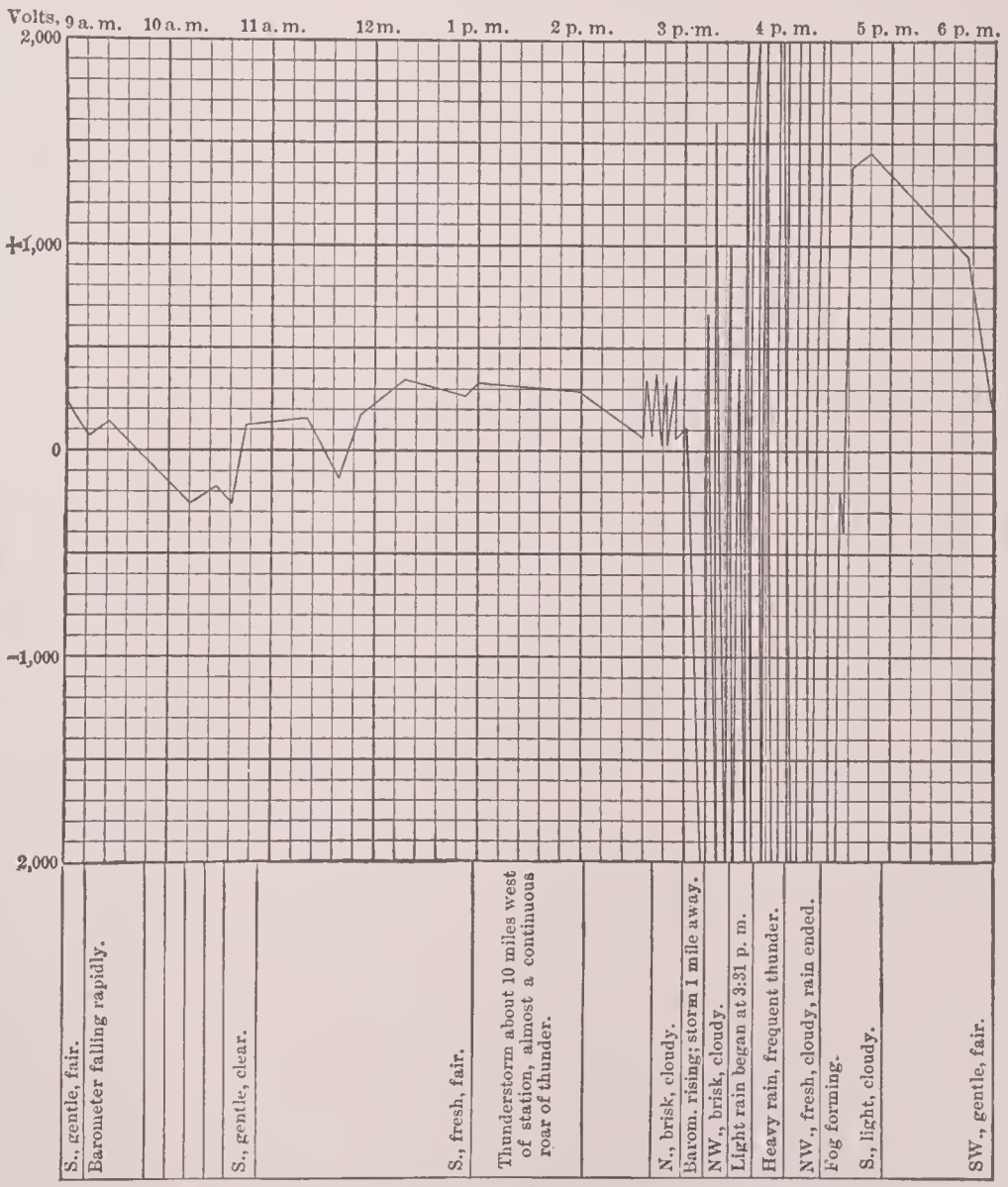


FIG. 3.—Form of electrometer used in the U. S. experiments on atmospheric electricity, 1884–88.



Curve showing variations of potential at Ithaca, N. Y., May 31, 1888, a day on which a thunder-storm occurred. Sparks passed from needle to quadrants almost continually from 3.15 to 4.30 p. m.

FIG. 4.

phere which are continually going on, a flash occurring whenever the differences of potential rise to values so great as to result in the breaking down of the dielectric intervening between a charged cloud and the surface of the ground, or between two differently charged clouds. That times when thunder-storms occur are times of great and sudden fluctuations in the atmospheric potential may be seen by inspection of the records of any electrical observing station. An example of the effect upon the electrometer of the passage of a thunder-storm is shown in Fig. 4.

The phenomenon is, in the nature of things, one with which it is extremely difficult to experiment, and, in spite of the very large amount of work which has been done, we are entirely ignorant of the method by which the enormous differences of potential necessary to the development of the lightning flash are produced. Many ingenious hypotheses have been put forth, and in some instances interesting attempts have been made to establish these by means of experimental devices for the imitation on a small scale of the phenomena of the thunder-storm. For a noteworthy example of this kind of research, the reader is referred to Gaston Planté's volume entitled *Phénomènes Électriques de l'Atmosphère* (Paris, 1888). Even in the hands of the most skillful experimental electricians, however, such attempts must remain in great measure futile.

Electrical sparks artificially produced rarely reach lengths greater than a meter, and our power of measuring differences of potential ceases with differences much smaller than those necessary to produce a discharge even through a meter of air. Under such conditions attempts to establish the potential differences between a cloud and the earth, where the thickness of the dielectric frequently exceeds a mile, must be regarded as altogether vague and indefinite. Even within the range of sparking distance obtainable experimentally, however, it has been shown that the potential differenee does not increase in proportion to the length of the spark. A curve plotted to express the relation between difference of potential and the distance in air over which disruptive discharge will occur seems to show a tendency toward a maximum value. It may be then that the potential difference necessary to break down a layer of the atmosphere a mile in thickness may not greatly exceed that which is necessary to produce a spark when the conductors between which the discharge takes place are near one another. Fig. 5 shows a curve of the kind just indicated. It is from measurements made by Steinmetz.* The sparking distances to which it refers are so short, as compared with those with which we have to deal in the case of lightning, that it would be absurd to draw any inference from them further than to say that the enormous values frequently assigned to the difference of potential between cloud and earth — values which are based upon the assumption of law of direct proportionality — are probably much too large. An example of such an estimate is given in a foot-note to page 9 of Lodge's book on lightning-conductors, in which he says: "The difference of potential for a spark a mile long between flat plates is, roughly, 16,000,000 electrostatic units, each one of which is equal to 300 volts; that is, nearly 5,000,000,000 volts."

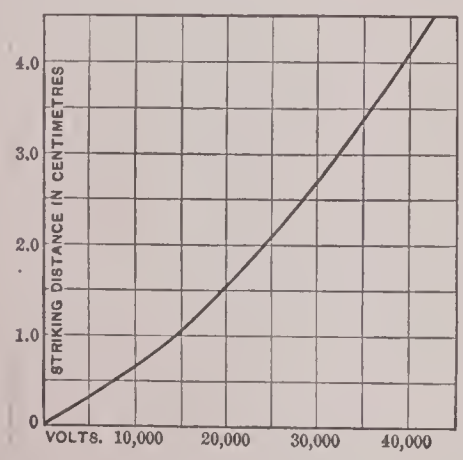


Fig. 5.

In certain other respects we are in a position to make more accurate estimates concerning lightning. The electrical strength of air considered as a dielectric is a well-established constant. From it we can compute in units of work the amount of energy necessary to strain the air lying between cloud and earth to the point of discharge. This is the energy released when the lightning flash occurs. Lodge makes such a computation in his book already cited. Translated into metric units his result is as follows:

For each cubic kilometer of air strained to the verge of electrical collapse, the storage of energy amounts roughly to 5,000,000,000 kilogrammeters. It would take a steam-engine

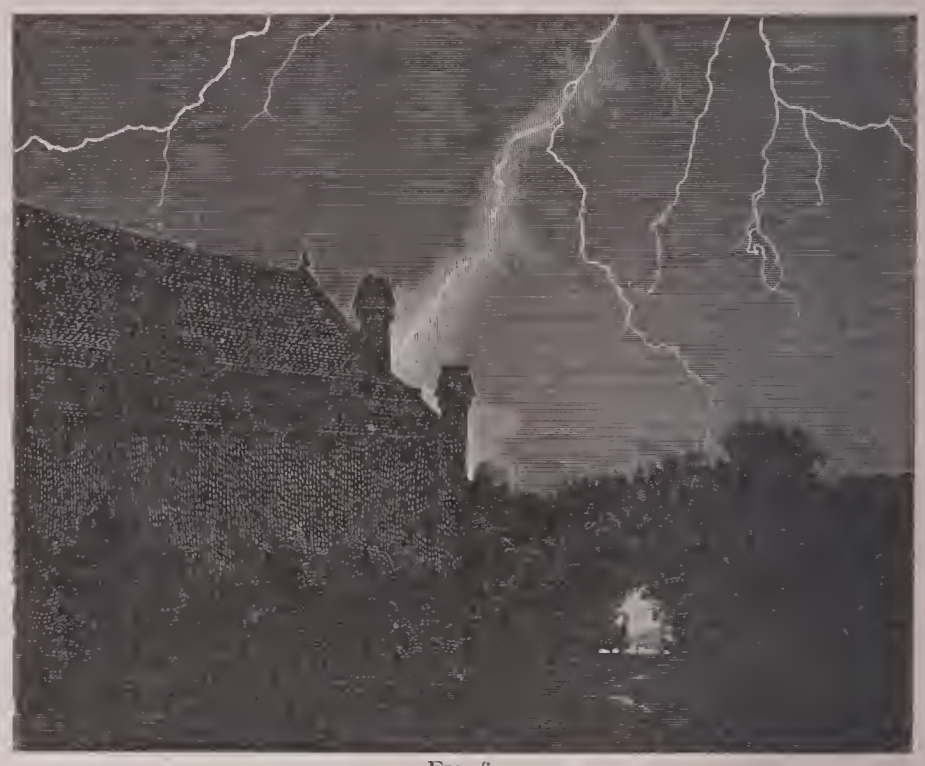


Fig. 6.

of 100 horse-power nearly twenty-four hours to develop this amount of energy. When we consider that all of it is liberated within a scarcely appreciable fraction of a second, by a flash which discharges a cloud 1 km. square, situated 1 km. above the earth, the effects produced where lightning strikes are easily explicable.

The most important advances in the study of lightning which have been made in recent times are due to the study of photographs of the lightning flash. Fig. 6 is from such a photograph, taken at Middletown, Conn., on June 14, 1892, by O. S. Blakeslee. It shows distinctly the crooked path of the discharge, and in many ways the very close relationship between lightning flashes and the sparks artificially obtained by such means as the Holtz machine. (See Electrical Machines.) The bright spot of light showing through the trees in the back-ground is from an arc-light, and is not, as might be supposed, due to what is termed globular lightning. Globular or ball lightning, indeed, is something the


Fig. 7.—The "black flash" (from a photograph by A. W. Clayden).

existence of which is very well substantiated by the evidence of the large number of observers. It has, however, hitherto almost entirely eluded all precise observation, so much so

* Steinmetz, *Transactions of American Institute of Electrical Engineers*, vol. x., p. 85 (1893).

that its very existence has frequently been questioned. The writer has never seen a photograph which contains anything which could be fairly classed as ball-lightning, although such photographs are said to have been taken.

Photographs of lightning frequently show phenomena which are difficult of interpretation. Fig. 7, taken from the frontispiece of Lodge's book, shows a phenomenon known as the *black flash*. It will be seen that of the several discharges recorded upon this plate, one, instead of being white, is densely black. This result is, however, undoubtedly due to an idiosyncrasy of the silver salts, well known to photographers. It is a familiar fact that when the photographic film is over-exposed there occurs a reversal. Under such circumstance one obtains, upon developing the film, a positive instead of a negative picture of the image in the camera. The simplest explanation, and the one which seems most probable, of the nature of the black flash in photographs of lightning is that certain flashes are of such extreme actinic intensity that even in the very short interval during which the exposure lasts they produce this reversal. The writer exposed a sensitive plate to the electric arc-light for the purpose of illustrating this effect, to which end the exposure for the brightest part of the image was over-timed. The result is shown in Fig. 8, in which it will be seen that the central part of the arc itself, and the crater of the positive carbon, and the tip of the negative carbon, appear black instead of white, while the less brilliantly incandescent regions surrounding these central portions are shown in the proper manner. The inspection of any photograph of lightning flashes will convince one that there is very great range of intensities. Given this range, reversal by over-exposure is a peculiarity of the photographic process which must be expected.

FIG. 8. — From photograph of an arc, over-exposed to show several of the brightest portions.

Fig. 9 shows another interesting phenomenon, the existence of which has been established by means of photography. It is what is known as the multiple flash. Owing to persistence of vision, the evidence of the eye is scarcely to be taken concerning such a phenomenon, but the photographic plate affords very good evidence of it. There is reason to believe that the multiple flash is simply an oscillatory discharge between cloud and earth. The question whether lightning is ever oscillatory is a mooted one; but the camera has furnished valuable evidence in the affirmative. Photographs of scenery taken from the window of a rapidly moving train during a thunder-storm at night, for instance, have shown a succession of images slightly displaced through equal distance with reference to one another upon the plate. Such an effect could be produced only by an oscillatory discharge. It has been held by the opponents of this theory that the multiple flash can not well be oscillatory, because the successive discharges would follow the same path. Photographs of an artificial spark known to be oscillatory have shown, however, that the various elementary discharges which come after the pilot spark do not all follow the same path. Fig. 10 is from such a photograph, made under the direction of the writer in 1893. The photograph shows one path of very great intensity and several others not so well marked. Prof. Trowbridge, of Harvard College, also has shown in the course of an extended investigation that in the case of the oscillatory spark the first two or three discharges occur along the same path as the pilot, but that the subsequent ones frequently take other paths. It is probable that in the case of the multiple flash we have to do with an oscillatory discharge in which the path followed is continually changing.

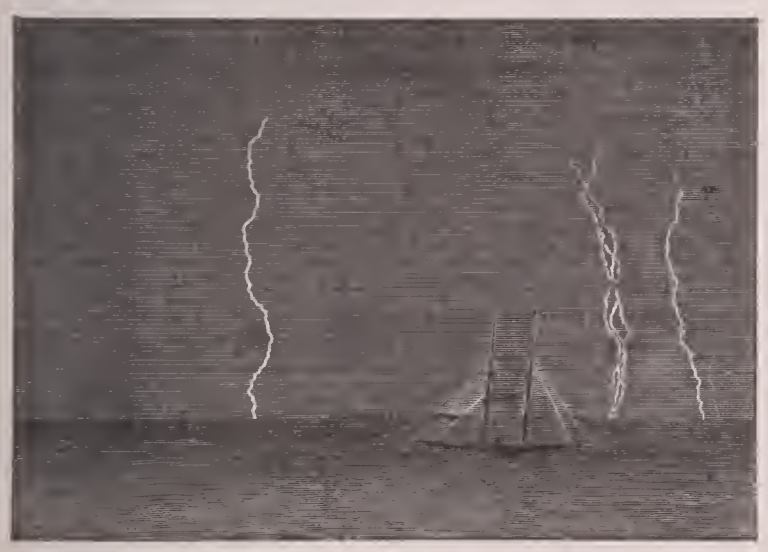


FIG. 9.—The multiple flash (from a photograph by Dr. H. S. Piffard).

FIG. 10.—From photograph of an artificial oscillatory discharge in which several distinct paths are shown.

There have been many theories promulgated with reference to the nature of lightning to touch upon which would exceed the limits of this article. For discussion of these, and of numerous other matters relating to this subject, the reader is referred to the works of Planté and Lodge, already cited.

E. L. NICHOLS.

Lightning-arrester (in applied electricity): a device for protecting dynamo-electric machinery, telephones, and other apparatus connected with systems of outdoor wires, from the ravages of lightning.

At times of electrical disturbance of the atmosphere, such apparatus as the above is particularly likely to suffer because its metal parts afford an easy path to the earth from a network of exposed wires. The quantity of electricity passing to earth through such channels at the time of thunder-storms is often very much too large for the carrying capacity of the wires and other parts of the apparatus which happens to form a portion of its path, and a sufficient amount of heat will therefore be generated to destroy the latter. The possibility of protecting such instruments from the effects of lightning depends largely upon the fact that they possess self-induction. An alternative path may therefore be provided which is free from self-induction, but which includes an air-space. To steady currents this path will be of infinite resistance; but to currents of a rapidly fluctuating character, the path afforded by the tortuous windings of dynamo coils, etc., offers a greater impedance than does the air-gap. The discharge therefore chooses the alternative path, leaping across the air-gap in the form of a spark, and in this way the machine or instrument is relieved from carrying an excessive amount of current to the earth.

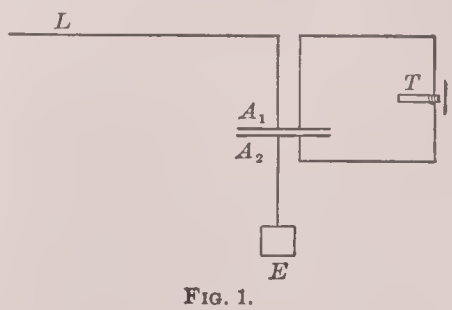


FIG. 1.

Sometimes parallel plates are used in lightning-arresters for the protection of a telephone circuit, as shown in Fig. 1. In the diagram, L is the line wire, T the telephone, E the earth connection. The pair of plates A_1 A_2 are introduced directly between the line and the earth, care being taken to reduce the impedance of this portion of the circuit to a minimum.

The telephone is in direct metallic connection with the earth by means of a circuit possessing considerable self-induction. For steady currents, or even for the undulatory currents used in telephony, the only path to earth is through T, while for the violent surges of current, of which the discharges during thunder-storms consist, the easier path is across the air-gap between A_1 and A_2. Lodge has shown that increased protection may be secured by placing several such air-gaps in multiple circuit, as in Fig. 2, and by using

points instead of plates. In the case of the latter, fusion sometimes leads to the building up of a metallic bridge across the air-gap. Such a contact would be more readily noticed between points and more easily remedied, while the

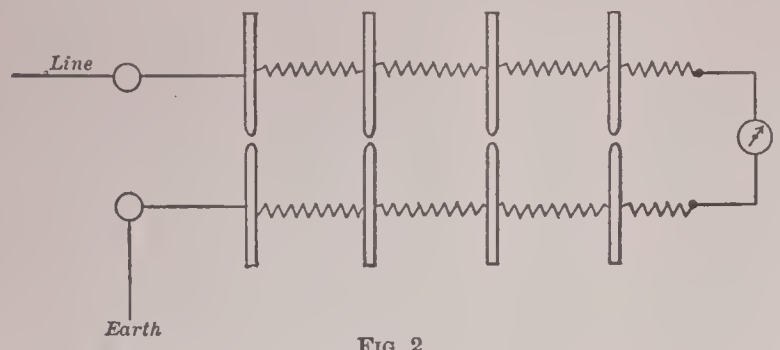


FIG. 2.

likelihood of its occurrence is greatly diminished. One source of difficulty in the construction of lightning-arresters based upon this principle lies in the fact that as soon as the air-space is traversed by the spark due to the lightning discharge, it becomes heated and loses its insulating power for steady currents. It is likely, then, to become a path for the currents generated by the dynamo or intended to supply the motor which it is the object of the lightning-arrester to protect. It becomes necessary, therefore, to extinguish the spark as soon as the lightning discharge has passed, thus permitting the air-space to resume its normal insulating power. This has been accomplished in a variety of ways, none of which, however, is more ingenious than that of placing the air-gap in a strong magnetic field. Under these conditions the arc is repelled strongly at right angles to the lines of force, and is almost instantly destroyed. Another successful device consists in employing metallic terminals composed of one of the so-called non-arcing metals. These metals are those which are readily oxidized, forming heavy solid oxides; for example, zinc, magnesium, etc. It is found that a permanent arc between poles of such metals can not be maintained, while the transient discharge following upon the inductive effects of lightning will still readily traverse the air-space.

Many mechanical devices for the temporary introduction of a shunt or alternative path to allow of the passage of lightning discharges have been constructed, but few, if any, of these are sufficiently prompt to afford adequate protection. Owing to the wide area over which the systems of wires of electric railway and telephone circuits extend, every passing thunder-storm induces upon some portion of such systems electrical fluctuations great enough to endanger the machinery with which these wires are connected. The lightning-arrester, indeed, in countries which, like the U. S., are exposed to violent electrical disturbances of the atmosphere, is an indispensable instrument. E. L. NICHOLS.

Lightning-bugs: See FIREFLIES.

Lightning-rods, or **Lightning-conductors**: metallic rods attached to buildings or ships for the purpose of protecting them from the effects of lightning. The famous experiments of Benjamin Franklin doubtless suggested the use of such devices. The principal ideas which have been in vogue with reference to protection from lightning, and upon which nearly all lightning-conductors since Franklin's day have been based, are two: The dissipation of the induced charge by the well-known action of points, and the carrying away to earth or water in a harmless manner of such portions of the discharge as may include in its path the building or vessel to be protected.

Owing to the great difficulties of experimenting with lightning, or of imitating its action artificially, the important question of the degree of protection afforded by lightning-rods is still an open one. Increasing knowledge of the phenomena of atmospheric electricity and of related phenomena in the domain of electrostatics, however, has made it possible to draw certain conclusions concerning lightning and protection from its action. Damages from lightning are of two distinct classes. The first includes damages arising from the direct action of the main discharge; the other class comprises the secondary effects, due to the restoration of equilibrium, temporarily disturbed, between bodies in the neighborhood of the main path. As regards the first class, it is a question whether any protective device short of a metallic shield surrounding the structure to be guarded would prove efficient. We are able to estimate with considerable precision the amount of energy which is liberated along the path of the lightning flash. (See LIGHTNING.) This quantity is very great, and it is set free within extremely limited regions. It is this energy suddenly liberated which produces the astounding mechanical effects noted when a building is struck by lightning. When a building is so situated as to form a portion of the path of the main discharge, lightning-rods, however well constructed, frequently fail to perform their functions. The cases in which lightning-rods have to deal with the main discharge are, however, comparatively rare; that is to say, the number of instances in which buildings lie in the neighborhood of the path of discharge without forming a portion of it are much more numerous than those in which the flash passes directly through the structure itself. For the protection of buildings from these secondary effects the efficacy of lightning-rods is unquestionable, and so far as this sort of protection is concerned, certain general statements as to their construction may be laid down:

First. The dissipating action of points is very small. It is doubtful whether points possess any practical efficacy, and the use of points constructed of such metals as platinum and gold is a useless expense.

Second. The lower end of the systems of rods should be well grounded. In buildings containing water-pipes a satisfactory connection with the earth can be obtained by attaching the system of lightning-conductors to these pipes.

Third. Gas-pipes should not be used as a means of establishing a connection with the earth. Gas-pipes, when connected with lightning-rods in such a way as to form a part of the path to the earth, are likely to cause fires by the ignition of their contents at any point where there is a leak.

Fourth. All portions of the structure containing considerable masses of metal, such as the sheathing of roofs, and systems of pipes not connected metallically with the earth, should be so connected by attaching them to the lightning-rods. One of the chief sources of danger from the secondary effects of lightning consists in the inducing of heavy electrostatic charges upon the surface of all such conducting bodies as may be insulated. In the production of these induced charges, either positive or negative electricity will be forced to seek a path to the ground; and if an unbroken path of good conductivity is afforded, it will be carried away without the production of sparks and without the danger of fire. If, however, the path is interrupted here and there by air-spaces, or by other bad conducting material, a series of sparks will leap across these spaces. Such sparks are frequently the cause of serious damage.

Fifth. As regards the material of which lightning-rods should be made, the metal of which they are constructed is of less importance than the form. Of course, metals readily fusible, such as lead, are not to be selected; and since lightning-rods are exposed to the weather, it is desirable to have them constructed of metals which will be permanent. Ordinarily the choice limits itself to copper and iron; and iron is, on the whole, probably the best available material. It is true that copper possesses a much higher conductivity than iron, but, as has been pointed out by Lodge in his volume on lightning-conductors, high conductivity is not altogether a desirable quality in the lightning-rod. For many years there was a controversy between those who held that the essential characteristic of lightning-rods was a sufficient cross-sectional area, and that the shape of the cross-section was a matter of indifference; and those, on the other hand, who held that the rod should be constructed so as to offer a large surface. It is now perfectly well established that sudden surges of current, such as pass over lightning-rods at the time of discharge, are not capable of being conducted save by the outermost layers of the metal. This fact is accounted for by the self-induction of the material. Owing to this inductive action, which confines the current to the outside, tubes with thin walls are as good carriers of lightning as solid rods of the same diameter, while a broad strip or tape weighing the same per linear foot as a rod or tube, is much better than either.

Sixth. Insulation of lightning-rods from the body of the structure which they are intended to protect is distinctly disadvantageous. The object of lightning-rods is not so much to convey a discharge from the sky to the earth without permitting the same to utilize the building itself as a conductor, as it is to connect all those portions of the building itself which are conductors of electricity with the earth, so as to allow the transfer of electricity, under the tremendous inductive action of passing clouds, to go on without the production of dangerous sparks. As has already

been indicated, the attempt to protect in the case of the direct discharge is probably futile in the great majority of instances; and at any rate the intervention of an inch or two of glass affords no appreciable obstacle to the passage of such a discharge as that which occurs when exchange takes place between earth and sky.

Seventh. Lightning-rods should be as nearly straight as possible. All coils and loops are to be avoided, because they possess self-induction sufficient to cause the discharge to leap across between the intervening portions of the conductor instead of going around through the metal. Although a metallic loop will afford a path of infinitely better conductivity for steady currents, it becomes useless whenever rapid fluctuations of electromotive force take place.

The desirability or undesirability of attaching lightning-rods to buildings is a question concerning which it would be difficult to lay down any general rule. In the case of ships at sea carrying wooden masts or spars there can be no question of the importance of such protection against lightning. In the case, on the other hand, of a building situated upon some stratum which in itself affords insulation from the surrounding regions of the earth's surface—and it may be noted that localities are frequently found where it is difficult to obtain a ground connection sufficiently good to serve for telephonic purposes—it is a serious question whether a system of metallic conductors connecting the house with the earth would be a source of protection or of added danger.

The development of extensive systems of overhead wires for telephone and electric-lighting service has greatly modified the problem of protection from lightning, and has compelled the introduction of apparatus quite as important as the lightning-rod. This apparatus is the lightning-arrester, the object of which is to afford a path to earth for the electric charges which gather by induction upon such systems of wires. The function of the lightning-arrester is primarily to protect the instruments (telephones, dynamos, motors, etc.) which are connected with the outdoor wires, but it also protects against fire the buildings which the wires enter. The system of wires pertaining to a telephone exchange, for example, gathers charges of electricity over a wide area, and the discharge to earth is likely to occur through the ground wire of some building remote from the disturbance. A properly arranged lightning-arrester will prevent this by keeping the potential of the entire system under control. Lightning-rods are ordinarily brought into service only at rare intervals; the lightning-arrester, on account of the extended network exposed to the inductive effects of thunder-clouds, will be in action with nearly every passing storm. See Anderson, *Lightning-conductors*; Lodge, *Lightning-conductors and Lightning-guards.* E. L. Nichols.

Light, Standards of: See the Appendix.

Ligne, leeñ, Charles Joseph, Prince of: soldier; b. in Brussels, May 12, 1735; was descended from one of the wealthiest and most powerful Belgian families; entered the Austrian army in 1752, distinguished himself in the Seven Years' war, and commanded the vanguard in the Bavarian war of succession. During the reign of Joseph II. he held the highest military and diplomatic positions, and the elegance of his manners and the brilliancy of his conversation made him a favorite with all European courts. Under Leopold he fell into disfavor, partly on account of his son's participation in the Belgian insurrection (1790), and though Francis I. made him field-marshal in 1808 he never regained his influence in the state. In the latter years of his life he was occupied in literary pursuits. D. in Vienna, Dec. 13, 1814. Of his *Mélanges militaires, littéraires et sentimentaires* (34 vols., 1795–1811), Malte-Brun has given a selection, *Œuvres choisies*, in 2 vols. His letters and memoirs have considerable historical interest.

Lignine: a synonym of Cellulose (*q. v.*).

Lig'nite [from Lat. *lignum*, wood. Cf. Fr. *lignite*]: the name originally given to bitumenized wood, but now applied to most coals which occur in the more recent geological formations; the term is therefore synonymous with brown coal. As stated in the article on Coal, lignite has no definite formula of composition, but different specimens vary much in physical and chemical character, shading into unchanged vegetable fiber above and true coal below. Lignites or brown coals are found chiefly in the Cretaceous and Tertiary formations. Here they occur in deposits which rival in area and thickness the coal-beds of the Carboniferous system. In general terms, it may be said that the lignites occupy an intermediate position, both in date and composition, between the peat which is now forming and true coals of Palæozoic age, and represent a stage in the progressive distillation which vegetable tissue passes through when buried. This process results in the formation of—1, peats; 2, lignite; 3, bituminous coal; 4, anthracite; 5, graphite. No sharp lines of demarkation separate these groups, as we find them shading into each other by all possible intermediate phases. Since they are successively derivatives one from the other, the series is necessarily continuous. It should also be said that the name *lignite* is applied to woody tissue in which the process of bitumenization has begun, and among the forms of recent and superficial bitumenized vegetation that which has been derived from the decomposition of mosses, grasses, etc.—generally a porous, spongy substance—is called peat.

The mode of formation of the great beds of so-called lignite of the Cretaceous and Tertiary systems seems to have been similar to that in which peat is now accumulating, and in which coal was formed in the marshes of the Carboniferous age. In some instances they are underlain by strata of fire-clay, and are overlain by shales, sandstones, and limestones, precisely as the coal-strata are; and it is evident that they have a common origin and history, except that in the lignites that history has not reached as far as in the coals. It frequently happens, however, that beds of lignite have by local causes been changed to the condition corresponding to bituminous coal, or even anthracite. Such instances are furnished by some of the best lignites of Colorado, Utah, and Alaska, which have reached the condition of bituminous coal, and by the anthracites of Crested Butte, Col., and that of Queen Charlotte's island. In the last two cases beds of Cretaceous lignite have been, by local volcanic action, converted into anthracite, as bright, hard, and useful as that of Pennsylvania. As the deposits of carbonized vegetation formed in the Tertiary and Cretaceous systems are classed as lignites, all the so-called coals of the great areas underlain by these formations come into this category.

It happens that the most important deposits of mineral fuel in Europe and Eastern North America are found in the Carboniferous systems, but it is not known that any important deposits of true coal exist in other parts of the world. So far as we know, all the great coal-fields of China, India, Borneo, and Western North America, are of Mesozoic or Tertiary age. Deposits of lignite are also known to exist in Greenland, Arctic America, and in Central and South America. The economic value of lignites is, as a general rule, considerably less than that of true coals. This is due both to their chemical composition and physical characters. They usually contain from 12 to 20 per cent. of oxygen and 10 to 16 per cent. of water. Their heating power is therefore usually from one-half to two-thirds that of bituminous coal. The different ingredients mentioned sometimes constitute as much as one-third of the mass—a third which probably contributes nothing to the heating power, the water even absorbing some portion of the energy of the combustible material in its vaporization. The calorific power of pure carbon being estimated at 8,000 units, and that of the best coals, in which the hydrogen is mainly neutralized by the oxygen, at from 7,000 to 7,500, the calorific power of lignite may be said to vary from 4,000 to 5,000. It should be said, however, that this is only a general rule. The calorific power of some of the Carboniferous coals of the U. S. hardly exceeds 6,000 units, and some of the best lignites reach and even pass this point. The physical character of lignites also frequently impairs their economic value. They are usually somewhat tender, and the waste in mining and transporting them is greater than in the bituminous coals. They are apt, also, to crack badly and frequently on exposure fall into a multitude of angular fragments. It rarely happens that they are capable of producing good coke. They are usually open-burning, i. e. do not adhere in the fire, and the proportion of volatile matter to fixed carbon is large. When this is driven off, the residual coke is spongy and pulverulent. To this rule there are, however, exceptions which will be mentioned further on.

In Europe the lignites or brown coals have been mined and used for years, and the practical tests to which they have been subjected have accurately determined their value.

The majority of the coals found in the western half of the U. S. are of modern age, and are classed as lignites. These occur in both the Cretaceous and Tertiary formations, but chiefly in the former; and although their extent and value

ANALYSES OF AMERICAN LIGNITES, BY H. S. MUNROE, NEW YORK SCHOOL OF MINES.

PLACE.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Water.	Ash.
1. Mt. Diablo, Cal.....Cret.	59·724	5·078	15·697	1·008	3·916	8·940	5·637
2. Weber river, Utah ..... "	64·842	4·336	15·518	1·288	1·602	9·415	2·999
3. Echo Cañon, " ..... "	69·840	3·897	10·990	1·932	0·768	9·170	3·403
4. Carbon station, Wyoming..... ?	64·992	3·762	15·199	1·736	1·066	11·565	1·680
5. " " " ..... ?	69·144	4·362	9·539	1·246	1·025	8·065	6·619
6. Coose Bay, Ore.....Tert.	56·244	3·379	21·815	0·420	0·810	3·285	4·047
7. Alaska ..... "	55·789	3·264	19·004	0·608	0·632	16·520	4·183
8. " ..... ?	67·674	4·658	12·804	1·582	0·920	3·075	9·287
Lignitic Anthracites.							
9. Santa Fé, N. M.....Cret.	74·372	2·583	8·712	1·764	0·727	3·190	6·052
10. Los Bronces, Sonora, Mexico.....Trias.	84·103	0·852	2·137	0·280	0·229	5·191	7·204

have been but imperfectly determined, it is known that very extensive deposits of this kind occur in New Mexico, Colorado, Wyoming, Utah, Nevada, California, Oregon, and Alaska. The lignites of New Mexico all belong to the Cretaceous formation, and are chiefly found in the lower portion of this series. They underlie a large area, including the northern portion of this Territory and Arizona, and on the San Juan river form strata altogether similar in appearance to true coal-beds, showing many miles of outcrop, and sometimes attaining a thickness of over 30 feet. These great beds, however, are not homogeneous, but consist of layers of a better quality, interstratified with those that are shaly and impure. The lignite beds of Colorado and Wyoming occupy a broad belt along the flanks of the Rocky Mountains, extending N. across the Missouri and reaching far into Canadian territory. It is not known how large an area in this belt is underlaid by workable beds of lignite, but it would probably not be extravagant to estimate that at least 50,000 sq. miles will prove to be productive coal area. The strata here vary in thickness from a few inches to 20 and even 30 feet. In Colorado and along the line of the Union Pacific Railway these beds have been opened in many places, and are extensively mined. The most important mines now worked are located at Trinidad, Cañon City, Golden, Carbon Station, Evanston, etc., and the coal is not only generally used by the resident population, but is largely consumed for locomotives on the railway. The lignites of Colorado have much the character of the best-known varieties used in the Old World, and hold about the same rank in comparison with the Carboniferous coals. Here, however, as in other countries, some localities furnish fuels of superior character; for example, the coal of Trinidad and Crested Butte, Col., can be coked and is capable of being successfully used in forging and smelting. The same may be said of the San Pete coal, which is found in Utah, S. from Salt Lake City. The geological age of the lignites of Colorado has been much discussed, but there is little doubt that they are for the most part Cretaceous. There are, however, Tertiary lignites in this region, and a part of those so extensively exposed along the Missouri river are of Tertiary age. Nevada and California are not so well supplied with mineral fuel as Colorado, Wyoming, and Utah, but beds of lignite have been found in both. In California they have been mined on the flanks of Mt. Diablo. The coal of this locality is Cretaceous. On the coast of Oregon the Coose Bay coal has been mined for many years. This is of Tertiary age, and may be taken as a typical example of Tertiary lignite. Its composition will be seen from the table given below. In physical character it is, when first mined, hard, bright, and pitchy, but on desiccation it is prone to break up into small fragments. Vancouver's island is well supplied with coal, and has been a source from which a large part of the coal used on the Pacific coast has been derived. This is of Cretaceous age; it has precisely the appearance of some varieties of bituminous coal, and has a higher heating power and bears exposure and transportation better than most of the western coals. In Alaska two varieties of lignite have been mined, both of which are reported to exist in large quantities. Of these, one (No. 7 of table) resembles closely the Coose Bay coal, and may be suspected, both from its composition and associated fossils, to be of Tertiary age. The other has been subjected to local metamorphism, and is much harder and more valuable.

The localities which have been mentioned are by no means all in which lignite is known to exist in the western part of the U. S., and there is every reason to believe, so far as quantity is concerned, that the deposits in this region are capable of supplying all the wants of its future population. In quality, however, these coals are not equal to the Carboniferous coals of the Eastern States.

The table of analyses here printed will show the composition of typical examples of the lignites of the western portion of America.

The material called *jet*, so largely used for ornaments, is a variety of lignite which is chiefly obtained from the Lias at Whitby, England. Lignite of similar character occurs in Texas, Utah, and Colorado, and some of it is equal in quality to the English jet. Revised by CHARLES KIRCHHOFF.

Lig'num Rho'dium [Mod. Lat., liter., rosewood; Lat. *lignum*, wood + Gr. *ῥόδον*, rose]: a commercial name for Canary island rosewood (see ROSEWOOD), which yields the so-called oil of rhodium; also for the wood of *Amyris balsamifera*, a tree of the West Indies, which yields an oil used as a substitute for that just mentioned. The name is also given to other fragrant woods.

Lignum Vitæ: See GUAIACUM.

Ligonier: town; Noble co., Ind. (for location of county, see map of Indiana, ref. 2–F); on the Elkhart river, and the Lake Shore and Mich. S. Railway; 25 miles S. E. of Elkhart, 108 miles W. of Toledo, O. It is in an agricultural region, has several manufactories, ships large quantities of grain and produce, and has 2 private banks and 2 weekly newspapers. Pop. (1880) 2,010; (1890) 2,195; (1900) 2,231.

Ligor': a state, town, and isthmus of the Malay Peninsula. The state is feudatory to Siam, lies between 7° and 9° N. lat., and extends across the peninsula; area, 17,000 sq. miles; pop. about 150,000, three-quarters Siamese, the rest Malays, Chinese, and the aborigines of the forests. The country is generally marshy, and the forest growths gigantic. The principal productions are rice, pepper, ratans, dyewoods, ivory, tin, and gold. The town and capital is in lat. 8° 25′ N., near the east coast, on a wooded plain, near the mouth of a small stream, forming a good harbor. Pop. about 12,000. The isthmus forms the northern part of the state; it has long been a favorite place for crossing the peninsula. Distance, 70 miles. MARK W. HARRINGTON.

Liguo'ri, Saint ALFONSO MARIA, de: priest; b. in Naples, Italy, Sept. 27, 1696; of a noble family; became a lawyer when sixteen years old; entered a religious congregation in 1722, and was ordained priest in 1726; devoted himself to the religious instruction of the poor; founded in 1732, at Villa Scala, the order of REDEMPTORISTS (*q. v.*), which received papal approbation in 1749, when Liguori was confirmed as its superior-general; declined the archbishopric of Palermo; was Bishop of Sant' Agatha 1762–75, when he resigned and devoted himself to theological studies and writing, giving up even his generalship of the Redemptorists. D. at Nocera dei Pagani, Aug. 1, 1787; was declared venerable 1796; beatified in 1816; canonized in 1839, and declared a doctor of the Church in 1871. Among his many works are *Theologia Moralis* (1755); *Homo Apostolicus* (1782); *Institutio Catechetica* (1768). As a moral philosopher he is equiprobabilist, teaching that in a balance of opinions that which is the less safe may be followed provided it be as probable, or nearly as probable, as its opposite. He was accused by the rigorists of leaning too much to the side favorable to liberty, but this charge was vigorously denied. According to him, moral theology may be either positive, speculative, polemical, or practical. Casuistry belongs to the last named, and is of two kinds. The first kind consists of a brief exposition of the principles of moral theology, but insists largely on the application of principles to cases. Casuistry of the second kind consists exclusively in the application of principles to cases real or imaginary. His complete works were often republished, especially by Marietti (Turin), and were translated into French. His letters were published complete in Italian, French, and German by the Redemptorists (3 vols., 1887–92). Revised by JOHN J. KEANE.

Liguorians: See Redemptorists.

Ligu'ria: in ancient geography, a district of Northern Italy; the land of the Ligures, the boundaries of which were not accurately defined until the time of Augustus. According to his division of Italy, it comprised the territory from the Ligurian Sea across the Maritime Alps to the Padus (Po) in the N., and from the Varus in the W. to the Macra in the E. When first mentioned in history, the Ligures occupied a much larger territory, extending far into Gaul, on the western side of the Rhône. They were a warlike, quick-witted, and enterprising people, whose origin and relations are entirely unknown. In the period between the first and second Punic wars the first encounter took place between them and the Romans, and about 125 B. C. they were wholly subjugated. Liguria formed the nucleus of the Roman province of Gaul. The name was renewed by Napoleon, June 6, 1797, when the republic of Genoa was transformed into the Ligurian republic, but the absorption of the little state in the French empire, June 4, 1805, destroyed its autonomy, and its territory became for a time the three French departments of Apennin, Genoa, and Montenotte.

Li Hung-Chang, lee-hoong-chaang: Chinese statesman; b. about 1823 (according to some authorities 1819) in the Hofei district, in the province of Ngan-hwuy; showed unusual talent as a student, and attained the degree of Chin Sze (the third) in 1847. He was afterward appointed a compiler of the second class in the Hanlin College, and in 1850 acted as compiler in the imperial printing-office. During the Taiping rebellion he served with honor, rose rapidly in rank, and conducted the final campaign that crushed the revolt. He was equally successful against the Nienfei rebels, whom he completely overthrew in the summer of 1868. In 1870 he was appointed Viceroy of Chihli and made Senior Grand Secretary of State. His policy has been liberal and progressive. In the face of opposition he has brought about the introduction of the telegraph, the reorganizing of the army on European models, the establishment of dockyards and arsenals, and prevailed upon the Government to permit the construction of railways. In his foreign relations he has worked steadily for peace, and by skillful diplomacy has generally contrived to secure it without sacrificing the interests or honor of his country. In 1896 he represented the Emperor of China at the coronation of the czar, and on his way back to China visited the principal countries of Europe and the U. S., and was well received everywhere. Note that *Li* is the surname, and is in Chinese custom invariably placed before the given name *Hung-Chang*. See Name.

Lilac [from Arab. *līlak*, from Pers. *līlaj*, *nīlaj*, indigo-plant; cf. *līlak*, *nīlak*, bluish]: the popular name of shrubs of the genus *Syringa*, family *Oleaceæ*. The best known is the common lilac, *S. vulgaris*, a native of Central Asia, half naturalized in Europe and the U. S. Its early-blooming flowers are commonly of the tint called *lilac*, but often are white or dark purple. *S. persica*, *S. chinensis*, with other species and their hybrids, are common in cultivation. Their bark has decided febrifugal powers.

Lil'burne, John: political agitator; b. at Thickney Puncharden, Durham, England, in 1618: imbibed in youth opinions extremely hostile to the Church of England, and having circulated pamphlets against the bishops, was condemned in 1638 to pay £500, to receive 500 lashes, to stand in the pillory, and be remanded to prison. In 1641 he received from the Long Parliament a handsome compensation (£3,000) for his sufferings. He fought in the Parliamentary army at Edgehill, Brentford, and Marston Moor, and was thrown into Newgate for libeling the Presbyterians. He afterward aided in organizing the Levelers (*q. v.*); accused Cromwell and Ireton of designs upon the sovereignty; was in 1649 tried for sedition and acquitted; took refuge in Holland; returned in 1653; joined the Quakers; died in 1657.

Lilia'ceæ: the Lily Family (*q. v.*).

Liliencron, Rochus, Freiherr von: b. at Plön, Holstein, Dec. 8, 1820; studied theology, jurisprudence, and German philology at Berlin and Kiel; became professor at Jena in 1852; went to Meiningen in 1855, and became editor-in-chief of the *Allgemeine Deutsche Biographie* in 1869. His researches are devoted chiefly to the history of the popular song and its music, the results of which are embodied in the large critical edition of *Die hist. Volkslieder der Deutschen vom 13–16 Jahrhundert* (1865–69), and in the exquisite little volume *Deutsches Leben im Volkslied* (1884).

Julius Goebel.

Liliuokalani, lēē-lēē-oo-ō-kăă-laa'nēē, Lydia Kamakeha: ex-Queen of the Hawaiian islands; b. Dec. 2, 1838; married John O. Dominis, a native of Boston, governor of Oahu, who died Aug. 26, 1891. She had been made vice-regent when King Kalakaua left Hawaii for the U. S., and soon after his death in San Francisco she was proclaimed queen, Jan. 29, 1891. She gave offense by her attempts to abolish the constitution of 1887, and restore the more absolute power of the crown. Though forced by the opposition to desist from these attempts, fear of their renewal and dissatisfaction with her government caused her overthrow Jan. 30, 1893, by a small portion of the population, consisting chiefly of the U. S. element. A provisional government was then set up and annexation to the U. S. proposed. The queen, on the other hand, alleging interference on the part of the U. S. minister on behalf of the revolutionists, requested the aid of that Government in restoring her to the throne. Soon after his inauguration, President Cleveland withdrew from the Senate the annexation treaty which had been negotiated, and in the following winter attempted unsuccessfully to mediate between the provisional government and the queen, with a view to her restoration to the throne, and a republic was proclaimed July 4, 1894. In connection with a rising of her supporters in Jan., 1895, she was arrested as an accomplice. Some days later she renounced her right to the throne, but was tried and sentenced to five years' imprisonment and a fine of $5,000. She was released, however, in September of the same year, and in Dec., 1896, visited the U. S.

Lilium [see Lily. O. Eng. *lilie*, from Lat. *li'lium*, from Gr. λείριον, lily]: a genus of the Lily Family (*q. v.*), comprising some of the commonest and most valued of hardy ornamental bulbiferous plants, natives of the northern temperate zone. Several are indigenous to the U. S., the more showy and common ones being *Lilium philadelphicum*, with an upright flower, and *L. canadense* and *L. superbum*, with nodding ones; these orange and orange-red. Related species of California are now coming into cultivation, as well as one or two with white or rose-colored blossoms. *L. candidum*, the common white lily of the gardens, came from the Levant and Caucasus. The large and choice Japanese lilies, white or partly so, came from *L. longiflorum*, with long and narrow flowers, and *L. japonicum*, *L. speciosum*, and *L. auratum*, with very broad and open ones. In the scarlet-flowered *L. chalcedonicum*, abounding in Palestine, we "behold the lilies of the field" of Scripture. The tiger and bulblet-bearing lilies of cultivation, all natives of the Old World, and producing bulblets in the axils of the leaves, belong to *L. tigrinum*, *L. croceum*, and *L. bulbiferum*, the last two known by their erect flowers. C. E. B.

Lille, or **Lisle** (Flem. *Ryssel*): the capital of the department of Le Nord, France; is situated in a fertile and well-cultivated plain on the Deule, and communicates by canals and railways with the sea and all the large commercial places of Northern France and Belgium (see map of France, ref. 1–F). It is the headquarters of the third military division, and is one of the strongest fortresses of Europe. Its fortifications were erected in the eleventh century; they were thoroughly reconstructed by Vauban. Since 1858 the ramparts on the south side have been demolished, and the town now includes the old communes of Esquarmes, Wazemmes, and Moulins-Lille. The city is well built, with broad and regular streets and numerous squares. It has a university, a lyceum, an academy of design with a celebrated collection of drawings—among which are 86 by Raphael and about 200 by Michaelangelo—a botanical garden, several literary societies, and many scientific and educational institutions. Its principal importance, however, it derives from its manufactures. Much flax is grown in the vicinity, and the linen manufactures of Lille are very extensive; the whole neighborhood is covered with bleaching-grounds. No less important is its cotton-spinning industry; about thirty-six large establishments are in operation. The tobacco-manufactory of the Government produces annually about 11,000,000 lb. Beetroot sugar, rape-seed oil, gloves, and gunpowder are also manufactured in large quantities, and an extensive trade is carried on. Lille was founded in the ninth century, belonged alternately to France or to the Counts of Flanders, came into the possession of the house of Burgundy at the end of the fourteenth century, passed from Burgundy to Austria and Spain, but was conquered in 1667 by Louis XIV., since which time it has been a French city. In 1792 the Austrians bombarded the city for nine days and nights, but had finally to raise the siege. Pop. (1891) 160,966; (1896) 216,276.

Lil'ly, John: See Lyly.

Lilly, William: astrologer; b. in Diseworth, Leicestershire, England, May 1, 1602; began the study of astrology in 1632, and in 1644 began the publication of an annual almanac, *Merlinus Anglicus Junior*, which contained some wonderful predictions, and was eagerly read by all parties. He instructed many pupils in his art, and practiced medicine. In his *Monarchy or No Monarchy* (1651) appeared two hieroglyphical figures subsequently claimed to refer to the plague and the great fire in London in 1666. He wrote an *Introduction to Astrology*, a *Grammar of Astrology*, and *Tables of Nativities*. D. in Walton-upon-Thames, June 9, 1681, leaving an *Autobiography*, published in 1715.

Lily [O. Eng. *lilie*, from Lat. *lilium*, from Gr. λείριον, lily]: any plant of the genus *Lilium*; by extension any one of various other lily-like flowers belonging to the same or related families (see Lily Family), and even to some dicotyledonous plants, as the water-lilies, *Nymphæa*, *Castalia*, etc.

Lily, or **Lilly**, William: See the Appendix.

Lily Family: the *Liliaceæ*, a group of monocotyledonous plants characterized by a regular complete perianth, free from the three-celled ovary, and six stamens. They are mainly herbaceous, and with the six divisions of the perianth colored alike and the leaves parallel-veined; but to all these characters there are exceptions. Many have bulbs, others tubers or root-stocks. A few are arborescent, such as the larger yuccas, and especially dragon-trees (*Dracæna*). The famous dragon-tree of Orotava, Teneriffe, described and figured by Humboldt (overthrown in 1868), was regarded as one of the oldest trees in existence. As now received, the family comprises fully 2,300 species, widely distributed throughout the world, and constituting a number of well-marked sub-families (sometimes regarded as families). To this family belong the tulips, lilies, crown-imperial, calochortus, and most of the well-known and highly prized ornamental plants of the order, as also the hyacinth and the onion tribe, the asparagus, and a popular conservatory climber, *Myrsiphyllum* (falsely called *Smilax*), *Convallaria* (the lily-of-the-valley), *Polygonatum* (Solomon's seal), the dragon-trees, the medicinal and ornamental *Colchicum* (meadow saffron, so called from a resemblance to *Crocus*), *Veratrum*, the white hellebore and its allies, which furnish *veratrine*, the last named having very active acrid-poisonous roots or corms. Such properties are not wholly absent from the first-named plants, as in the bulbs of *Gloriosa* and of crown-imperial. Those of squills are likewise very active, while those of garlics and leeks are well-known condiments, and those of onions and the young shoots of asparagus are staples of food. The bitter juice of one or two species of *Aloë* furnishes aloes, a common purgative. One of the strongest of fibers is New Zealand flax, from the leaves of *Phormium tenax*.

Revised by Charles E. Bessey.

Lilybæ'um (originally the name of the cape which forms the western extremity of Sicily): the modern Marsala (*q. v.*); built by the Carthaginians about 350 B. C. It was their last possession on the island. At the close of the first Punic war it was made over to Rome, and became the basis for her attacks on Africa. At the fall of the Roman empire it was still a flourishing place, and the Saracens valued its port.

Revised by G. L. Hendrickson.

Lily-of-the-Valley: a plant of Europe and Asia, also sparingly indigenous in the Alleghany Mountains, prized in garden and greenhouse cultivation for its beauty and fragrance. Its scientific name is *Convallaria majalis*. It is used by perfumers as the basis of *eau d'or*.

Lima, lē'mă: a coast department of Peru; bounded N. by Ancachs, E. by Junin, S. E. by Huancavelica, S. by Ica, and S. W. by the Pacific; area, 23,647 sq. miles. The port of Callao, with a few square miles of adjoining country, is sometimes separated as a distinct constitutional province. The western portion of the department lies in the Cordilleras, and has many peaks above the snow-limits; the eastern part is lower, but broken by many spurs of the mountains, some of them extending to the seashore. Between the spurs are the valleys of several small rivers, which widen out toward the sea and constitute the most fertile districts; in these a large portion of the inhabitants are gathered. Sugar-cane and grapes are the principal crops. Silver, gold, copper, coal, and other minerals are found in the mountains, but there are few mines. The coast valleys were long occupied by Indian tribes of the Quichua race, who were not conquered by the Incas until about 1420; at the time of the Spanish conquest they still retained many of their peculiar customs, and one of their idols, Pachacamac, was renowned throughout Peru. They had large cities and extensive irrigation-works, the ruins of which still exist; and their cemeteries, particularly that of Ancon, near Lima, have yielded enormous quantities of objects which they buried with their dead. The northern valleys were held by people of the Chimu race, to which some archæologists also refer the Ancon remains. Pop. of department in 1894, probably 350,000 (the confessedly imperfect census of 1876 gave 261,414).

Herbert H. Smith.

Lima [Span. corruption of Quichua *rimac*, an oracle: in allusion to an idol and temple formerly located here]: capital of Peru and of the department of Lima; at the head of a plain forming a plateau where the river Rimac emerges from the spurs of the Cordilleras; 512 feet above the sea; 6 miles from its port of Callao on the Pacific; in lat. 12° 2′ 34″ S., and lon. 77° 7′ 36″ W. (see map of South America, ref. 5–B). Historically it is the most important city in South America. It was founded in Jan., 1535, by Francisco Pizarro, who called it Ciudad de los Reyes (City of the Kings), probably in allusion to the feast of the Magi Jan. 6; this name was the official one during two centuries. It was the seat of the Viceroys of Peru, who, during most of the colonial period, ruled nearly all of Spanish South America; their court was the most magnificent in America, and attracted all the learning and riches of the continent; the Archbishop of Lima was the most powerful prelate in America, and here the religious orders and the Inquisition had their centers. Taken by San Martin July 9, 1821, it remained in the hands of the patriots with slight interruptions during the war for independence. It has always been an important point during the Peruvian civil wars, its possession generally indicating the party which is in power. The capital of the Peru-Bolivian confederation 1836–38, it was taken in the latter year by the Chilians, united with Gamana and other revolutionists. It was again occupied by the Chilians after several severe battles Jan. 17, 1881, and was held by them until Oct. 22, 1883; during this period great damage was done to the city, and especially to public institutions. Lima has suffered greatly at intervals from earthquakes; it was nearly destroyed by the great shock of Oct. 28, 1746, when more than 1,000 persons perished; and it was much injured in 1586, 1630, 1687, 1806, and 1828. It has always been an unhealthful place, and under the viceroys there were frequent severe epidemics, due to bad sanitary arrangements. The city now has an excellent system of underground drainage, and its water-supply is improved; but intermittent fevers and dysentery are still prevalent. Owing to the proximity of the mountains the temperature is low, the mean from June to November being only 56·4° F.; the remaining months are warmer (maximum 82°), and are characterized by long spells of thick mist, peculiarly trying to weak lungs: but rains are rare. Formerly the city included about 3 sq. miles on the southwest side of the Rimac, with a suburb, San Lazaro, across the river; it was surrounded by adobe walls, which were leveled in 1870 and replaced by fine boulevards; but these were destroyed during the Chilian invasion. The Rimac is crossed by three bridges. The city is regularly laid out, but has narrow streets and sidewalks; there are thirty-three public squares, many of them handsomely adorned with statues and fountains. Among the monuments are a fine equestrian statue of Bolivar (bronze); the marble group of Columbus discovering America; and the Dos de Mayo column, commemorating the defense of Callao against the Spaniards. The cathedral, on the Plaza Mayor, is one of the largest and finest in America. It was founded by Pizarro, destroyed in the earthquake of 1746, and rebuilt on the old foundations. Elevated on a marble terrace, it has the usual two towers, of exceptional height, and a portal in Moorish style. The older parts, including pillars of red marble and statues in niches, are finely wrought; but some of the modern additions are in brick, stucco, and wood. The interior is imposing and very rich, many of the adornments being of solid silver: there is a very fine organ. In the crypt are shown the coffins of Pizarro and of several of the viceroys. There are some seventy other churches, many of them of great interest, but some of them have been turned over to secular uses; most of the Church treasure was given to the Government during the Chilian invasion. The senate house is the old palace of the Inquisition, and Pizarro's palace is now used for Government offices. The mint has a coining capacity of $1,000,000

monthly. The University of San Marcos is the oldest in America, having been founded in 1551; it now includes the College of San Carlos (founded 1770), where most of the better class of Peruvian youth are educated. There are, besides, several national colleges (answering to high schools in the U. S.), medical schools, a mining and engineering school, naval and military institute, etc. Girls are very generally educated in nunneries, of which there are eight or ten. The national library was next to that of Rio de Janeiro, the finest in South America, and particularly rich in historical books and manuscripts relating to Peru; it was sacked by the Chilians in 1881, and, though it was reopened in 1884, only a small part of its priceless treasures has been recovered. The Dos de Mayo Hospital, built at an original cost of $1,000,000, has 700 beds, and is perhaps the finest edifice in the city. The exposition building, a kind of national museum, erected in 1872, is a very handsome edifice, and is surrounded by a beautiful pleasure-ground, now the favorite promenade. Another fine promenade is the Alameda, in the San Lazaro suburb; and there is a good botanical garden and a zoölogical garden in the outskirts. The Pantheon or principal cemetery is noted for its numerous fine marble monuments. The houses of Lima are generally made of sun-dried bricks, a sufficiently durable material in this dry climate; and the older ones have the second story projecting over the sidewalk; the better class are furnished with richness and taste. Clubs are numerous and popular. The society of Lima is noted through Spanish America for intelligence and culture. Many of the well-to-do families have residences at Miraflores by the seashore, a beautiful place which was destroyed during the Chilian invasion, but has been rebuilt; this and Chorillos, a favorite bathing-place, are connected with the capital by railway. The railway from Callao is continued in the Oroyo route, destined to open up Western Peru; and a line runs northward along the coast. Lima is the commercial metropolis of Peru, Callao being, for practical purposes, a portion of it; the most important exports are silver, gold, vicuña wool, hides, sugar, cotton, and cinchona. Population (1891) estimated at 103,556, which is probably below the truth. Paz Soldan (1877), rejecting the imperfect census of 1876, claimed a population of over 200,000. See Markham, *Cuzco and Lima*; Fuentes, *Estadística de Lima*; Vincent, *Around and About South America*; Childs, *Spanish American Republics.* HERBERT H. SMITH.

Lima: village; Livingston co., N. Y. (for location of county, see map of New York, ref. 5–D); on the Lima and Honeoye Falls Railroad; 4 miles S. of Honeoye Falls, 18 miles S. of Rochester. It is in an agricultural region; contains 4 churches, Genesee Wesleyan Seminary, 2 district schools, and a weekly newspaper; and has coal and lumber yards, wagon and blacksmiths' shops, and a machine-shop. Pop. (1880) 1,878; (1890) 1,003; (1900) 949.
EDITOR OF "RECORDER."

Lima: city; capital of Allen co., O. (for location of county, see map of Ohio, ref. 3–D); on the Ottawa river, and the Cin., Ham. and Dayton, the Erie, the Lake E. and W., and the Penn. railways; 130 miles N. by E. of Cincinnati. It is the center of the great Ohio petroleum and natural-gas fields, and since 1885, when petroleum was first discovered in the city, it has become one of the largest petroleum shipping-points in the country. It has one of the largest oil-refineries in the world, the shops of the Lake E. and W. and the Cin., Ham. and Dayton railways, and manufactures of straw-board, egg-case fillers, and of tools and machinery used in the petroleum and wood-working industries. There are 2 national banks with combined capital of $220,000, a State bank with capital of $50,000, a private bank, and 2 daily and 6 weekly newspapers. Pop. (1880) 7,567; (1890) 15,981; (1900) 21,723. EDITOR OF "REPUBLICAN-GAZETTE."

Limac'idæ [Mod. Lat., liter., those belonging to the slug family; *li'max* (= Lat. *li'max*, slug, snail), the typical genus + Gr. patronymic ending *-ίδαι*, plur. of *-ίδης*, descended from]: a family of gasteropodous mollusks of the order *Pulmonata*, distinguished by the elongated semi-cylindrical body, which is not distinguishable from the foot, the absence of any visceral sac, and the rudimentary character of the shell, which is concealed by the mantle; the respiratory orifice near the right posterior margin of the mantle; the anus close in front of the respiratory orifice; the jaws are ribless; the teeth of the radula in numerous rows. The family thus defined embraces the well-known slugs of the gardens, and in the U. S. includes two species introduced from Europe—viz., *Limax agrestis* and *L. flavus*. These are found in moist places under boards, stones, etc. They are herbivorous, and are frequently injurious to succulent young plants. Besides the introduced species, there is an indigenous form which is widely distributed in the U. S.—*Limax campestris*, Binney.

Lima e Silva, -ā-seel'vă, LUIZ ALVES, de (successively Baron, Count, Marquis, and from Mar. 23, 1869, Duke of Caxias): general and statesman; b. at Rio de Janeiro, Brazil, Aug. 25, 1803. His father, Francisco de Lima e Silva, was a distinguished soldier, subsequently general and regent in 1831. The boy entered the army as a cadet when only five years old, studied in the military academy, and in 1823 made his first campaign in Bahia. He fought in Uruguay 1825–28; was promoted to brigadier; was president of Maranhão Feb., 1840, to May, 1841, subduing a formidable rebellion; in May, 1842, was made vice-president and military commandant of São Paulo, which was also in rebellion, and finally defeated the insurgents at Santa Luzia Dec. 24, 1842. To subdue the formidable revolt in Rio Grande do Sul he was made president of that province Dec., 1842, and only retired in Oct., 1846, after complete peace was restored. In 1851–52 he was commander-in-chief of the Brazilian army which, in alliance with Urquiza, drove the dictator Rosas from Buenos Ayres. In June, 1855, he accepted the portfolio of war in the conservative ministry of the Marquis of Paraná, and by the death of that statesman Sept. 3, 1856, became premier, resigning May 3, 1857. Already in 1855 he had been chosen to the senate, and he was now acknowledged leader of the conservatives. From Mar. 3, 1861, to May 4, 1862, he was again premier. In Dec., 1862, he became marshal. When the war with Paraguay broke out he was at first excluded from active command owing to his political affiliations; but after the disaster of Curupaity he was made commander-in-chief of the Brazilian forces Oct. 13, 1866. During the ensuing operations he was twice left in command of the whole allied forces, and these intervals were marked by the great successes of the war, including the taking of Humaitá, Aug. 5, 1868; the victories before Asuncion Dec., 1868; and the occupation of that city Jan. 5, 1869. In Feb., 1869, he was relieved, owing to ill-health. The duke was again prime minister June 25, 1875, to Jan. 5, 1878, a period which included the absence of the emperor in the U. S. and Europe. D. at his estate of Santa Monica, province of Rio de Janeiro, May 7, 1880. He was the most distinguished soldier ever produced by Brazil, and the only duke created under the empire. See J. Pinto de Campos, *Vida do grande cidadão Luiz Alves de Lima e Silva* (Lisbon, 1878). HERBERT H. SMITH.

Limassol, lĕe-măă-sōl': port in Cyprus; on south coast; 40 miles S. W. of Nikosia; and chief place of the district of Limassol. Here the Ottomans landed in 1571 and took the island from the Venetians. Gypsum, raw umber, raisins, brandy, and an excellent wine are exported. Pop. (1891) 7,388. Three miles north are the ruins of Amathus, ancient capital of Cyprus, celebrated for its copper mines and its temple of Venus. E. A. G.

Limbo, or **Limbus** [from Lat. *lim'bus*, edge, border, *in limbo*, on the border—i. e. of hell]: the word limbus was first used by the scholastic theologians of the Middle Ages to designate, as being on the outskirts of hell, that place in which the souls of the just who died before Christ's resurrection were detained. In this sense it was, and still is, called the *limbus patrum*. It was a place of rest and joy, though imperfect, to the saints of the Old Testament, till Christ delivered them, and led them into heaven at the time of his ascension. It also means a place where the souls of infants that die without baptism are detained on account of original sin. In this sense it is called *limbus infantium*. Though the Church has not spoken on the subject, yet it is the common opinion of theologians that such infants suffer no "pain of sense," but are excluded from heaven. Some even hold that they know God by the use of their natural powers, and enjoy a certain degree of natural happiness.
JOHN J. KEANE.

Limborch, lim'bōrch, PHILIPPUS, van: theologian; b. at Amsterdam, June 19, 1633; studied theology under his uncle, Episcopius, and was appointed in 1657 minister of the Remonstrant congregation at Gonda, and in 1667 Professor of Theology at the Remonstrant College of Amsterdam, where he died Apr. 30, 1712. His *Theologia Christiana* (Amsterdam, 1686) gives a comprehensive and systematic exposition of the doctrines of Arminius. It was translated into English by W. Jones (London, 1702; 2d ed. 1713, 2 vols.).

His *Historia Inquisitionis* (1692) was translated by S. Chandler (*The History of the Inquisition*, London, 1731, 2 vols.). See his *Life*, by Van der Hoeven (Amsterdam, 1843).

Limbs, Artificial: artificial limbs are employed for two purposes—relief of deformity and restoration of function, so far as may be possible, after deprivation of a limb or part thereof. They first came into practical use during the early part of the sixteenth century, although in certain classical instances they had been resorted to before that. Of course the earlier forms were very imperfect, and could only be moved by the aid of the hands, or the one hand if only one were left. In a measure they served their purpose, and by their use men were enabled to engage in battle, guide their horses, and otherwise care for themselves. A little later efforts were made to permit natural movements of the lost parts, and thus for the iron hands which had been first used there were substituted contrivances of metal, leather, paper, etc. During 200 years or more the models were not materially altered. During the latter part of the eighteenth century a Carmelite monk made considerable progress by inventing a hand with movable joints, independent of assistance from the other hand. It was made of sheet-tin, and contained several springs. Since that time inventive spirit has produced very great improvements, and now artificial limbs are made with such perfection that under ordinary circumstances they not only do not attract attention, but give rise to no suspicion of their presence.

The chief materials in the construction of artificial limbs are English willow covered with strong rawhide, aluminium, rawhide, leather, and felt. The three latter materials are usually strengthened with steel or some other form of metal. The feet are of some firm material, such as wood or soft rubber. The best form of artificial limb is of English willow covered with rawhide, with a foot of the same material or of rubber. The construction of rubber feet is well shown by Figs. 5, 6, and 7. A wooden core is first carved of the desired shape and size. This is placed in an iron mold previously formed of proper dimensions and the rubber covering vulcanized over or around the wooden or inner portion. Feet constructed in this manner are firm, yet elastic, and give to the wearer many advantages in walking.

If the amputation be above the knee, a form like Fig. 1 is

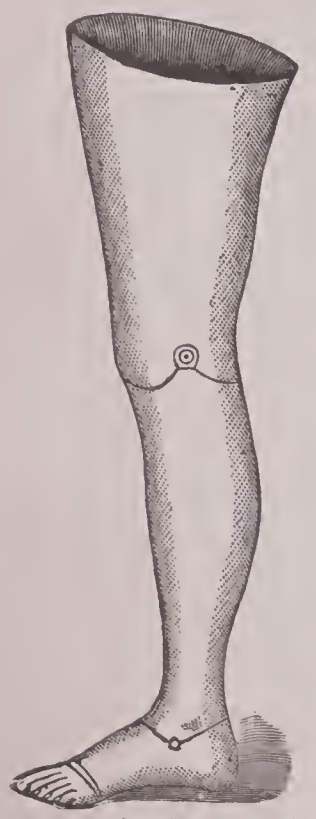


FIG. 1.—Showing an artificial limb for an amputation above the knee.

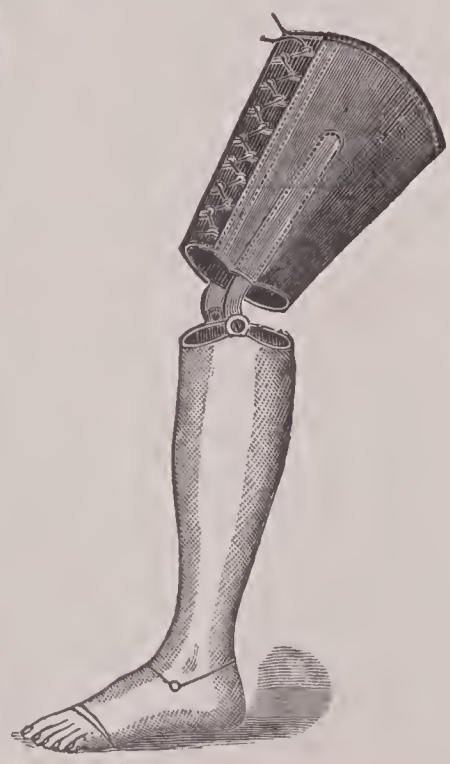


FIG. 2.—Showing an artificial limb for an amputation below the knee.

usually employed. It has plain antero-posterior movements both at the knee and ankle. If the amputation be below the knee, the upper socket or lacer is of leather, and is attached to the stump socket by means of lateral-joint irons as shown by Fig. 2. If the amputation has been made through or near the ankle, the apparatus need not reach above the knee, but may be constructed in some form resembling Fig. 3.

For amputations through the instep or arch of the foot an appliance like Fig. 4 may be used, and while it will not

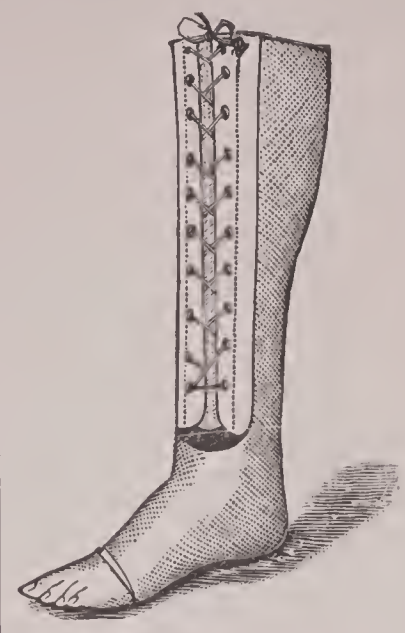


FIG. 3.—Showing an artificial leg for ankle amputations.

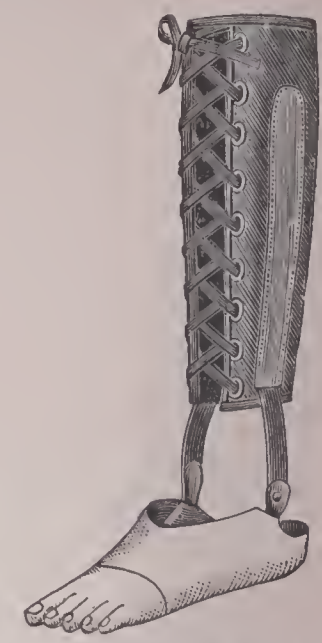


FIG. 4.—Showing an artificial limb for instep amputations.

prove so satisfactory as Fig. 2 or 3, it will be the best that, from the nature of the case, can be provided.

The weight of the patient is not, as many suppose, borne upon the end of the stump but is distributed over a large amount of surface by means of a conical-shaped socket fitting closely to the exterior of the stump. If, therefore, the patient be supplied with a painless stump that is absolutely conical—if it is of sufficient length to provide leverage with which to swing the limb, and has the firmness to bear the contact with the socket—the best of results may be expected.

In walking, the action of the natural leg is largely automatic. The limb is swung forward by such muscles as lie upon the pelvis, having their insertion in the upper portion of the femur. The knee is automatically self-locking, because the bearing of the ends of the bones forming this joint is posterior to a line drawn perpendicularly through the shafts of the tibia and femur. With the exception of the antero-posterior motion of the ankle, the latter is largely automatic in its movement, because independent of any attempt on the part of the patient the foot naturally accommodates itself to any inequalities of the ground.

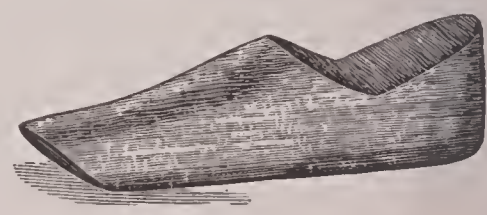


FIG. 5.—Showing the block of wood over which a rubber foot is molded.

In the construction of artificial limbs, these automatic movements are closely imitated, and many patients learn to accommodate themselves to the changed condition of circumstances to such an extent that their disability is unnoticed even among those with whom they associate daily.

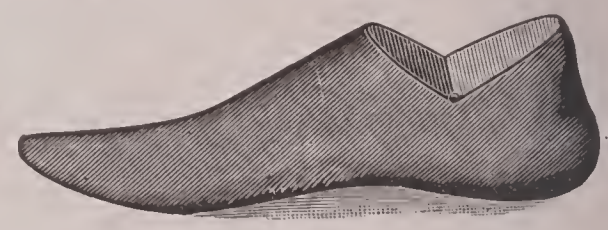


FIG. 6.—Showing a rubber foot.

Favorable cases do not exist among patients following amputations either in or near to an articulation. If an amputation is made through the knee-joint, the end of the stump necessarily occupies the space that should be employed for knee-joint mechanism. Fig. 8 shows the best form of a knee-bearing joint. It consists of a long, hollow cylinder supplied with a bushing of leather or other suitable material, and has a bearing throughout its entire length. If the amputation has been made through the joint, the instru-

ment-maker must make use of some form of a lateral-joint iron similar to Fig. 9. This pattern can not be made with

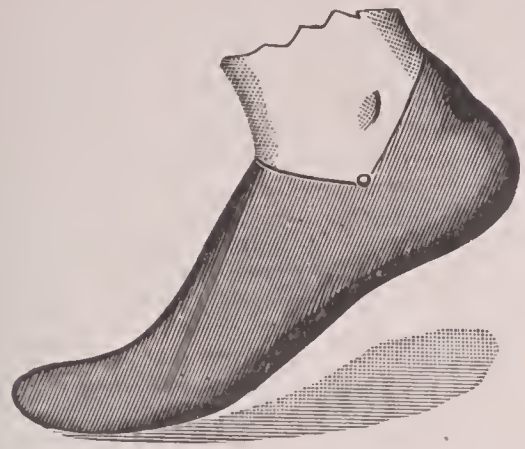


Fig. 7.—Showing how a rubber foot will bend in walking.

a bushing; it will not withstand much lateral strain, its bearing-surface is limited, and it will occasionally get out of order.

If an amputation has been made through the tibia nearer than 3 inches to the knee-joint, the short stump will contract, and the patient will be obliged to wear a knee-bearing or peg leg—one in which the weight is taken on the anterior aspect of the flexed limb. These are inefficient and usually unsightly appliances, and a patient supplied with an

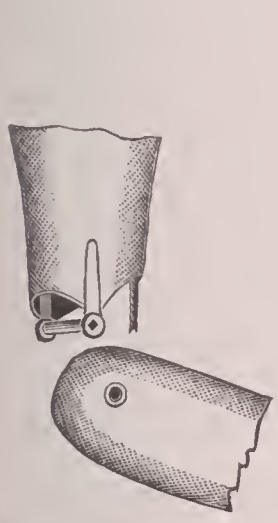


Fig. 8.—Showing a cylindrical or best form of knee-joint.

Fig. 9. — Showing a lateral knee-bearing joint iron.

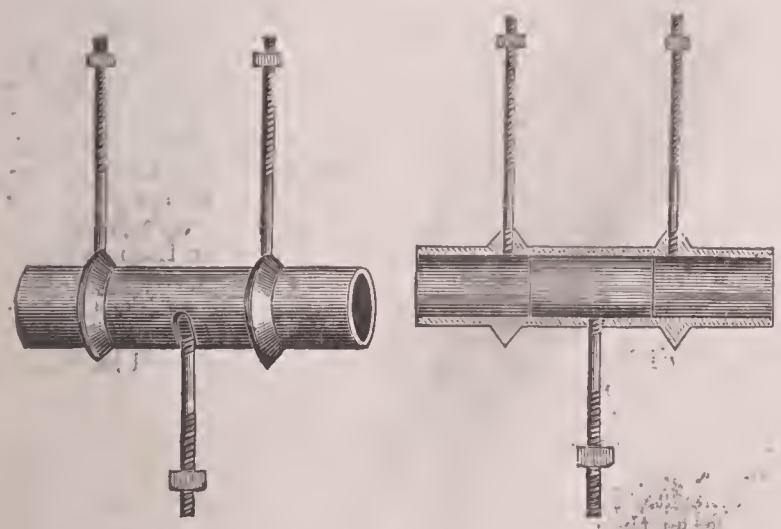


Fig. 10.—Showing the best forms of ankle-joint irons.

apparatus of this character will always walk with an awkward or clumsy gait.

The same rules that apply to amputations of the knee have equal force when considered in connection with amputations at the ankle; and in amputations at this point, unless there be sufficient space underneath the end of the stump for the insertion of a cylindrical form of joint similar to Fig. 10, the best of results can not be expected.

Natural walking is accomplished by exercising the lever principle illustrated in the extension of the foot. This principle is well exhibited in the flexion and extension of the foot while walking, the foot itself being the lever, the tendo Achillis or "hamstring" furnishing the power, the ground or floor the fulcrum, and the body the weight to be moved. To take a complete step forward necessitates the raising of the weight, because the trunk, at the time when the forward foot is planted on the ground (being then mid-

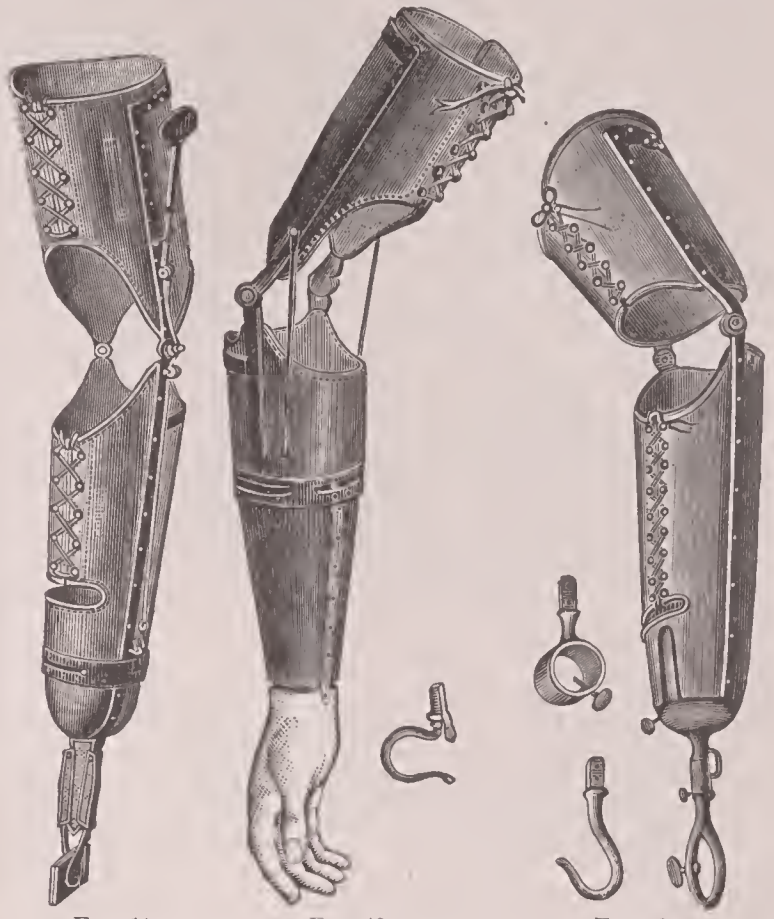


Fig. 11. Fig. 12. Fig. 13.

Figs. 11-13.—Showing forms of artificial arms and hands.

way between its two oblique supports), has dropped until the pelvis is on a lower plane than before the step was begun; the completion of the step requires the raising of the trunk to its original level. This elevation of the body is accomplished by the exercise of the lever power to which we have referred, because the extension of the foot then in the rear forces the body forward and raises it until the trunk is in a position perpendicularly over its advanced limb, and the step completed.

In walking, the heel and ankle rise on the ball of the foot, and by the lengthening of the limb caused by the extension of the foot the body is forced forward, and is raised by the changing of its supporting limb from an inclined to an upright position. This falling and raising of the trunk produce the undulating motion so noticeable in walking.

If one or both of these levers are amputated at points where they can not be artificially replaced, an awkward, limping gait will result. If one lever be removed it becomes necessary for the patient to take a shorter step with the sound limb, otherwise he would be unable, for the want of the extension previously referred to, to complete the movement—at least without undue exertion. It is evident that the longer the stride, the lower the level reached by the pelvis. The taking of a short step with the sound limb, however, does not entirely compensate for the loss of a foot, but usually compels the patient to adopt a lurching movement of the body. This lurching, due to rotation of the pelvis upon the hip of the sound limb, is frequently assisted by a greater flexion and extension of both knees. These movements, whether made use of singly or conjointly, are directed toward the accomplishment of the same result, viz., the forward propulsion of the body and the consequent elevation of the trunk until it has reached the level occupied by it before the step is begun. Patients who have suffered amputations of this class, after being provided with artificial substitutes, rarely walk so well (and to walk at all requires the outlay of more labor) as those upon whom the amputation has been performed through the tibia.

Owing to the manifold uses required of an arm, it has been impossible to furnish a good artificial substitute, and the surgeon should therefore exhaust the last resources of

conservative surgery in his endeavors to save every possible portion of this valuable member. When selected simply for dress an arm and hand closely resembling the natural one (see Fig. 12) should be adopted (the hands may be provided with articulations, and with them considerable work may be accomplished); if for a laborer, some form of a hook or clasp (see Figs. 11 and 13) will be found more serviceable than the complicated mechanism of an artificial hand. The former may be used as an assistant in performing a great deal of manual labor, and in point of utility it is much to be preferred.

Following amputations of a portion of the hand, appliances similar to Figs. 14, 15, and 16 can be constructed, many of which will prove of great satisfaction to the wearer. Where the surgeon has been enabled to leave a portion of a hand it is possible to construct an appliance that will afford the patient a fair degree of satisfaction, not only in point of utility but in general appearance.

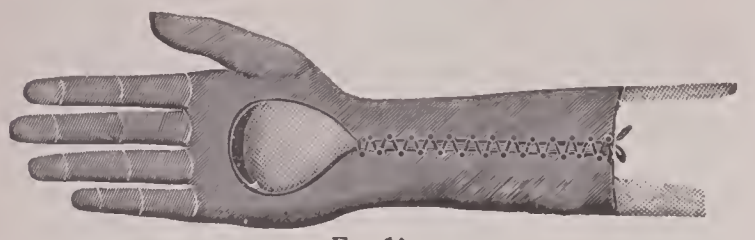


Fig. 14.

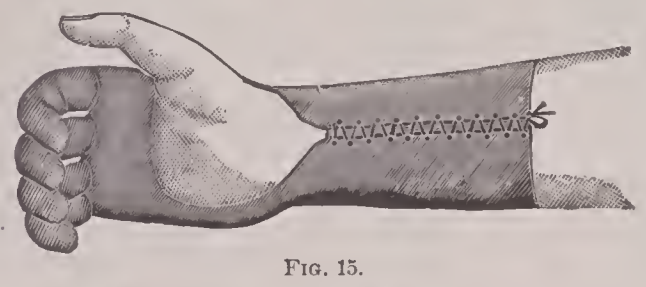


Fig. 15.

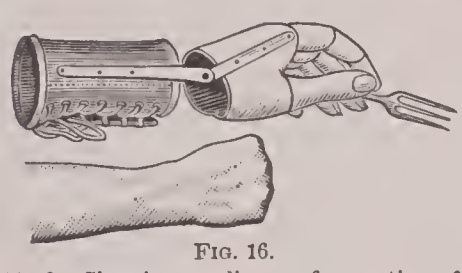


Fig. 16.

Figs. 14–16.—Showing appliances for portion of hand.

Most of the present devices are protected by patents, and are in the hands of a relatively small number of makers. To soldiers disabled while in U. S. Government employ the Government furnishes these artificial substitutes. Others procure them usually through dealers in surgical instruments, from whom catalogues, illustrations, and prices are easily obtained. It is of no small advantage nowadays both to surgeons and to patients to realize that the loss of a limb is not necessarily a disfiguring or mutilating affair, but that very frequently an artificial limb well fitted will be of vastly more service and less trouble and annoyance than a member already crippled by disease, or left in a condition where life even is thereby threatened. In other words, the art of the instrument-maker has done very much to assist the surgeon, and to make patients willing to undergo serious operations who otherwise would be very loath to lose so useful a part of their bodies as one or more limbs. It has done much also to atone for the horrible injuries and mutilation inflicted by railway and various other accidents.

Charles Truax.

Limburg (Dutch pron. lim'boorch), or **Limbourg** (Fr. pron. lăń'boor'): a territory extending along both sides of the river Meuse, which alternately belonged to the Netherlands, Belgium, France, and Austria, until it was finally divided between Belgium and the Netherlands in 1839. Along the Meuse the region is very fertile, affording excellent pasturage for large herds of cattle, but the rest of the country is sterile, the soil being either marshy or sandy. At Herve, not far from the city of Limburg, is made the celebrated Limburger cheese. *Dutch Limburg* comprises an area of 851 sq. miles, with 259,593 inhabitants, of whom nine-tenths are Roman Catholics; the principal towns are Maestricht and Roermond. *Belgian Limburg*, which contains some iron and coal mines, comprises an area of 932 sq. miles, with 223,531 inhabitants. Principal towns, Hasselt, St.-Trond, and Tongres.

Revised by S. A. Torrance.

Lime [O. Eng. *līm*, lime : O. H. Germ. *līm* > Mod. Germ. *leim* < Teuton. *lim-* < Indo-Eur. *limos* > Lat. *li'mus*, mud]: one of the alkaline earths, chemically the protoxide of calcium, symbol CaO. It forms the base of limestones, marbles, corals, and the shells of mollusks, where it is in combination with carbonic acid, forming the carbonate of lime. By the application of heat the carbonic acid is driven off, and the lime is left in the condition of "caustic" or "quick" lime. Lime is usually white, light gray, or cream-colored, porous, and soft. It rapidly absorbs water, uniting with it chemically, with the evolution of much heat. This process is called slaking or slacking. Pure or "fat" limes when slaked swell very much, and ultimately fall into a snow-white powder. If more water is added, what is called the "milk of lime" is formed. The lime is now in the condition of a hydrate, and if exposed to the action of the air it absorbs carbonic acid, and is again converted into the carbonate of lime. In the preparation of mortar, sand is added according to the richness or "fatness" of the lime—that is, according to the fineness and uniformity of the powder into which it falls when slaked. Where the powder is very fine it makes with water a fluid paste which will penetrate the interstices between the grains of sand, however closely they may be crowded. The thinner the film of paste between the grains of sand the stronger their adhesion will be. Hence the value of a lime is roughly measured by the quantity of sand it will serve to unite. Lime is largely used in agriculture as a dressing on soils which require calcareous matter, in the manufacture of bleaching-power (chloride of lime), in tanning, as a flux in smelting iron, etc. Lime is extremely infusible, and cylinders of this substance are commonly used in the oxyhydrogen or calcium light, a jet of the ignited gases being thrown upon a piece of lime, which when intensely heated emits a light so bright as to be almost unbearable to the eye.

The great consumption of lime, however, is in the production of mortar, and for this purpose it has been used in construction by all modern and most ancient civilized nations. In the earliest masonry of which any remains have been found, as the Etruscan, that of the island of Cyprus, and ancient Troy, walls were laid up with large stones without mortar ("cyclopean" masonry), or with smaller ones packed in clay, but by the Egyptians, Hebrews, Greeks, and Romans the use of lime for mortar was universal. In the manufacture of mortar from lime, as has been stated, the hydrate of lime is formed by the addition of water to quicklime. This is, in part, chemically combined with the lime, and produces the first "setting" of mortar. Subsequently, by the absorption of carbonic acid, it is converted into the hydrated carbonate. In process of time a combination is also formed between the lime and some of the silica of the sand with which it is associated, and silicate of lime is produced. By this the strength of the mortar is still further increased. This progressive change has been ascertained by careful analysis of many samples of older and newer mortars. These have shown that in the older mortars—which in some instances are as hard as the stones they join—the percentage of silicate of lime is much greater than in those more recently made.

The notion is commonly entertained by architects and masons that the best lime is produced from the purest carbonate of lime, and statements to that effect will be found in many books which treat of this subject. This theory, however, has been abundantly proved to be a fallacy, for it has been shown that nearly all the most extensively used and highly esteemed limes contain a large percentage of magnesia. Magnesian limes are preferred by masons, because, as they say, they are "cooler" and set more slowly. The pure lime is, in their language, too "hot" and "quick."

A similar fallacy prevails in regard to the use of magnesian limestones for fluxes in metallurgy. It is generally believed that pure limestones make much the best fluxes, but this is a mistake, as abundant experience has shown that magnesian limestones are quite as well adapted to this use as those which contain the carbonate of lime only.

Lime is manufactured from limestone, marbles, or shells, by calcination, which expels the carbonic acid. This is effected in kilns of various kinds. Formerly, lime-burning was done in kilns having the form of an inverted beehive, with a single opening at the bottom. In these the fuel and stone were mixed, the fire being lighted below. At the end

of three or four days, the fuel having been consumed and the limestone calcined, the charge was allowed to cool partially, and was then drawn out at the bottom. Now, lime-burning is nearly all done in what are called perpetual kilns. These are square or round towers, 25 to 30 feet in height, having a cylindrical cavity within, 5 or 6 feet in diameter. These kilns have usually two furnaces, one on either side, situated at about one-third of the height from the bottom. In these the fires are kept perpetually burning, and are fed with wood or soft coal, the flame and heat from which, passing up through the limestone, calcine it so that when it has descended to the level of the furnaces it is deprived of all its carbonic acid. From time to time the limestone is charged at the top and the calcined lime drawn out below. See KILNS.

When mortar freshly made from quicklime is placed in water, it softens and loses its form; but, on the contrary, the lime made from certain limestones which contain a large percentage of silica and alumina hardens under water, and forms what is known as hydraulic cement. When calcined, these hydraulic limestones yield a yellow or brown lime which does not slake or heat much on the application of water. From its hardness it must be ground in a mill before it can be used for mortar. Further particulars in regard to this class of lime will be found in the artiele CEMENT. See also Vicat *On Mortars* and Vicat's *Treatise on Mortars and Cements*; Pasley's *Limes, Mortars, and Cements*; Burnell's *Mortars, Limes, Cements, and Concretes*; and Gillmore's *Limes, Mortars, and Cements.*

Revised by CHARLES KIRCHHOFF.

Lime [from Fr. *lime*, from Pers. *līmū*, lime. Cf. LEMON]: the fruit of *Citrus acida* and *C. limetta* (the last called sweet lime), both probably mere varieties of *Citrus medica*, the citron-tree. The lime grows upon a dwarfish tree or shrub, and is a native of Asia, but is cultivated in nearly all warm regions. Limes are in nowise inferior to lemons, for which they are used as a substitute. The limes of the West Indies and those mostly known in the markets of the U. S. are the *sour limes*—the *Citrus acida* of many botanists. Pickled limes are prized as a condiment. Lime-juice is extensively employed in ships' stores as an antiscorbutic. Citric acid is largely manufactured from it. Lime is the usual English name of the linden-tree (genus *Tilia*).

Revised by L. H. BAILEY.

Lime, Chloride of: See HYPOCHLOROUS ANHYDRIDE and HYPOCHLORITES.

Lime-light, frequently called from its inventor, THOMAS DRUMMOND (*q. v.*), the **Drummond Light**: a source of illumination consisting of a cylinder of lime (Ca O) against which the flame of an oxyhydrogen burner plays. The refractory oxide becomes brilliantly incandescent, and affords a source of light inferior in whiteness, among artificial illuminants, only to the *arc-light* and to that of burning magnesium. When first ignited, indeed, the incandescent lime exceeds in brilliancy the arc, and nearly or quite equals the magnesium light. It very soon depreciates in quality, however, and when it reaches its permanent condition it gives light of a lower degree of incandescence than either of these.

Comparisons of the lime-light with gas-light show the following result, the data being reduced for the purpose so as to represent lights equally bright in the yellow ($\lambda = 0{\cdot}589$):

Relative intensities of lime-light and gas-light for various wave-lengths, both taken as unity in the region of the D. line ($\lambda = 0{\cdot}589$).

REGION OF THE SPECTRUM.	LIME FRESHLY IGNITED.	LIME IN FINAL STATE OF INCANDESCENCE.
	Lime-light / Gas-lamp.	Lime-light / Gas-lamp.
$\lambda = 7530$	0·65	0·49
6685	0·76	0·72
6562	....	....
6080	0·89	0·89
5890	1·00	1·00
5570	1·24	1·18
5185	2·10	1·32
5180	....	....
4920	3·84	1·62
4685	5·38	1·81
4500	10·80	2·08

The results given in this table are from measurements made by Nichols and Franklin in 1888 (*American Journal of Science*, vol. xxxviii., p. 100). They are shown graphically in curves of Fig. 1.

Owing to the cost of oxygen gas, the lime-light is used only for special purposes, viz., for producing spectacular effects upon the stage, for the projection of transparencies by means of the magic lantern, etc. For these purposes, too, it has been in some measure superseded by the more powerful electric arc-light. Other refractory oxides are sometimes substituted for the lime in the Drummond light, generally magnesium oxide and the oxide of zirconium. Of these the latter, zircon, is probably the best substance for the purpose, but its rarity has prevented it from coming into general use.

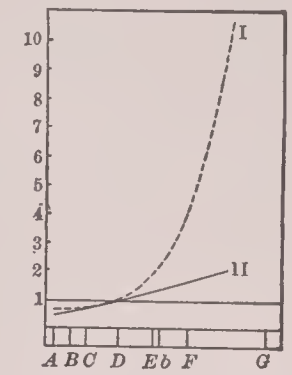


FIG. 1.—Curves of relative intensities in the spectrum of the lime-light as compared with gas-light. Curve I. gives results of measurements upon the freshly ignited lime. Curve II. upon lime in permanent state of incandescence.

The essential features of the simplest form of burner for the lime-light are shown in Fig. 2.

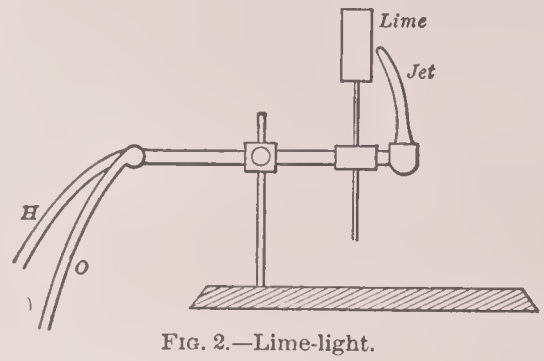


FIG. 2.—Lime-light.

See, further, articles ELECTRIC LIGHTING and MAGIC LANTERN; also Dolbear's *The Art of Projection*, and Wright *On Light*.

E. L. NICHOLS.

Lim'erick: county; in the province of Munster, Ireland; bounded on the N. by the estuary of the Shannon and the counties of Clare and Tipperary, on the E. by Tipperary, on the S. by Cork, and on the W. by Kerry. Area, 1,064 sq. miles. The surface is mostly an undulating plain on a subsoil of limestone, trap, and sandstone, comprising the larger portion of the so-called Golden Vale, and watered by the Shannon, which is navigable up to Limerick, the Maig, which rises in the Galtees, flows into the Shannon, and is navigable up to the town of Adare, the Deel, and the Mulcair. Toward the S., however, the ground rises into the picturesque Galtee Mountains, which extend into the county of Tipperary and have in Galtymore an elevation of 3,015 feet. In the mountainous districts the soil is poor and incapable of improvement, but the Golden Vale comprises the most fertile districts in Ireland. Besides agriculture, some manufactures of coarse woolens and paper are carried on, and there is a considerable number of flour-mills; but the flax-spinning and weaving industry has become almost extinct. The population, which in 1841 amounted to 331,003, had in 1891 decreased to 158,912. This decrease was chiefly the result of emigration. The county belonged originally to the kingdom of Thomond, and was inhabited by the Coriandi; afterward it became an independent state, under the name of *Aine-Cliach*, and from the eighth to the eleventh century it was partially occupied by the Danes. The county is, however, not particularly rich in interesting antiquities.

Limerick: city of Ireland; capital of the county of Limerick, province of Munster; on both sides of the Shannon, which is crossed by five bridges and lined with docks (see map of Ireland, ref. 11–E). On the western bank of the river stands Irish Town, on the eastern Newtown Pery, and on an island in the river English Town; but the first and the last parts of the city are occupied by the poorer classes, and consist mostly of mean houses. All the principal buildings, streets, and squares are in Newtown Pery. The city has distilleries, tanneries, flour-mills, flax-spinning and weaving factories, and lace-manufactures, and its port is the fourth in importance in Ireland. It admits vessels of 1,000 tons. Limerick was taken in 1651 by Gen. Ireton, and was the last place in Ireland which surrendered to William III.; on that occasion a treaty was signed (1691) granting certain rights to Roman Catholics. Its prosperity dates mainly from the

founding of Newtown Pery, in 1769, by Sexton Pery. Pop. (1891) 37,155.

Limestone: a sedimentary rock composed chiefly of calcium carbonate. It may originate by precipitation of the mineral from solution in the water of ocean or lakes, but this process is usually supplemented or replaced by an organic process, the material being secreted by aquatic animals or plants to form their tests or other hard parts. These parts are not decomposed after death, but accumulate in layers which are afterward consolidated by the precipitation of calcium carbonate in the interstices. Such a deposit if incoherent, is called *shell marl* or *calcareous marl*, and a special variety of fine texture is called CHALK (*q. v.*). *Coquina* is a porous but coherent variety occurring in Florida. *Oölite*, or oölitic limestone, is composed of spherical grains believed to be secreted by algæ. When precipitated limestone, instead of crystallizing, gathers in successive coherent stony layers it is called *tufa*. Usually such deposits occur in springs or streams, but they may be formed in lakes. The ornamental stone called *Mexican onyx* is a tufa. Some limestones consist partly of magnesium carbonate, and are called *magnesian* or *dolomitic limestones*. All other substances contained in limestones are regarded as impurities. *Arenaceous* and *argillaceous* or earthy limestones are characterized severally by notable amounts of sand and clay. In *cherty* limestone silex is segregated in concretionary masses called chert or flint. Pure limestone is white, a yellow color is sometimes given by iron oxide, and gray, the ordinary color, is commonly due to organic matter. By metamorphism limestone becomes marble. The limestones constitute about one-fifth of all sedimentary rocks. They are extensively used as building material (see BUILDING-STONE), in the construction of roads (see ROADS), as a source of LIME (*q. v.*), and for the fluxing of ores (see FLUX).

G. K. GILBERT.

Limestone Sink: See SINK-HOLE.

Lime-tree: See BASS and LINDEN.

Limicolæ [literally "mud-dwellers," from Lat. *limus*, mud + *co'lere*, to dwell]: an order of birds containing those small waders comprehensively termed snipe or plovers, having slender, soft, and often long beaks. The palate is schizognathous, the nostrils usually schizorhinal; there are basipterygoid processes and the angle of the jaw is produced. The toes are only exceptionally, as in the avocet, webbed; the wings are generally long and pointed, the tail short. The eggs are usually four in number, pear-shaped; the young are born downy, and run about as soon as hatched. See AVOCET, LAPWING, PLOVER, and SANDPIPER. F. A. LUCAS.

Limitation of Actions: in law, the limitation of the time within which actions may be brought to enforce rights.

History of the Doctrine.—In the older *Roman law* all rights of action were in principle unlimited or perpetual. Actions *in rem*, for the recovery of land or movables, of course perished when the property had passed into the ownership of an adverse possessor by *usucapio*, but in this case the right of action was lost simply because the substantive right on which it rested had been extinguished. (See PRESCRIPTION.) The first true limitation of action was introduced by the prætors and ædiles when they began to give equitable actions unknown to the older law. (See ROMAN LAW.) Many of these new actions were limited or temporal, and limited to very brief periods—from sixty days to a year—but in computing these periods days on which the plaintiff could not have brought suit (e. g. legal holidays) were not counted. Even the prætorian actions, however, were usually perpetual when they ran for recovery of property or its value, and only the actions which aimed at imposing penalty upon the defendant were regularly limited. Later imperial legislation subjected all actions to shorter or longer periods of limitation, and in Justinian's time the so-called perpetual actions were merely actions that ran for the longer periods—thirty or forty years.

In the prætorian procedure the plea that an action was extinguished by limitation was a plea of *tempus*; and at the time of the classical jurists this plea was put at the head of the formula or abstract of pleadings sent to the referee (*judex*), and was therefore termed a prescription (*præscriptio longi temporis*). The same form was used in pleading right derived from long and undisturbed possession. Hence mediæval jurists treated the acquisition of title by adverse possessors and the loss of rights of action by limitation as a single legal institution—viz., prescription; and the same confusion exists in the *Code Napoléon*. Modern European jurists and later codes distinguish the prescriptive acquisition of rights in things from the limitation of actions, but they still use the word prescription (German *Verjährung*) to cover both classes of cases. It was partly because of the mediæval confusion of ideas that the *canon law* declared that "no prescription should be good without good faith," a principle which at Roman law did not apply to limitation of actions, but only to prescriptive acquisition of rights. Mediæval practice applied this canonical rule to the limitation of actions only in case the action was for recovery of tangible property from an adverse possessor, but even in this restricted interpretation the rule has been rejected in all the great modern codes.

Following the initiative of the *Code Napoléon*, modern legislations have considerably shortened the Roman periods of limitation for all actions that arise in the ordinary course of trade and in the dealings of daily life, adopting terms ranging from six months to five years; but for other actions they generally retain the subsidiary term of thirty years.

Roman and Modern European Rules.—At bottom it is the non-enforcement of the right, of which the action is only an expression, which entails the loss of the action. For this reason modern German jurists speak of limitation of claims rather than of actions. Limitation in fact begins to run not merely from the time when suit can be brought (*actio nata* in the concrete sense), but from the time when satisfaction of the claim can be demanded. Conversely, limitation is *interrupted* by any exercise of the right (such as the retention of a pledge by way of security, or the receipt of interest or of a payment on account), and in some modern legislations by any express recognition of the claim by the adversary. Limitation is also interrupted by bringing action.

At Roman law the loss of the action by lapse of time was viewed as a just punishment of the negligence of the party entitled to sue. Hence limitation did not run against those who could not sue—against lunatics, for example, or boys under fourteen years of age; nor did any but the longest limitations run against minors (youths between fourteen and twenty-five). Some of the modern codes declare that no limitation will begin to run against lunaties or minors, but that limitations already running may be completed. The general tendency of modern European legislation is to permit limitation to run against minors and lunaties, at least when they are under guardianship.

What effect the loss of an action has upon the substantive right of which it is an expression is a question differently answered in the case of rights *in rem* and in that of rights *in personam*. The loss of an action *in rem*, even against an adverse possessor, leaves the property right theoretically intact. (Not so, however, in the *Code Napoléon*. See PRESCRIPTION.) In the case of the right *in personam*, on the other hand, most European jurists hold that when the action is no longer enforceable there is nothing left. In other words, they hold that statutes of limitation, as far as actions *in personam* are concerned, destroy the right as well as the remedy.

Not all actions, according to the better opinion, are subjected to limitation. Actions that do not aim at the enforcement of a claim against a special defendant, but at determining *status* (the existence or validity of a marriage, the legitimacy of a child, etc.), and in general all actions the object of which is to ascertain the existence or non-existence of a legal relation, the genuineness of a document, etc. (Germ. *Feststellungsklagen*), are not, in principle, limited. At Roman law such suits were not termed actions, but *præjudicia*.

Grounds of Limitation.—Apart from the theory already noticed, that the loss of the action is a just punishment of the negligence of the person entitled to sue, other considerations have been urged. One is that old claims are very likely to be bad claims that have been purposely held back until it has become difficult for the defendant to disprove them. Another consideration is the increasing difficulty, as time goes on, of proving that a debt has been paid. From this point of view statutes of limitations are intended to protect honest defendants by raising a presumption that the claim, if originally good, has been satisfied. This was clearly the view of the French codifiers, at least as regards some of the briefer limitations of the code; for when such a limitation is pleaded the *Code Napoléon* permits the plaintiff to compel the defendant to take oath to the fact of payment (art. 2275). Short terms of limitation have also been defended by German writers on the ground that they discourage long credits and keep business on a solid basis.

The fundamental principle on which statutes of limitation and laws of prescriptive acquisition alike rest is the social necessity of doing away with uncertainties of title and disputed claims. If such matters are not settled by adjudication, they must be settled by time. Cicero expressed this thought in saying that there must at some time be "an end of litigation and the peril of suits," and the English courts have insisted upon the same idea in declaring that statutes of limitation are "statutes of rest."

LITERATURE.—Windscheid, *Die Actio* (Düsseldorff, 1856); Puchta, *Institutionen*, sec. 208 (8th ed. Leipzig, 1875); *Motive zum Deutschen bürgerl. Gesetzbuch*, i., 288–347.

MUNROE SMITH.

LIMITATION IN ENGLISH AND U. S. LAW.—At common law a presumption of payment or satisfaction arose after the lapse of twenty years. This presumption threw upon the complaining party the burden of proving that the debt had not been paid or the claim satisfied; but the fact that this presumption could be rebutted and the claim asserted, even after the twenty years had elapsed, rendered it a very inadequate rule of limitation. It has accordingly been supplemented by a considerable body of direct legislation, which has taken its place in our law alongside of the legal presumption referred to. Various statutes of this kind have been enacted in England at different periods, but those which were first adopted were narrow in scope, applying only to actions relating to real property. The first statute to be enacted of a comprehensive character, applying to civil actions in contract and in tort, as well as to actions concerning real estate, was passed in the reign of James I. (21 James I., ch. 16). Upon this statute the various statutes of limitation enacted by the different States of the U. S. have been chiefly based, its principal provisions having been frequently adopted with but slight if any modification.

The rules relating to actions of tort and to actions concerning real property, as well as the statutes of limitation which have been enacted with reference to suits in courts of equity and to criminal prosecutions, may with most convenience be considered separately from those relating to contract.

I. *Actions upon Contract.*—It is provided by the statute of James that "all actions of account and upon the case, other than such accounts as concern the trade of merchandise between merchant and merchant, their factors, or servants, all actions of debt grounded upon any lending or contract without specialty, all actions of debt for arrearages of rent, shall be brought within six years next after the cause of such actions, and not after." Before the enactment of this statute there was no limit to the period within which an action upon contract might be instituted. It was a maxim of the common law that a "right never dies," and it could therefore not be barred or extinguished by any lapse of time. The object sought to be attained by the enactment of these provisions limiting the right of action to a specific and comparatively brief period was to relieve debtors from the undue embarrassment and hardship naturally attendant upon harassing litigation at remote periods of time, when vouchers and other instruments of evidence are likely to be lost or destroyed, or it has become unreasonably difficult or impossible to procure the necessary testimony. The statute is in furtherance of the principle that "the law favors those who are vigilant, not those who sleep upon their rights," and aims to promote the diligence of creditors in enforcing their claims while an adequate defense, if any can be made, is reasonably practicable. The limit of time assigned is necessarily arbitrary, though it was undoubtedly fixed upon with reference to two important considerations: first, that the creditor should not be forced to undue haste in bringing action before time was given to collect all necessary testimony, to employ other means of effecting a settlement, or to wait until an impoverished debtor might become capable of satisfying the claim; and, secondly, that the debtor should not be unwarrantably prejudiced in his interests by the creditor's excessive delay. For these reasons the statute is commonly termed in law a "statute of repose," because its purpose and effect are to quiet old and stale claims, to extinguish causes of litigation, and to relieve debtors from oppressive suits. There has been, however, no little conflicting adjudication in the courts as to whether it should be deemed a statute of repose or one of presumption. The decisions sustaining the latter doctrine proceed upon the ground that a creditor's claim is not to be enforced at the expiration of the prescribed period, because it is then presumed in law that it has been satisfied. It is now to be considered as the generally established rule that the statute is one of repose, founded upon principles of expediency and public policy, and not one of legal presumption. It may be briefly stated as the substance of the statute that it requires actions upon simple contracts (i. e. contracts not under seal) to be brought within six years after the cause of action accrues. The time when the cause of action accrues and from which the six years are to be reckoned is the time when the creditor could have begun his action. Thus if credit be given, the statute begins to run when the term of credit expires. If a bill of exchange be payable at sight, the six years are computed from the date of presentment; but a note payable on demand is due at any time, and the statute runs from the making of the note. If, however, the note be drawn payable a certain time after demand, a demand must be made to fix the beginning of the period of limitation. If a bill or note have days of grace, the statute runs from the time of their expiration. If a debt be payable by installments, the statute begins as to each installment from the time when it becomes due.

It is a general principle applicable to statutes of limitation that they do not apply to actions brought by the crown or state, unless there be an express provision in the statute to that effect. It was a maxim of common law that "time does not run against the king." Special provisions are generally adopted at the present day barring the right of the state to recover real property after a certain specified interval; but the rule as applicable to actions upon contract is not so frequently changed.

The statute also provided that actions upon contracts under seal, or *specialties*, should not be included within the prescribed period of limitation. Accordingly, the defendant in such an action had only the imperfect protection afforded by the disputable presumption of payment after twenty years, which has been above described. It is now provided in England and in most of the U. S. by statute that actions upon sealed instruments shall be begun within twenty years after the cause of action accrued. The bar of the statute may be removed in any case by a new promise to pay the debt, or by a part payment of its amount or of interest thereon, made within six years before action is brought for its recovery. The statute begins to run anew from the time of the promise or payment. This is true whether the six years have wholly or partially expired. The new promise may be either express or implied. It will generally be implied from an unconditional and unqualified acknowledgment of the existence of the debt, if unaccompanied by any refusal to pay or by any declarations showing an intention to rely upon the statute as a defense. In former times, when the statute was generally held to be a statute of presumption, very slight and trivial admissions of the debtor from which the existence of a debt could be inferred were fastened upon by the courts as sufficient evidence of a new promise, because they served to repel the presumption of payment. It was even generally held that the debtor would be liable though his admission were accompanied by a refusal to pay; but when the statute came to be regarded as a statute of repose the natural deduction was that the debtor might take advantage of the statute, unless he voluntarily waived it by an express promise or by an acknowledgment so full and unequivocal as to be equivalent to a new promise; and this is now the established rule. It is provided in Great Britain by Lord Tenterden's act that no promise or acknowledgment shall be sufficient to take a debt out of the operation of the statute unless it be contained in some writing to be signed by the party chargeable thereby. This act, however, it is declared, shall not alter the effect of any payment of principal or interest. Similar statutes have been adopted in a number of the U. S.

The statute of James provides that if the plaintiff be under certain disabilities at the time when the cause of action accrues, he may bring his action within six years after the disability ceases or is removed. The disabilities enumerated are minority, coverture, or marriage, imprisonment, unsoundness of mind, or absence beyond the seas. The expression "beyond seas" means beyond the four seas surrounding Great Britain, and therefore is equivalent to "out of the realm or country." The same phrase, as contained in statutes of limitation in the U. S., has been usually interpreted to mean "out of the State," though in some States it has been held to mean "out of the U. S." It was also provided by the statute 4 Anne, ch. 16, that if the *defendant* in any action shall at the time when the cause of action accrues be "beyond seas," the action may be brought

against him within six years after his return. It has been generally held under this statute that the return must not be clandestine, and with an intent to set the statute in motion, and then depart without giving the creditor an opportunity to enforce his claim. It must be so public and made under such circumstances of notoriety as to render it presumable that the creditor might by ordinary diligence have acquired information of the return and set the machinery of the law in motion against the debtor. This exception is usually held to apply to foreigners as well as non-resident citizens, and they may be sued within six years after coming within a state, even though the debt may be barred by the statute of their own state; for it is a general principle in reference to statutes of limitation that they are controlled in their operation and effect by the *lex fori*, or the law of the place where a suit is brought to enforce a legal demand. (See INTERNATIONAL PRIVATE LAW.) Similar exceptions and disabilities are usually included in the statutes of limitation in force in the U. S. It is the general rule, also, that when fraud has been committed by the defendant under such circumstances as to conceal from the plaintiff all knowledge of the fraud, and prevent him from asserting his right, the bar of the statute may be avoided and the six years computed from the discovery of the fraud.

The statute of limitations is held to affect the plaintiff's remedy, but not his right. Hence, though the remedy be lost by the expiration of the prescribed time, any lien which the creditor may have will not be extinguished. So a promissory note may be barred, while a mortgage given as security for its payment may be enforced by foreclosure after the six years have terminated. Moreover, it is held that the enactment by a State of a statute of limitations barring a right of action after the lapse of a certain interval, and operating prospectively, is not in violation of that clause of the U. S. Constitution which provides that "no State shall pass any law impairing the obligation of contracts," since the "obligation" of the contract still subsists, though the creditor is deprived of the regular legal means of enforcing it.

II. *Actions of Tort.*—The common-law theory of the action in tort, as a purely personal action which could not survive the parties to it, afforded a certain, if somewhat indefinite, limitation upon actions of this nature. Whereas rights of action for breach of contract would usually devolve upon the executor of the person entitled, and rights of entry upon land would descend to the heir of the person who died without exercising such rights, the right of action for a tort died with the death of either party to the tort. Obviously, there was need of shorter periods of limitation for actions of this nature, and this need also was supplied by the statute of James. The periods of limitation prescribed by this statute in cases of tort are as follows: In actions of trespass for injuries to real or personal property, in actions of trover, of detinue, of replevin, and of case (except for slander), six years after the cause of action accrues; in actions of trespass for assault, battery, or false imprisonment, four years; and in actions for slander, two years. (See TRESPASS, TROVER, CONVERSION, DETINUE, REPLEVIN, and CASE.) These are the periods still established in Great Britain. In the U. S. similar statutes generally exist, applying to the same forms of action, or the same classes of tortious injuries, though there is no such general agreement among the various States in regard to the periods of limitation prescribed in these actions as in relation to actions upon contract.

III. *Actions Relating to Real Property.*—By the statute of James it was further provided that no person should make entry into lands, tenements, or hereditaments but within twenty years after his right should first accrue. This provision, supplemented by later legislation, has operated to set up an absolute bar against actions for the recovery of real property in all cases where the rightful owner has been excluded from the possession of the property for twenty years. By the English law persons under the disabilities of infancy, lunacy, or coverture, and those beyond seas are to be allowed ten years from the termination of the disability to enforce their rights, but no action can be brought by any one after forty years. Statutes of a similar character exist in all of the U. S., and though these American rules differ much in detail and in scope, the English period of twenty years has usually been adopted as the time of limitation. The list of disabilities has also been somewhat reduced in the U. S., coverture, or marriage, having by recent legislation in many States lost the character of a disability, and absence "beyond seas" not being generally regarded as a ground for claiming exemption from the general rule of limitation. It should be added that in Great Britain as well as in the U. S. the only disabilities which are permitted to delay the running of the statute are such as exist at the time the right of action first accrued. No subsequent or intervening disability will be regarded, and no original disability can be extended by "tacking" another subsequently incurred. Thus a woman who is disseised during minority can not prolong her period of disability by marrying before she comes of age. Disabilities under the statute relating to actions upon contract and in cases of tort are similarly dealt with; but whatever may be the differences between the several statutes of limitation, their practical operation is substantially the same. A person who is deprived of the possession of his land by an adverse occupant for the statutory period is forever prevented from recovering it, and is thus, to all intents and purposes, divested of his ownership. The apparent effect of the statute, then, is to vest an indefeasible title in the adverse possessor, or, as it is sometimes expressed, to transfer the title from the original owner to the one who has maintained the adverse possession against him. It would, however, be a more accurate description of the process to speak of it as confirming to the adverse possessor the undisturbed enjoyment of a title acquired by him by his original act of dispossessing the former owner. So important was the actual visible possession of lands deemed to be at common law that the mere disseisin of one man by another operated to transfer the freehold from the former to the latter. The person who had thus been deprived of his property had certain rights of entry and of action, by the exercise of which he might show that he was entitled to have the lands restored to him; but, in the meantime, not all of these rights together amounted to a title, nor even to an interest in the property, and they were so precarious in their nature that they might be lost or barred by a variety of circumstances. The true effect of limitation, therefore, on the interests of the parties is not to create any new property rights, but only to cut off certain rights of action which had survived the loss of property rights by disseisin. In either view, the property has, upon the expiration of the period of limitation, become so effectually vested in the disseisor, or adverse possessor, that he can divest himself of it only by the ordinary means of conveyance. Even an abandonment of the property to the original owner, after twenty years' adverse possession, will not have the effect of restoring the title to the latter.

This explanation will help to make clear the distinction between limitation and the related doctrine of *prescription*. The latter term designates the process of acquiring by lapse of time rights of user or enjoyment in the land of another. These rights, known variously as *easements* and *profits*, are properly conferred by grant, or deed; but the courts will, after the right has been exercised for a certain length of time, conclusively presume that it was originally conferred by grant. Of course this so-called conclusive presumption is only a clumsy fiction for the rule of law that rights in the nature of easements and profits may be acquired by their enjoyment during the period of prescription. The doctrine of prescription has been developed almost exclusively by judicial decision, and is not, in the U. S. at least, usually regulated by statute. (See PRESCRIPTION.) The doctrine of limitation is, in its present form, purely the creature of statute law, and is, properly speaking, confined to corporeal property.

The act of disseisin which, under the description of adverse possession, deprives the rightful owner of his lands consists in the taking possession of the property with the intention of claiming the same as owner, or, in the language of the common law, it is "possession as of the freehold." This intention is of the essence of the act; consequently no squatter or other trespasser, who enters upon the lands of another without this intention, is a disseisor, and no statute of limitation runs in his favor. The question of the motive or intention with which an entry is made is always one of fact for the jury. In order to raise this question of fact, however, there must first have been a distinct and unequivocal entry upon another's lands, under such circumstances that it shall at least be open to the construction of being a hostile or adverse act. Thus no length of time will render a tenant's possession adverse to his landlord. Neither can a tenant, by any declarations or conduct on his part during the continuance of his term, confer upon himself the rights of a disseisor. Even after the expiration of his term, if he continue in possession, he does not lose the character of a ten-

ant, and his possession is always in subordination to his landlord's title. In New York and some other States it is now provided by statute that a tenant may be deemed an adverse possessor after twenty years from the expiration of his term or the last payment of rent. In such cases the statute of limitations begins to run at the expiration of such twenty years. So, also, the disseisin, in order to confer upon the disseisor an estate in fee, must operate upon every freehold interest in the estate in question. In other words, the disseisin of a tenant does not in general set the statute running against his landlord until the tenant's term has come to an end. Until such time the landlord, who is deemed to have only a future estate in the lands (see LANDLORD AND TENANT), can not bring ejectment for the premises, and consequently his right of action has not, in the language of the statute, "accrued." He will usually, therefore, have twenty years after the tenant's term has expired in which to bring his action for the recovery of the property.

It has been observed that adverse possession in order to "ripen into title," as it is often expressed, must be accompanied with an intention to claim title to the land occupied as against any and all other persons claiming the same; but so long as this intention exists it is immaterial whether the adverse possessor acted with knowledge of any claim hostile to that asserted by him or not. Thus if a person innocently incloses a part of his neighbor's land with his own and occupies it as his own for the requisite time, he has as effectually displaced his neighbor's claim and title as though he had knowingly and wrongfully seized and occupied the land in question. This has been denied in a few States (especially Iowa and Kansas), but is the generally accepted and more reasonable doctrine.

There has been no little controversy as to what acts of occupancy shall be sufficient to raise a presumption of adverse possession. It is difficult to lay down any general rules on the subject, as the same acts may require a different construction according to the nature of the land upon which they are committed. Conduct which would amount to an assertion of ownership in the case of woodland or pasture land might amount to nothing more than occasional acts of trespass on a cultivated farm or a city lot. In general it may be said that in order to give possession the character of a disseisin it must be accompanied with the habitual cultivation of the land or by a substantial inclosure or other permanent improvement of the premises. In other words, it can not be a secret possession, but must be "actual, visible, and notorious." It is not necessary that the rightful owner shall know of the adverse possession, but it must be of such a character that he may with due vigilance become aware of it.

As would naturally be expected, a person will usually gain title by disseisin only to so much land as is actually held by him in the adverse possession above described. It must appear that he has actually cultivated, or inclosed, or improved all of the land so claimed by him; but there is one class of cases in which an adverse possessor may acquire title to more land than he has actually inclosed or reduced to possession, and that is where he claims under a deed or will which describes the tract or parcel of land claimed. In such cases the adverse possessor is said to occupy under "color of title," and has "constructive possession" of the whole tract described in the instrument under which he claims. There must, however, in every case in which this doctrine is invoked be actual possession of a part of the lot or parcel described, and the courts have refused to extend the principle so as to give constructive possession to very extensive tracts of land, especially where but a small portion of the tract claimed has been actually occupied. This doctrine of constructive possession does not prevail in England. Of course no "color of title" or claim of right, in the proper sense of that term, is requisite to confer title by disseisin where the possession relied upon is of the proper character. The only title which need be claimed in such cases is the title acquired by the disseisin.

It is obviously necessary that the adverse possession, in order to bar the rightful owner, shall be *continuous* during the whole period of limitation. Any abandonment of the possession by the disseisor before the period has run its course at once restores the title to the original, or "rightful," owner, and the return of the adverse possessor, or the entry of a stranger, constitutes a new disseisin and the beginning of a new period of limitation. It is a general rule that successive disseisins, even though there be no intervals of time between them, can not be "tacked" so as to make up the time of limitation, but subsequent occupants who are in "privity" with the original disseisor may tack their terms of possession to his. By privity is here meant "privity of estate," or the transfer of the lands from one to the other by will, or descent, or lawful conveyance. Thus the possession of an heir is, for the purposes of the statute, deemed to be continuous with that of his ancestor and the possession of a grantee with that of his grantor. Indeed, there is a marked tendency in some of the States to permit the tacking of consecutive possessions in all cases where the newcomer has entered under or by agreement with his predecessor, even though no relation of privity is thereby created between the parties. This is the rule in Connecticut, Ohio, and a few Western States. It seems that in England it is not necessary to have a continuous possession so long as the original owner is continuously excluded from the possession. See the Carter cases, 9 Q. B. 863 and 13 Q. B. 945.

IV. *Suits in Equity.*—The several statutes of limitation above considered were not enacted with reference to proceedings in the equity tribunals, and are of no binding force there. The equitable doctrine of LACHES (*q. v.*) and the broad discretion vested in the courts of equity to grant or refuse their aid, as justice might require, rendered unnecessary such arbitrary limitations on suits before them. It has, however, become the practice in equity to apply the statutory rules of limitation to all causes of action which come specifically within their provisions, and even to extend them to other analogous cases. Manifestly, however, the courts of equity are, as compared with the courts of law, capable of employing these rules with great flexibility, and they do, in fact, habitually apply them according to the "conscience" of each case. Accordingly they disregard them entirely when to do so would enable fraud to be committed or result in manifest injustice.

V. *Criminal Prosecutions.*—There have been several statutes of limitation enacted in England at different periods applying to prosecutions for certain crimes. Thus, by statute 7 Will. III., ch. 3, it was provided that no prosecution shall be had in cases of high treason whereby corruption of blood may ensue, except for an attempt to assassinate the king, unless the bill of indictment be found within three years after the offense was committed. So by the statute 31 Eliz., ch. 5, prosecution by information upon a penal statute was limited to a prescribed period. In New York it is provided that indictments for murder may be found at any time after the death of the person killed; in all other cases indictments are to be found within five years after the commission of the offense, but the time during which the defendant shall not have been an inhabitant of the State, or usually resident therein, shall not constitute any part of this period. Similar statutes exist in all the other States.

VI. *Actions against Public Officers, etc.*—In many of the U. S., as well as in England, statutes of limitation have been enacted defining and restricting the time within which actions shall be brought against certain public officials—as sheriffs, etc.—for malfeasance in office, and also for the recovery of penalties or forfeitures under a statute, etc. These miscellaneous causes of action are too numerous and the rules of limitation regulating them are too various to make more than a general reference to them possible or necessary in this place. The statutes of the several States should be consulted for further information regarding them.

On the general subject of limitation of actions, consult the treatises of Angell, Burrell, Banning, Wood, Buswell, and Wilkinson *On Limitations.* GEORGE W. KIRCHWEY.

Limitations, Statute of: See LIMITATION OF ACTIONS.

Limited Liability: a phrase used specifically to designate liability of copartners or shareholders in a joint-stock company upon the future debts of the company when limited to a fixed sum by virtue of compliance with statutes provided for that end. At the common law an individual is liable on his contracts and for his torts to the full amount of his property, and every member of a partnership is liable in the same way for all partnership obligations or liabilities.

In the case of individuals who act themselves or by their duly authorized agents in matters concerning themselves, and over which they have a personal supervision, this rule works no hardship; but in the case of a partnership consisting of a large number of individuals it often does. In such a case the total capital and the total liabilities are commonly larger than the entire capital of any individual partner, and the management is necessarily intrusted to a few individuals over whom no close personal supervision can be had. A failure may involve the loss of the entire property of many

small holders, and yet be due to no negligence or remissness on their part, but to the reckless borrowing or incurring of liabilities by their agents, which is made possible by the fact of the unlimited liability of the partners. To remedy this evil statutes have been passed both in Great Britain and in the U. S. providing for the formation of companies, usually joint-stock companies, whose members are shareholders with liabilities limited by the act of conforming to the formalities prescribed by law. (See JOINT-STOCK COMPANIES, CORPORATION, and PARTNERSHIPS.) In some cases the liability is regulated by the amount of capital stock subscribed for, in others by the amount guaranteed by the person who becomes a member of a company. The legislation on this subject in Great Britain began in the first half of the nineteenth century, and led up by gradual changes to the Companies Act of 1862, which is the basis of their present system. These statutes at first were not made to apply to banking companies, but the great hardships occasioned by the failure of the City of Glasgow Bank led in 1879 to a provision limiting the liability of shareholders in banking companies, except that the unlimited liability was continued with respect to the issuing of notes. The shareholders in the national banks of the U. S. are liable for twice the amount subscribed—that is, on paid-up stock for the amount paid in, and as much more when that is exhausted. This provision is very generally adopted with respect to banking and insurance companies. F. STURGES ALLEN.

Limits, Method of: in mathematics, a method of arriving at relations between certain quantities which do not admit of being directly compared. An example of such quantities is afforded by curved lines and surfaces. In geometry, two quantities are proved equal by showing that they may be so divided into parts that each part of the one may be brought into coincidence with a separate part of the other; but two bodies, bounded by different curved surfaces, such, for example, as a cone and a cylinder, can not be so divided. The circumference of a circle can not be divided into pieces of a straight line. To meet these difficulties, what is now called the method of limits was imagined by the older geometers, and has come down to us from the time of Euclid. The principles on which it rests are sometimes called the doctrine of limits. Examples of the reasoning may be found in any elementary treatise on geometry; reduced to its logical framework it may be presented in this form:

I can not prove these quantities equal by dividing them up in the usual way, because if I had to do so I should have to divide one or both of them into an infinite number of parts, which there is no possibility of my doing; but if they are not equal they must differ by a certain quantity, and by whatever quantity you suppose them to differ I can divide them up so as to show that they differ by less than this quantity. Hence they must be equal, for if they are unequal the difference must exist, and must have a certain value.

When we reduce the reasoning of the differential calculus to a rigorous form, we are always led to this mode of reasoning, and therefore to the method of limits. By establishing certain general propositions respecting limits, we are relieved from the necessity of going through this course of reasoning. Thus we define an infinitesimal as a quantity in the act of approaching zero as a limit. By the introduction of such a quantity we reach conclusions by simple and direct algebraic operations which it would be tedious or impossible to reach without it. S. NEWCOMB.

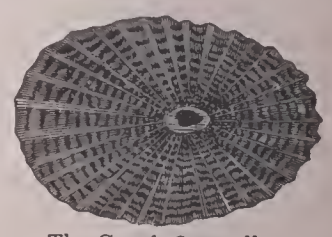
Limoges, lĕĕ′mōzh′ [Fr. < Lat. *Limo'vices*, the ancient name]: capital of the department of Haute-Vienne, France; on the Vienne river, 250 miles S. of Paris (see map of France, ref. 6–E). It is one of the seven places in which Christianity was planted about the middle of the third century, and it became an important ecclesiastical center. It was here, in 994, that the first attempt was made to establish the TRUCE OF GOD (*q. v.*). The noble Gothic cathedral was begun in the seventeenth century, and completed in 1851. The city has a famous breed of horses and extensive manufactures of porcelain, a very fine white porcelain earth having been discovered in the neighborhood in 1768. It has also cotton, paper, and woolen mills. Pop. (1896) 77,703.

Li'monite [from Gr. λειμών, meadow, moist grassy place]: the hydrated sesquioxide of iron, often called brown hæmatite, one of the commonest and most important ores of iron. The deposits of limonite are peculiarly local and irregular in character. They are never found forming continuous strata, but are (1) either the superficial deposits of chalybeate waters, filling fissures or cavities or incrusting slopes or accumulating in concretionary or botryoidal masses in sand, clay, or gravel; or (2) they are produced by the oxidation, at and near the surface, of beds of the carbonate of iron or iron pyrites. From their mode of formation the deposits of limonite are less extensive and reliable than those of other ores of iron, and their irregularities have often been a cause of disappointment and loss; but some of them are of great extent, and they are so numerous in many countries that they have always constituted one of the great sources from which the supply of iron has been derived. In the U. S. valuable deposits of limonite are found in a great number of localities. They occur perhaps in the greatest abundance in a belt which extends along the eastern flank of the Alleghanies from New England to Alabama. Here they rest on rocks of various kinds, such as gneiss, serpentine, crystalline limestone, slate, etc. From Pennsylvania southward their association with the Lower Silurian limestones and slates is such that they have by some writers been represented as holding a definite geological position in that series of rocks. It is quite certain, however, that they are altogether superficial in position, and form no part of the stratification of this or any other formation. It is probable, as suggested by Prof. Frederick Prime, that some of the brown hæmatites of Pennsylvania are formed from the decomposition of pyrites along the outcrops of pyritous slates; but some of the most important deposits of this belt are so far removed from the metamorphosed Palæozoic rocks of the Alleghanies that they can have had no connection with them—such as the limonites of Salisbury region of Massachusetts and Connecticut, and Staten Island, N. Y. In Alabama and Tennessee deposits of limonite of great extent and purity are found along the outcrops of the Lower Carboniferous limestone. In Missouri a belt of superficial limonite encircles the district which contains the great deposits of specular iron in the central part of the State, and may be supposed to have been formed from the ferruginous drainage of this district. The limonites which are formed by the oxidation of the stratified carbonates are best seen in Southern Ohio and Eastern Kentucky, where some of the calcareous orebeds of the coal-measures are oxidized along their outcrops, and are more or less deeply converted into the hydrated sesquioxide. A similar change is observable in some of the limonite beds of Eastern New York and Connecticut, which pass into siderite in depth.

Bog-iron ore is a spongy and usually impure limonite which accumulates in marshes from the leaching of surrounding beds of sand, gravel, etc., containing iron. *Lake ore* is the name given to limonite which gathers at the bottom of lakes and ponds that receive the drainage of ferruginous strata or soils. In some of the Swedish lakes and at Radnor Forges, Canada, this ore is dredged up periodically, the deposit being reproduced at intervals of one year or of several years. Revised by CHARLES KIRCHHOFF.

Limousin, lĕĕ′moo′săñ′: a former province of Central France, comprising the present departments of Corrèze, Creuse, Dordogne, and Vienne. Its capital was Limoges. It gave name to a mediæval dialect which prevailed through much of Southern France, and had a considerable poetic and romantic literature.

Limpet [< O. Eng. *lempedu*, from Lat. *lam'petra*, lamprey. See LAMPREY]: a name given to various GASTEROPODA (*q. v.*) in which the shell is low and the spiral obscure, and which adhere closely by the muscular foot to the rocks, etc., in the water. The different forms to which the name is given are not closely allied. Strictly speaking, the term belongs to the members of the group *Docoglossa*, which contains the genera *Patella*, the common limpets of Europe, and *Acmæa*, the common limpets of the east coast of the U. S. The keyhole limpets (*Fissurella*), which belong to another group (*Zygobranchia*), have an opening at the apex of the conical shell; the slipper limpets (also called bonnet or cup limpets) form the family *Calyptræidæ* (of the *Pectinibranchia*); specimens are common on the coasts of the U. S. adhering to the inside of deserted snail-shells, especially those inhabited by hermit crabs. The fresh-water limpets (*Valvatidæ*) are small forms, resembling the *Patellas* in general appearance, but belonging to a separate sub-order, the *Monotocardia*, of gasteropods.



The Greek fissurella.

J. S. KINGSLEY.

Limpo'po River: the second largest river in South Africa; so called by natives along its middle course. It has several other names given by various tribes; is also called by the Boers the Crocodile river. It rises on the Transvaal plateau, near Pretoria, flows N. W., N. E., and S. W., and reaches the Indian Ocean some distance above the Delagoa Bay. It forms a large part of the northern boundary of the South African republic. It has many tributaries, but loses much of its water in swamps. Its mouth is obstructed by a sandbar, and it is not important for navigation. Discovered in the third decade of the nineteenth century, it was not known for thirty years where the Limpopo reached the sea.

C. C. Adams.

Limulus: See Horseshoe Crab.

Lin'acre, or **Lynaker**, Thomas: physician and scholar; b. at Canterbury, England, about 1460; studied at Oxford and on the Continent; became fellow of All Souls', Oxford, in 1484, and afterward Professor of Physic; was an associate of Colet, Erasmus, and Lily in introducing into England a knowledge of Greek, which he learned from the celebrated Chalcondylas, and studied under Poliziano, from which language he made elegant translations of Galen into Latin; studied theology, and in 1518 became a prebendary of York; founded the College of Physicians at London (1518), was its president for life, and was physician to Henry VII. and VIII. D. in London, Oct. 20, 1524. His translation of Galen's *De Sanitate Tuenda* appeared in 1517, the *Methodus Medendi* in 1519, and the *De Temperamentis* in 1521. He published in 1524 a treatise on the rules of Latin prose composition, *De Emendata Structura Latini Sermonis, lib. vi.* See the *Life* by Dr. Noble Johnson (1835).

Linares, lĕe-naa'rās: a town of Chili; in the central basin or "valley," on a plain near a small southern affluent of the river Maule; 167 miles S. S. W. of Santiago, and about 500 feet above the sea (see map of South America, ref. 8–D). Population about 9,000. It is an important railway station on the line which runs southward from Santiago, and is the capital and commercial center of a province of the same name, having 3,488 sq. miles of area and a population of 115,646 (1891).

H. H. S.

Linares, José Maria: statesman; b. at Potosí, Bolivia, July 10, 1810. He was a distinguished jurist, was Minister of the Interior under Santa Cruz, subsequently minister to Spain, president of the senate in 1848, and for a short time acting president by virtue of that office. In 1857 he was elected president, and his term was one of the best and most progressive that Bolivia has ever known. Dr. Linares was deposed by a revolution in Jan., 1861, took refuge in Chili, and died at Valparaiso the same year.

H. H. S.

Lincoln, or **Lincolnshire**: county of England, extending along the North Sea from the Wash to the Humber. Area, 2,762 sq. miles. The ground is very low along the coast; in some places it is protected by dikes against inundations of the sea; but from the coast it gradually rises until it swells into high chalk hills in the northwestern part of the county, the so-called *Wolds*. The soil is generally very fertile and cultivated with great care. Large crops of wheat and oats are raised, and fine breeds of horses, short-horned cattle, and long-wooled sheep are reared. Immense flocks of geese are fed on the fens along the shore. Pop. (1901) 436,820.

Lincoln: the capital of Lincolnshire, England; on the Witham; 130 miles N. of London (see map of England, ref. 8–J). It is a parliamentary, county, and municipal borough, one member being sent to the House of Commons. It is an old city, the seat of a bishopric, with one of the finest cathedrals in England, built in the thirteenth century, 524 feet long, 250 feet wide, a theological college, and a school of science; large foundries and manufactures of agricultural implements, and an extensive trade in flour and wool. The famous bell Great Tom of Lincoln is hung in the central tower of the cathedral. Lincoln has a noted annual horse-fair and a celebrated race-meeting. Pop. (1901) 48,783.

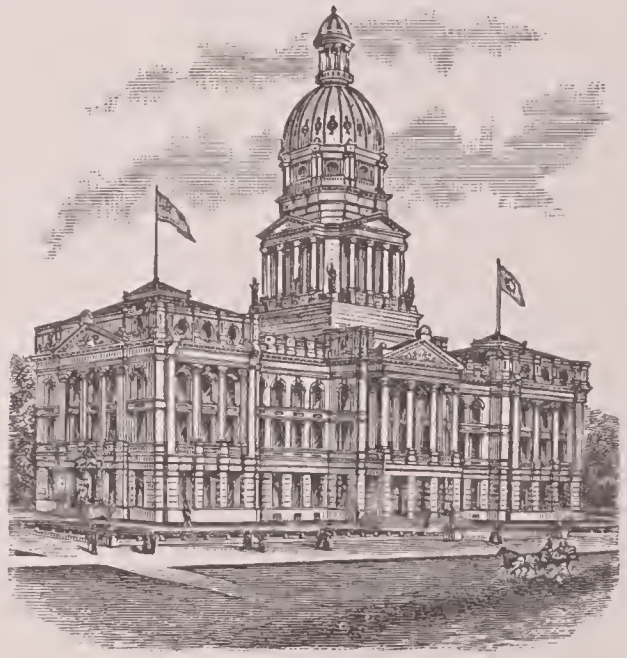
Lincoln: city; capital of Logan co., Ill. (for location of county, see map of Illinois, ref. 6–E); on the Chi. and Alt., the Peoria, Decatur and Evans., and the Ill. Cent. railways; 28 miles N. E. of Springfield, 157 miles S. W. of Chicago. It is in an agricultural and stock-raising region, and in a section underlaid with 27 feet of coal, and has four coal mines, several flour-mills, press-drill works, canning-factory, horse-collar factory, and excelsior-works. There are 17 churches, 3 national banks with combined capital of $210,000, public library, electric street-railway, and 2 daily and 4 weekly newspapers. It is the seat of Lincoln University (Cumberland Presbyterian, organized 1865), for both sexes, which in 1900 had 5 departments, 14 professors and instructors, 275 students, $50,000 invested in grounds and buildings, and $61,000 in productive funds. The city also contains the Odd Fellows' Orphans' Home of Illinois and the Illinois State Asylum for Feeble-minded Children. Pop. (1880) 5,639; (1890) 6,725; (1900) 8,962.

Editor of "Courier."

Lincoln: city; capital of Lincoln co., Kan. (for location of county, see map of Kansas, 5–F); on the Saline river, and the Union Pacific Railway; 220 miles W. of Kansas City. It is in a wheat and corn region; has large wool-growing interests, and contains 5 churches, a national bank with capital of $50,000, a State bank with capital of $50,000, and 2 weekly newspapers. It is the seat of the Kansas Christian College (Christian, chartered 1884), for both sexes, which has grounds and buildings valued at $15,000. Pop. (1880) 422; (1890) 1,100; (1900) 1,262.

Editor of "Republican."

Lincoln: city; capital of Nebraska and of Lancaster County (for location of county, see map of Nebraska, ref. 10–G); on the Burl. and Mo. River, the Chi., Rock Is. and Pac., the Fre., Elk. and Mo. Valley, the Mo. Pac., and the Union Pac. railways; 55 miles S. W. of Omaha. It is one of the most flourishing cities of the Missouri valley, and has an immense wholesale and distributing business in all lines of merchandise, lumber, coal, grain, and live stock. It has large stock-yards, seventy wholesale houses, and important manufactures. The census returns of 1890 showed that 117 manufacturing establishments (representing 38 industries) reported. These had a combined capital of $1,914,889, employed 1,518 persons, paid $936,675 for wages and $1,278,863 for materials, and had products valued at $3,018,837. The public buildings include the State Capitol (built of white limestone at a cost of $900,000), State Insane



State Capitol, Lincoln, Neb.

Asylum, State Penitentiary, U. S. Government building, and Home for the Friendless. Among the educational institutions are the University of Nebraska, Nebraska Wesleyan University (chartered 1887), Cotner University (Christian, opened as Christian University 1889, name changed 1890), Union College, Nebraska Conservatory of Music, Roman Catholic convent and three parochial schools, and five libraries (State, Public, Public School, State Historical Society, and University of Nebraska), which together have over 60,000 volumes. There are 3 national banks, a savings-bank, electric lights, electric street-railway, and 3 daily, 21 weekly, 10 monthly, and 2 other periodicals. The city has nearly one dozen old line and mutual fire and life insurance companies, some of them of much importance. Pop. (1880) 13,003; (1890) 55,154; (1900) 40,169.

Will Owen Jones.

Lincoln, Abraham: the sixteenth President of the U. S.; b. in a cabin on Nolin creek, 3 miles W. of Hodgensville, in Larue (then Hardin) co., Ky., Feb. 12, 1809. He was a grand-nephew of Daniel Boone. His parents were Thomas and

Nancy Hanks Lincoln. Of his ancestry and early years the little that is known may best be given in his own language: "My parents were both born in Virginia, of undistinguished families—second families, perhaps I should say. My mother, who died in my tenth year, was of a family of the name of Hanks, some of whom now remain in Adams, and others in Macon co., Ill. My paternal grandfather, Abraham Lincoln, emigrated from Rockbridge co., Va., to Kentucky about 1781 or 1782, where a year or two later he was killed by Indians—not in battle, but by stealth, when he was laboring to open a farm in the forest. His ancestors, who were Quakers, went to Virginia from Berks co., Pa. An effort to identify them with the New England family of the same name amounted to nothing more than a similarity of Christian names in both families, such as Enoch, Levi, Mordecai, Solomon, Abraham, and the like. My father, at the death of his father, was but six years of age, and he grew up literally without education. He removed from Kentucky to what is now Spencer co., Ind., in my eighth year. We reached our new home about the time the State came into the Union. It was a wild region, with many bears and other wild animals still in the woods. There I grew up."

The early residence of Lincoln in Indiana was 16 miles N. of the Ohio river, on Little Pigeon creek, 1½ miles E. of Gentryville, within the present township of Carter. Here his mother died Oct. 5, 1818, and in the following year his father married Mrs. Sally (Bush) Johnston, of Elizabethtown, Ky. She was an affectionate foster-parent, to whom Abraham was indebted for his first encouragement to study. He became an eager reader, and the few books owned in the vicinity were many times perused. He worked frequently for the neighbors as a farm-laborer, was for some time clerk in a store at Gentryville, and became famous throughout that region for his athletic powers, his fondness for argument, his inexhaustible fund of humorous anecdote, and his cleverness in speech-making. In 1828 he made a trading voyage to New Orleans as "bow-hand" on a flatboat; removed to Illinois in 1830; helped his father build a log house and clear a farm on the north fork of Sangamon river, 10 miles W. of Decatur, and was for some time employed in splitting rails for the fences—a fact which was prominently brought forward for a political purpose thirty years later. In the spring of 1831 he, with two of his relatives, was hired to build a flatboat on the Sangamon river and navigate it to New Orleans; the boat "stuck" on a mill-dam, and was got off with great labor through an ingenious mechanical device which led some years later to Lincoln's taking out a patent for "an improved method for lifting vessels over shoals." This voyage was memorable for another reason—the sight of slaves chained, maltreated, and flogged at New Orleans was the origin of his deep convictions upon the slavery question. Returning from this voyage, he became a resident for several years of New Salem, a recently settled village on the Sangamon, where he was successively a clerk, grocer, surveyor, and postmaster, and acted as pilot to the first steamboat that ascended the Sangamon. Here he studied law, interested himself in local politics after his return from the Black Hawk war, and became known as an effective "stump-speaker." The subject of his first political speech was the improvement of the channel of the Sangamon, and the chief ground on which he announced himself (1832) a candidate for the Legislature was his advocacy of this popular measure, on which subject his practical experience made him the highest authority. Elected to the Legislature in 1834 as a "Henry Clay Whig," he rapidly acquired that command of language and that homely but forcible rhetoric which made him more than a match in debate for his few well-educated opponents. Admitted to the bar in 1837, he soon established himself at Springfield, where the State capital was located in 1839, largely through his influence; became a successful pleader in the State, circuit, and district courts; married (1842) a lady belonging to a prominent family in Lexington, Ky.; took an active part in the presidential campaigns of 1840 and 1844 as candidate for elector on the Harrison and Clay tickets, and in 1846 was elected to the U. S. House of Representatives over the celebrated Peter Cartwright. During his single term in Congress, Lincoln did not attain any prominence. He voted for the reception of anti-slavery petitions, for the abolition of the slave-trade in the District of Columbia, and for the Wilmot proviso, but was chiefly remembered for the stand he took against the Mexican war. For several years thereafter he took comparatively little interest in politics, but gained a leading position at the Springfield bar. Two or three non-political lectures and a eulogy upon Henry Clay (1852) added nothing to his reputation. In 1854 the repeal of the Missouri Compromise by the Kansas-Nebraska act aroused Lincoln from his indifference, "like a fire-bell in the night," and in attacking that measure he had the immense advantage of knowing perfectly well the motives and the record of its author, Stephen A. Douglas, of Illinois, then popularly designated as the "Little Giant." The latter went to Springfield in Oct., 1854, on the occasion of the State fair, to vindicate his policy in the Senate, and the "Anti-Nebraska" Whigs, remembering that Lincoln had often measured his strength with Douglas in the Illinois Legislature and before the Springfield courts, engaged him to improvise a reply. This speech, in the opinion of those who heard it, was one of the great efforts of Lincoln's life, certainly one of the most effective in his whole career. It aroused great enthusiasm, and from that moment it was felt that Lincoln was the man to be pitted against Douglas. Lincoln was accordingly selected as the Anti-Nebraska candidate for the U. S. Senate in place of Gen. Shields, whose term expired Mar. 4, 1855. Trumbull was ultimately chosen, but the armed conflict on the soil of Kansas, which Lincoln had predicted, soon began, and the result was the disruption of the Whigs and the formation of the Republican party. At the Bloomington State convention in 1856, where the new party first assumed form in Illinois, Lincoln made an impressive address, in which for the first time he took distinctive ground against slavery in itself. At the national Republican convention at Philadelphia (June 17), after the nomination of Fremont, Lincoln was put forward by the Illinois delegation for the vice-presidency, and received on the first ballot 110 votes against 259 for William L. Dayton. He took a prominent part in the canvass, being on the electoral ticket. In 1858 Lincoln was unanimously nominated by the Republican State convention as its candidate for the U. S. Senate in place of Douglas, and in his speech of acceptance struck the keynote in the celebrated declaration that "a house divided against itself can not stand." When he was advised that the expression was an impolitic one, and would probably defeat him, he revealed his character by declaring: "I would rather be defeated with this expression in the speech, and uphold and discuss it before the people, than be victorious without it." (Herndon, ii., 67.) The same inflexibility of far-seeing purpose showed itself at a later period in the course of the campaign. At a conference held at Dixon between Lincoln and leading Republicans, he declared to them his purpose to propound to Douglas the following question: "Can the people of a U. S. Territory, in any lawful way, against the wish of any citizen of the U. S., exclude slavery from its limits prior to the formation of a State constitution?" All those present counseled Lincoln not to put that question to Douglas, because he would answer it in the affirmative, and thus probably secure a re-election. Lincoln replied that to draw an affirmative answer from Douglas was exactly what he wanted, and that his object was to make it impossible for Douglas to get the vote of the Southern States in the next presidential election. He considered the presidential fight much more important than the senatorial one, and he would be willing to lose this in order to win that. Arnold quotes him as saying: "I am after larger game; the battle of 1860 is worth a hundred of this." It turned out precisely as he predicted. Lincoln propounded the question at Freeport, and Douglas gave an affirmative answer. Had he answered in the negative, Illinois would surely have voted against him. His affirmative reply gave him the State, but hopelessly and permanently alienated the South. The great debate carried on at all the principal towns of Illinois resulted in the election of Douglas, but being widely circulated as a campaign document the speeches fixed the attention of the country upon Lincoln as the clearest and most convincing exponent of Republican doctrine. Early in 1859 he began to be named in Illinois as a suitable Republican candidate for the presidential campaign of the ensuing year; and a remarkable political address delivered at the Cooper Institute, New York, Feb. 27, 1860, followed by similar speeches at New Haven, Hartford, and elsewhere in New England, first made him known to the Eastern States in the light by which he had long been regarded at home. By the Republican State convention, which met at Decatur, Ill., May 9 and 10, Lincoln was unanimously indorsed for the presidency. The national Republican convention at Chicago, after spirited efforts made in favor of

Seward, Chase, and Bates, nominated Lincoln, with Hannibal Hamlin for Vice-President (May 18), at the same time adopting a vigorous anti-slavery platform. The Democratic party having been disorganized and presenting two candidates, Douglas and Breckenridge, and the remnant of the "American" party having put forward John Bell, of Tennessee, the Republican victory was an easy one, Lincoln being elected Nov. 6 by a large plurality, comprehending nearly all the Northern States, but none of the Southern. The secession of South Carolina and the Gulf States was the immediate result, followed a few months later by that of the border slave States and the outbreak of the great civil war. The life of Abraham Lincoln became thenceforth merged in the history of his country. None of the details of the vast conflict which filled the remainder of Lincoln's life can here be given; they will be found under appropriate headings. He reached Washington Feb. 23, and was inaugurated President of the U. S. Mar. 4, 1861. Lincoln called to his cabinet his principal rivals for the presidential nomination, Seward, Chase, Cameron, and Bates; secured the co-operation of the Union Democrats, headed by Douglas; called out 75,000 militia from the several States upon the first tidings of the bombardment of Fort Sumter (Apr. 15); proclaimed a blockade of the Southern ports (Apr. 19); called an extra session of Congress for July 4, from which he asked and obtained 400,000 men and $400,000,000 for the war; placed McClellan at the head of the Federal army on Gen. Scott's resignation (Oct. 31); appointed Edwin M. Stanton Secretary of War (Jan. 14, 1862), and on Sept. 22, 1862, issued a proclamation declaring the freedom of all slaves in the States and parts of States then "in rebellion against the U. S." from and after Jan 1, 1863. This was the crowning act of Lincoln's career—the act by which he will be chiefly known through all future time—and it decided the war. On Oct. 16, 1863, President Lincoln called for 300,000 volunteers to replace those whose term of enlistment had expired; made a celebrated and touching, though brief, address at the dedication of the Gettysburg military cemetery Nov. 19, 1863; commissioned Ulysses S. Grant lieutenant-general and commander-in-chief of the armies of the U. S. Mar. 9, 1864; was re-elected President in November of the same year by a large majority over Gen. McClellan, with Andrew Johnson, of Tennessee as Vice-President; delivered a very remarkable address at his second inauguration Mar. 4, 1865; visited the army before Richmond the same month, entered the capital of the Confederacy the day after its fall, and upon the surrender of Gen. Robert E. Lee's army (Apr. 9) was actively engaged in devising generous plans for the reconstruction of the Union, when on the evening of Good Friday, Apr. 14, he was shot in his box at Ford's theater, Washington, by John Wilkes Booth, a fanatical actor. He died early on the following morning, Apr. 15, 1865. Almost simultaneously a murderous attack was made upon William H. Seward, the Secretary of State. At noon on the 15th Andrew Johnson assumed the presidency, and active measures were taken which resulted in the death of Booth and the execution of his principal accomplices. The funeral of President Lincoln was conducted with unexampled solemnity and magnificence. He was buried at Oak Ridge Cemetery, near Springfield, Ill., on May 4, in an appropriate tomb, surmounted by a statue, Oct. 15, 1874. The leaders and citizens of the expiring Confederacy expressed genuine indignation at the murder of a generous political adversary; foreign nations took part in mourning the death of a great statesman; the freedmen of the South almost worshiped the memory of their deliverer; and the general sentiment of the great nation he had saved awarded him a place in its affections scarcely second to that held by Washington. The progress of time since his death has constantly increased the respect and admiration as well as the affection in which he is held by the people of the U. S. The most thorough investigations have made it more and more evident not only that he was the master-spirit of the great struggle in which the nation was engaged, but also that he was in very small measure indebted to the counsel and advice of those about him. See biographies by Dr. Holland (1865); Arnold (1868); Lamon (1872); Nicolay and Hay (1890); Schurz (1892); Herndon (1888; 2d ed. 1892).

Revised by C. K. Adams.

Lincoln, Benjamin: general; b. at Hingham, Mass., Feb. 3, 1733; was a farmer in his native town at the outbreak of the Revolutionary war in 1775; having aided in organizing and training the Continental soldiery, was appointed major-general of the Massachusetts troops; obtained the favor of Washington during the siege of Boston; commanded an expedition which in June, 1776, cleared Boston harbor of British vessels; led a body of Massachusetts militia at the battle of White Plains and in the ensuing engagements (1776); took a new levy of militia to the aid of Washington at Morristown, N. J., in Feb., 1777; was appointed by Congress, at Washington's request, a major-general in the Continental service Feb. 19; co-operated with Schuyler in the summer campaign against Burgoyne; joined Gates as second in command Sept. 29; was severely wounded at the battle of Bemis's Heights, near Saratoga, Oct. 8, and disabled from active service until Aug., 1778, when he joined, and was in September appointed to, the chief command of the Southern army. He warded off several demonstrations made by the British general Prevost against Charleston; lost one-fourth of his forces by the defeat of Gen. Ashe at Brier Creek Mar. 2, 1779; unsuccessfully attacked the enemy's works at Stone Ferry June 20; joined d'Estaing in September in his fruitless siege of Savannah, and after the bloody repulse of Oct. 9 returned to Charleston, which in the spring of 1780 was besieged by Sir Henry Clinton and Gen. Arbuthnot with greatly superior forces. The defense was skillfully and strenuously conducted, but Lincoln was obliged to capitulate May 12, and was allowed to go to his home at Hingham on parole. Exchanged in the spring of 1781, he joined Washington on the Hudson, took part in the siege of Yorktown, and was deputed to receive the sword of Cornwallis on his surrender. He received the degree of M. A. from Harvard in 1780. Elected by Congress Secretary of War in Oct., 1781, he held that office three years, after which he retired to his farm at Hingham. In 1786–87 he commanded the Massachusetts militia in the suppression of Shays's rebellion; was elected Lieutenant-Governor of Massachusetts in 1787; was appointed collector of the port of Boston in 1789, and held that office for twenty years. He was one of the commissioners who in 1789 made a treaty with the Creek Indians, and in 1793 was employed in an unsuccessful negotiation with the Ohio Indians. He wrote many papers on scientific subjects, some of which were published. D. at Hingham, May 9, 1810. See his *Life*, by Francis Bowen, in Sparks's *American Biography* (2d series, vol. xiii.).

Lincoln, Robert Todd: eldest son of Abraham Lincoln; b. at Springfield, Ill., Aug. 1, 1843; graduated at Harvard College in 1864, and then entered Harvard Law School, which he soon left to enter the army, where he served till the end of the civil war as a captain on the staff of Gen. Grant. He finished his law studies after the war closed, and was admitted to the Chicago bar; was Secretary of War Mar. 5, 1881, to Mar. 5, 1885; in 1884 was spoken of as a candidate for the presidency, but refused to be placed in opposition to President Arthur. From 1889–93 he was U. S. minister to Great Britain.

Lincoln University (Illinois): See Lincoln, Ill.

Lind, Jenny: "The Swedish Nightingale"; b. in Stockholm, Oct. 6, 1821, of humble parentage; her father was a teacher, and poor. Her precocious talent attracted the notice of Mme. Lundberg, a retired actress, who introduced her to Crælius and Berg, famous teachers in music, and to Lindblad, the composer. The manager of the court theater procured for her admission to the musical academy, where her progress was rapid. She acted and sang in children's parts till she was twelve years of age, when her voice failed her. Four years later it returned, and she sang the part of Alice in Meyerbeer's *Robert le Diable* with a brilliancy that insured her success. She soon became the operatic star of Stockholm, and sang with applause in the chief cities of Sweden and Norway. In 1841 she went to Paris and took lessons of Garcia. There she was introduced to Meyerbeer, who took a deep interest in her, and obtained from M. Pillet an opportunity to sing in opera; but she aroused no enthusiasm, and in her chagrin left Paris. Her next opportunity, also due to Meyerbeer, was in Berlin in 1845. There her success was distinguished. Previous to this she had sung with acceptance in Stockholm and Dresden. At Vienna she repeated her triumphs in *Norma*, *The Camp of Silesia*, and *The Daughter of the Regiment*. Her first appearance in London was in May, 1847. In *Robert le Diable*, *I Puritani*, and *Somnambula* she more than justified her claims as an artist, and covered herself with honors. In 1848 she sang for the first time in oratorio, *Elijah*, at Exeter Hall, to found musical scholarships in memory of Men-

delssohn. Henceforth this was to be her chosen field. In 1850 she went to the U. S., under contract with P. T. Barnum to give 150 concerts. The enthusiasm was unbounded, the profits were enormous, but the toil and irksomeness were excessive, and in June, 1851, after singing ninety-five times, the contract was terminated by Jenny Lind. In 1852 she married Otto Goldschmidt, soon after returned to Europe, and passed several years in Dresden, appearing only occasionally in public, and then for charitable purposes only. In 1858 she took up her residence in England, where she died Nov. 2, 1887. Jenny Lind's voice was a light soprano of remarkable sweetness, flexibility, and charm of expression, and she threw into it the feeling of a passionate soul. She sang out of a heart full of goodness. Both in Europe and in the U. S. she was as well known for her charities as for her genius.

Lindau, lin'dow, Paul: author and critic; b. at Magdeburg, Prussia, June 3, 1839; studied philosophy and literature at Halle, Leipzig, Berlin, and Paris; visited Italy, the Netherlands, etc.; founded *Die Gegenwart*, a weekly journal of politics and literature, in 1872, *Nord und Süd*, a monthly, in 1878, and contributed a great number of articles to various papers, besides publishing several critical essays—*Molière* (1872); *Beaumarchais* (1875); *Alfred de Musset* (1877); *Dramaturgische Blätter* (1875, 2 vols.); *Nüchterne Briefe aus Bayreuth* (1876); *Ueberflüssige Briefe an eine Freundin* (1877), etc.; several dramas—*Maria und Magdalena*, *Marion*, *Diana*, etc.; and travel sketches of Venice, Paris, etc. During later years Lindau tried in vain to make a reputation as a novelist by imitating French models of the realistic school. Though a witty and clever writer and a satirist of more than usual talent, he lacks the true poetic gift, the want of which he is unable to disguise.

Revised by Julius Goebel.

Lin'degren, Amalia: Swedish painter; b. May 22, 1814. She began painting portraits without a teacher, and in 1850 she was sent abroad at public expense, where she took lessons from Tissier in Paris and prominent masters in Munich and Rome. Her subjects are chiefly from family life and among children (*The Widow*, *The Girl with an Orange*, etc.). Her works all bear the mark of genius, and are characterized by great depth of feeling. Her portraits rank among the best ever produced in Sweden. R. B. A.

Linden [orig. an adj., deriv. of *lind*, linden < O. Eng. *lind*: Germ. *linde*]: the lime-tree, *Tilia europæa* (family *Tiliaceæ*); a large European forest tree, closely related to the bass of the U. S. Its wood is soft, but valued by carvers and turners, and used in making charcoal. Its bark makes the bass matting so extensively exported from Russia. Its flowers afford valuable bee-pasture. There are many varieties, some of which are well known in cultivation in the U. S. The name is often applied also to the Bass (*q. v.*) and other American species of *Tilia*.

Lindenthal, lin'den-tăl, Gustav: civil engineer; b. in Bruenn, Austria, May 21, 1850; was educated in Bruenn and Vienna, and during 1870–74 was employed on railway work in Austria and Switzerland. He is the designer of several large bridges, notably the great suspension bridge of 3,300 feet span proposed for the Hudson river between New York and Jersey City, and is the author of several valuable papers on long-span bridges and metal construction.

Lin'derman, Henry, M. D.: director of the U. S. mint; financier; b. at Lehman, Pa., Dec. 26, 1825; studied medicine under his father, and graduated at the New York College of Physicians and Surgeons; practiced his profession in Pike co., Nesquehoning, and Mauch Chunk, Pa.; took an active interest in politics as a Democrat; was chief clerk of U. S. mint at Philadelphia 1855–64; in 1864 resigned and went into business in a firm of stockbrokers in Philadelphia. He was director of U. S. mint at Philadelphia 1866–69; was sent to investigate the San Francisco mint; in 1871 was sent to London, Paris, and Berlin, to collect information concerning their mints; in 1872 made an elaborate report on the condition of the market for silver; projected the trade dollar to make a market for the great amount of silver produced in the U. S.; was author of the Coinage Act of 1873; Dec. 7, 1873, was appointed director of all the U. S. mints for five years, having entire charge of them; published *Money and Legal Tender in the United States* in 1877. His annual report for 1877 was an exhaustive review of the metallic standard and of the capacity of the mines of the U. S. to supply the world with the precious metals. D. at Washington, D. C., Jan. 27, 1879.

Lindh, Theodor: poet; b. in Finland in 1833; is magistrate of the town of Borgå; has published two volumes of *Dikter* (poems, 1862 and 1875), the versified tragedies *Konung Birger och hans Bröder* (1864) and *Maria of Skottland* (1865), and a translation of Byron's *Hebrew Melodies* (*Hebreiska Melodier*, 1862).

Lindisfarne: See Holy Island.

Lindley, John, Ph. D., M. D., F. R. S., F. L. S.: botanist; b. at Catton, Norfolk, England, Feb. 5, 1799; was the son of a nurseryman; began early to write upon botany, assisting in preparing Loudon's *Encyclopædia*; became in 1829 Professor of Botany in University College, London; appointed in 1860 examiner in Botany in London University; edited *The Gardener's Chronicle* 1841–65. D. near London, Nov. 1, 1865. Among his writings are *Introduction to the Natural System* (1830); *Structure and Physiology of Plants* (1832); *Vegetable Kingdom* (1846); *Flora Medica* (1838); *Fossil Flora* (with Hutton, 1831–37); *Pomologia Britannica* (1841); *Orchidaceous Plants* (1837–38); *Folia Orchidacea* (1852); *Theory of Horticulture* (1840), etc.

Lindley, Sir Nathaniel: See the Appendix.

Lindner, Albert: b. at Sulza, in the grand duchy of Weimar, Apr. 24, 1831; studied philology at Jena and Berlin, and became a teacher at the Gymnasium of Rudolstadt. In 1866 his tragedy *Brutus und Collatinus* was awarded the first prize at Berlin, and afterward successfully played on nearly all German stages. This success prompted him to go to Berlin and continue as a playwright. His subsequent dramas were, however, less favorably received, with the exception of *Die Bluthochzeit* (1871), which is still a standard play of the German stage. D. Feb. 2, 1888. Julius Goebel.

Lindo, Mark Prager: writer; b. in London, Feb. 19, 1819; d. at The Hague, Mar. 9, 1877. English by birth, he was as a boy sent to school at Boulogne in France; thence he went to Düsseldorf, where he attended the Realschule and gymnasium. In 1838 a chance advertisement for an English teacher took him to Arnhem, in Holland. The next year he became corresponding clerk in a counting-house at Amsterdam. Finding this employment irksome he went to Bonn for further studies. Before he had obtained his doctorate (finally won in 1853), he returned to Arnhem as teacher in English in the gymnasium (1842). Here he married a Dutch lady (1844), and definitely chose Holland for his country. In 1853 he was appointed Professor of Modern Languages in the Royal Academy at Breda, and here he remained until 1865, when his appointment as education inspector for South Holland took him to The Hague. His first literary venture was a sketch for children published in *Herfst-en Lentebloemen voor de Nederlandsche jeugd* (1844). From 1845 to 1850 he wrote for the *Algemeen Letterlievend Maandschrift*. In 1851 he began to publish in the *Arnhemsche Courant* the sketches upon which his fame mainly rests. He signed these *de oude heer Smits*; and in 1852 he issued a collection of them under the title *Brieven en Uitboezemingen van den ouden heer Smits*. The power of these sketches at once attracted attention and gave him a distinct place in Dutch letters. In 1856 he began the publication of a weekly journal, written entirely by himself, called *Nederlandsche Spectator*, which he continued in the same fashion until 1859, when others were associated with him. In its pages appeared several of his best-known works: *Clementine* (1857); *Le Saltimbanque* (1859); *De geschiedenis van een gentleman* (1862). Worth mentioning also are *Losse schetsen in en om Parijs in den zomer van 1852* (1853) and *Afdrukken van Indrukken* (with his friend Mulder, 1854). Besides these original works he wrote many school-books dealing with English, and translated into Dutch works of Sterne, Fielding, Scott, Kingsley, Dickens, Thackeray, and other English authors. An historical work, *De opkomst en ontwikkeling van het Engelsche volk in zijne geschiedenis tot op onzen tijd geschetst* (2 vols., 1868–74), has some value. In 1877 appeared *Kompleete werken van den ouden heer Smits* (5 vols., The Hague, 1877–79; 3d ed. 1886). A. R. Marsh.

Lindsay, lin'zi: capital of Victoria co., Ontario, Canada; a junction of several railways and on the navigable Scugog river (see map of Ontario, ref. 3-E). It has an extensive trade in lumber, grain, and flour. It has manufactures of castings, lumber, sash, blinds, hemlock extract, etc., and a brewery. The town is mostly built of brick, and contains the county buildings and several churches and schools. It has two weekly newspapers. Pop. (1891) 6,081.

Lindsay, Barons and Earls: a distinguished family in the Scottish peerage, descended from Sir Walter de Lindsay, an Englishman of Norman descent, who in the reign of David I. acquired Ercildoun and Luffness in East Lothian. In the twelfth century the lands of Crawford in Clydesdale came into possession of the family by an intermarriage with the royal line of Scotland. Sir James Lindsay of Crawford was distinguished at the battle of Otterburn. His nephew and heir, Sir David, married a sister of King Robert III., and was made by that monarch Earl of Crawford, while Sir William, David's younger brother, became ancestor of the Lords Lindsay of the Byres, Haddington, and, through a natural son, was also ancestor of the celebrated poet, Sir David Lindsay of the Mount. In the fifteenth century the Earls of Crawford were among the wealthiest, proudest, and most influential of the Scottish nobility, and took a large part in the civil warfare of that agitated period. David, the fifth earl, a trusted minister of James III., was made Duke of Montrose in 1488—a title never before bestowed in Scotland except upon princes. In 1644 the tenth Lord Lindsay of the Byres was created Earl of Lindsay, and soon afterward obtained also, by a new creation, the Earldom of Crawford, extinct in the elder line. John, fourth Earl of Lindsay and Crawford, b. in Oct., 1702, was a distinguished general in the Russian service, in the German campaign 1743–45, and the suppression of the movement of the Pretender in Scotland in 1746. D. in London, Sept. 20, 1749. A. W. Crawford Lindsay, Earl of Crawford and Lindsay (d. Dec. 13, 1880), wrote *The Lives of the Lindsays*. See Crawford, Earls of.

Lindsay, Sir David, of the Mount: poet; b. about 1490, either at Garmylton, East Lothian, or at the Mount, Fifeshire, Scotland. In 1511 he is mentioned as an amateur actor in a play performed at the court of James IV. to Scotland, and in 1512 was appointed keeper or tutor to the infant prince, who succeeded to the throne as James V. His important duties were discharged with an affectionate care, which the young king rewarded in 1528 with an appointment as king's herald, and in 1530 with knighthood and the office of Lord Lyon king-at-arms, in which capacity he accompanied embassies to the courts of England, France, Spain, and Denmark, and is introduced into Scott's poem of *Marmion*. He represented Cupar in Parliament (1542–43), contributed to the success of the Reformation, and died at an unknown place and date before May, 1555. As a poet Lindsay takes high rank, and his satires against the clergy are credited with having been the most effective preparation for the labors of John Knox. His principal works were *The Dreme* (1528); *Satyre of the Thrie Estaitis*, played at court in 1539; *Historie of Squyer Meldrum* (1548); and *The Monarchie* (1553). The best edition is that of the early English Text Society (1865–71), in 5 parts.

Lindsay, Thomas Martin, D. D.: a minister of the Free Church of Scotland; b. in Lesmahagow, Lanarkshire, Oct. 16, 1843; was educated in the University and New College of Edinburgh; has been Assistant Professor in Logic and Metaphysics and examiner in Arts in the University of Edinburgh; secretary of the board of local examination, Edinburgh; Professor of Church History in the Free Church College, Glasgow; convener of committee on foreign missions in the Free Church of Scotland; and was a delegate to the Pan-Presbyterian Council at Toronto 1892. He contributed to the *Encyclopædia Britannica*. He has published *Handbook of the History of the Reformation* (1882); *Commentaries on St. Mark's Gospel* (1883); *St. Luke's Gospel* (1887); and *The Acts of the Apostles* (1888).

Lindsey, Charles: See the Appendix.

Lindsey, Theophilus: clergyman; b. at Middlewick, Cheshire, England, June 20, 1723; studied at Cambridge; traveled on the Continent 1754–56 as tutor to the Duke of Northumberland; held various positions in the Church of England, but gradually adopted Unitarian views; resigned his position in 1772, and began in 1774 to conduct Unitarian service in Essex Street, London; and published *Unitarian Doctrine and Worship from the Reformation to our own Times* (1783). He was unique among protesting churchmen in his secession from the Established Church, as was Dr. Freeman in the U. S. among protesting Episcopalians in his distinct avowal of the Unitarian position. Lindsey's was the first society in England frankly called Unitarian. Lindsey's original church edifice is now the headquarters of the English Unitarians. He was a man of genuine spiritual force and of the most thorough intellectual and moral honesty. D. in London, Nov. 3, 1808.

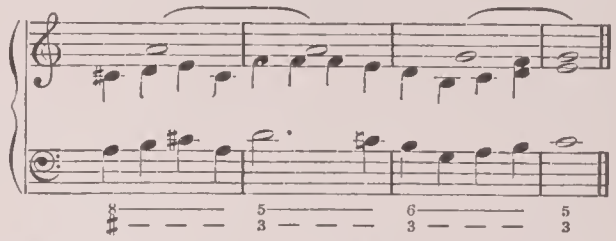
Lindsley, John Berrien: See the Appendix.

Line [M. Eng. < O. Eng. *līne*, hawser, cable, from Lat. *li'nea*, linen thread, string line (deriv. of *li'num*, flax) > Fr. *ligne*, line, which also influenced the meaning of M. Eng. *line*]: a geometrical magnitude which has length, but neither breadth nor thickness. We may regard a line as the path of a moving point, in which case the nature of the line will depend upon the law of motion of the point. Two positions of the generating point are said to be *consecutive* when the distance between them is infinitesimal, and the corresponding portion of the line is called an *element*. We may suppose the point to move so that the elements shall be equal, or so that the projections of these elements on a given straight line shall be equal; the former is the method of plane geometry, and the latter is the method of analytical geometry and of the calculus. Lines may be either straight or curved. A *straight* line is a line whose elements all lie in the same direction; that is, it is a line whose direction is the same throughout; a *curved* line is one in which no two consecutive elements lie in the same direction. See Curve.

Revised by R. A. Roberts.

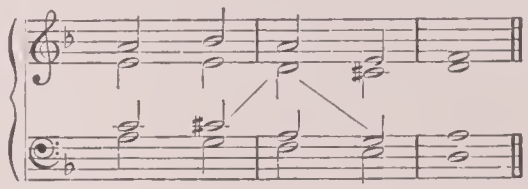
Line [from Lat. *linea*]: in music, a horizontal mark used not only in the formation of the stave and its extension by ledger-lines, but also for several other purposes. In a figured base a long unbroken line after a figure signifies the continuation or holding of the note indicated by the figure, while broken or short lines imply repeated strokes of a note, or sometimes the repetition of the same figure over the several notes of a moving bass. See Ex. 1:

Ex. 1.



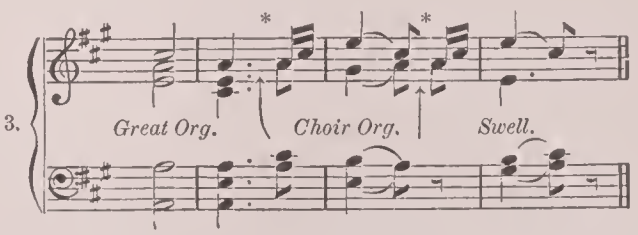
A line drawn through a figure thus, 4 or 5, is equivalent to a ♯ and back. Figures stand for a sharp fourth, a sharp fifth, etc. When, in a condensed score, one part crosses another, its course is frequently marked by a slanting line, to avoid confusion or to explain an *apparent* false progression. See Ex. 2, where the crossing of the tenor and alto is pointed out by lines connecting the notes of the tenor.

Ex. 2.



In modern music for the organ, curved or straight perpendicular lines, with arrow-heads, are often used to mark the exact place where a change is to be made from loud to soft, or the reverse, or from one stop or set of keys to another. Instances of this are given in Ex. 3:

Ex. 3.



Two diverging or converging lines over a series of notes imply an increase or decrease of loudness, as otherwise expressed by the words *crescendo* or *diminuendo*, or their abbreviations, *cres.* and *dim.* Revised by Dudley Buck.

Linen [orig. an adj. <O. Eng. *līnen*, made of flax, deriv. of *līn*, flax; Germ. *lein*: Goth. *lein*, linen; cf. Gr. λίνον: Lat. *li'num*, flax, linen]: one of the earliest of textile manufactures. Its origin is lost in the cloudland of history. Pieces are still in existence which were woven 4,000 years ago. In the days of Herodotus it was an article of Egyptian export. The mummies are wrapped in cere-cloths of this material. Sir Gardner Wilkinson has fully described the linen-manufacture of Egypt. The term *linen* is a generic name for

cloths woven from the fibers of the flax-plant and hemp. (See FLAX.) The raw material of linen proper is the flax-plant (*Linum usitatissimum*), which thrives in latitudes ranging from Egypt to Russia. From the seed is expressed the linseed oil so much used in commerce. Cloth made from the hemp-plant was worn by the Thracians. This plant is extensively grown in various parts of Europe, and has been cultivated in Bengal from remote ages. The use of hemp in the linen-manufacture is smaller now than formerly. JUTE (*q. v.*) may also be commercially considered as a sort of linen, as it affords a cheap substitute for flax, the cultivation of which has not kept pace with the requirements of the makers. Of other substitutes which have been employed with varying degrees of success the nettle, china-grass, rhea, New Zealand flax, and Manilla hemp (*Musa textilis*) may be named. The garments of the Hebrew priests were chiefly of linen, and in the Bible there are many allusions which show the esteem in which this fabric was held. In Homer we read that the mother of Nausicaa in the early dawn spun by the hearth soft fleeces dyed with red purple. In many parts of the ancient world the manufacture of linen —chiefly, it may be presumed, carried on by the women as a household occupation—was common. Some parts of Spain and Italy were celebrated for the culture of flax and its subsequent conversion into textile fabrics. Linen has been made in England from an early date. The garments of the Anglo-Saxons were linen and woolen. The daughters of Edward the Elder were famous for their skill in spinning, weaving, and embroidering. The Bayeux tapestry is a linen cloth, with designs worked in wool. Although the flax-plant had been cultivated by the Saxons, it is not found in a list of tithable produce drawn up in 1070. Fine linen is said to have been first made in Wilts and Sussex in 1253. In 1272 Irish linen was used at Winchester. Flemish weavers were introduced into England in 1331, and in 1386 a guild of linen-weavers was established in London, but does not seem to have been very prosperous. Indeed, the manufacture was still in its infancy in the reign of Charles II. Yarranton, writing in 1677, proposed the establishment of spinning-schools, such as were then common in Germany. In these places perhaps 200 girls from six years old upward were assembled under the supervision of a woman who sat in a pulpit, and with a long white wand tapped any of the little workers who flagged in their attention. If this were not sufficient she rang a bell, and the offender was taken away and chastised. From the introduction of the cotton-manufacture until about 1773, while the weft was of cotton the warp was of linen yarn. Arkwright's invention changed this. In Ireland the history of linen-manufacture is mixed up with that of sectarian feeling, for the woolen-manufacture of the Roman Catholic S. and W. was ruined by heavy export duties, while the Protestant interest of Ulster was protected in 1699 by the act for the encouragement of the linen trade. A board was constituted which held sovereign sway over the trade until 1828, when its obsolete regulations and procedure led to its extinction. As early as the eleventh century linen was woven in Ireland, but it was Louis Crommelin, a refugee driven from France by the Revocation of the Edict of Nantes, who set it on a firm footing. The Duke of Ormonde in 1711 ordered linen hatbands and scarfs to be used for funeral purposes; fourteen years later machinery began to be used. Improvements in bleaching were introduced by Dr. Ferguson in the middle of the century. It was not until 1828 that flax-spinning machinery was started at Belfast. The pioneers were Messrs. Mulholland. For eighteen years there was a society for the promotion of the growth of flax in Ireland, but it came to an end in 1859. Linen was made in Scotland in the reign of Charles I., but on a very small scale and in a rude style. In 1688 Morer styles it the most noted and beneficial manufacture of the kingdom. As showing the unfriendly feeling between North and South, it may be mentioned that the Scotch packmen who traveled into England to sell linen were, about 1684, sometimes whipped as malefactors, and obliged to give bonds that they would discontinue their traffic.

On the Continent traces of the use and manufacture of linen are found at early dates. Charlemagne, who dressed after the manner of the Franks, had linen underclothes. In mediæval Italy it was an important article of commerce. In Spain the Moors paid great attention to textile manufactures, and linen was exported to India and Constantinople. In the fifteenth century Seville had 16,000 looms; a century later they had diminished to 300. Flanders, Brabant, and some of the German towns were notable for their linen-manufactures in the eleventh century. Louvain had 150,000 linen and woolen weavers in the fourteenth century. In Flanders, by the middle of the thirteenth century, the manufacture was very flourishing, and its products were largely exported to England and other countries. Ypres, which dates from 960, has left its impress in the word *diaper* (i. e. d'Ypres, cloth of Ypres), still used for table-linen. The soil of France is suitable for flax-growing, and since the time of the Roman rule linen has been made in that country. In 1394 it is said the king sent fine linen of Rheims to the sultan in ransom of some noble prisoners who had fallen into the hands of the paynims. The Revocation of the Edict of Nantes was disastrous in its effects on French industry, and the linen-trade suffered in common with all others from the loss of the Huguenots. Russia has long been the greatest flax and hemp growing country of the world.

There are more linens used in the U. S. in proportion to the population than in almost any other country.

We turn now to the history of the processes of the linen-manufacture. The flax-fiber is made up of a number of smaller filaments bound together. The primary operation in their separation was termed heckling. The heckle is a many-toothed steel comb which removes the coarser fibers of the tow and partially divides the filaments of the flax. The fineness of the flax depends upon the number of hecklings it receives by instruments of increasing delicacy. Machine heckling is now most commonly used, and there are various patented inventions for this purpose. The fibers require to be united into a continuous thread before they are capable of being woven. The earliest method of doing this was by the spindle. One was found at Thebes by Sir Gardner Wilkinson which had still some linen thread upon it. They were about 15 inches in length, usually of wood, with a circular head of gypsum, or composition. They were bulbous near one end, tapering to a point, while the other end lengthened into a handle. The thread was attached to the handle; and the spindle resting upon the right thigh, the right hand was drawn quickly over it, causing it to revolve or spin like a top. To this was afterward added the distaff, a piece of wood round which the flax to be spun was wrapped. The spinning-wheel was the next step forward. One was invented at Brunswick in 1553. That called Saxon had on the spindle a bobbin round which the thread was wound, a flyer going round faster than it, giving the requisite twist to the thread. The flax was loosely wrapped round a distaff or rock above the spindle. A treadle moved by the foot gave a rotatory motion to the wheel. It was only by slow degrees that this supplanted the older instrument, and a two-spindled wheel had not been very long in use when Arkwright's cotton-spinning machinery must have turned attention to the possibility of a similar revolution in other branches of human labor. In 1787 John Kendrew and Thomas Porthouse, both of Darlington (Durham), England, took out a patent for this purpose. Various mills in Scotland were worked under licenses from the patentees. It was long before the hand-made yarn was superseded by the machine-made article. In 1788 Alexander Robb invented a loom to be driven by water, and in 1810 Joseph Crompton, of Dundee, one to go by water or steam, but it is doubtful if they were brought into use. The first manufactory for weaving flax by power was set up in London about 1812 by Charles Turner & Co.

According to the modern method of treatment, the fibers are first *scutched* or combed; *broken* into three pieces, the inner section being the best; *heckled*, now usually done by a rotatory machine, the flax placed on the periphery being drawn through or against a series of teeth; the short fibers *drawn* into one continuous thread; after having been *roved* it is *spun*. The flax, however, has to be kept wet during this process, for which purpose warm water is now used. The spun yarn is used either for thread or for weaving, and such yarn is called wet-spun, but in modern times Dundee, in Scotland, and Lille, in France, produce a yarn made without the use of water. This is called dry-spun and is used principally for heavy fabrics such as sail-canvas, heavy sheetings, towelings, crashes, glass-cloths, etc. The quantity of *leas* (300 yards) contained in a pound is a method of indicating the quality of yarns. For information as to the processes of SPINNING, WEAVING, and BLEACHING, see the articles with those titles.

The greatest spinning centers for wet-spun yarns are Belfast, Ghent, Silesia, Bohemia, Westphalia, and Moravia.

The principal varieties of linens are *lawn* (Fr. *linon*), the finest qualities of which are now made in Ireland, for handkerchiefs, etc. Scotland furnishes sheetings, ducks, Osnaburgs, towelings, canvas, paddings, etc. *Diapers* are fabrics with patterns of geometrical regularity such as are produced by the kaleidoscope. *Dowlas* is a strong, coarse fabric, formerly much used by working people for shirts and trousers, and also made in jackets for soldiers. Large quantities of this cloth are exported to South America. *Damasks* are fabrics with figures of print and flowers, and free-hand ornament as opposed to the geometrical severity of diaper. The name is supposed to be taken from Damascus, an ancient seat of the art, which until the introduction of the Jacquard machine (see Loom) was a secret confined to a few localities. The towns of Dunfermline and Kirkcaldy, and the whole county of Fife, in Scotland, are the greatest centers of damask or Jacquard weaving in the world. Lately Belfast, Germany, and Austria have appeared as strong competitors, while Barnsley and France have both lost ground. Courtrai and Ghent are famous for sheetings and fine shirting linens. *Cambric*, which takes its name from Cambrai, once famous for its production, is the finest and thinnest of linen fabrics. Handkerchiefs made from this cloth range in price from $1 to $20 per dozen. The so-called Scotch cambric is a cotton fabric with the fiber twisted very hard.

Some velvets or plushes are also made from flax, and used in the printed state as curtains, table-covers, and upholstery goods. France furnishes most of these velvets.

Hessians or burlaps are made from jute, and are used for all kinds of bags, for packing purposes, and for making tarpaulins, and foundations for floor-cloth. *French canvas* is a coarse variety, much used by tailors for stiffening, etc. *Crumb-cloth* is made in Scotland on Jacquard looms, and is used for covering carpets in rooms and stairs; it is woven as wide as 4 and 5 yards.

The modern process of bleaching has somewhat lessened the durability of linen, but a greater destroyer is the prevailing system of laundry-work. The lessened cost of linen, however (50 per cent.), compensates for these evils.

For a time the rapid increase of cotton-manufactures endangered the prosperity of the linen-trade (and to some extent they are antagonistic), but, although the manufacture of linens has not kept pace with that of its cheaper rival, it has exceeded its former proportions as one of the great staple industries of the world.

The U. S. has not made any appreciable progress in the manufacture of linens, save a few coarse crashes and towelings. Practically, the manufacture of linens has not begun, and the outlook is not encouraging for many reasons, such as climate, unprofitable returns for very hard work in the preparation by the farmer of the flax fiber for market, and the difficulty of grass bleaching under a scorching sun. At present the flax is raised for the seed only. The imports of flax and flax-manufactures into the U. S. for the year 1891 had a value of $24,000,000. This included burlaps, about $6,000,000. Revised by Frederick S. Pinkus.

Ling [M. Eng. *lenge* : Germ. *länge* : Icel. *langa*. So called from its length. Cf. O. Eng. *lang*, long]: a sea-fish of the cod family (*Molva molva*), extensively caught in Europe. It is eaten fresh, or salted and dried. It is a rather tasteless fish, its value depending to a great extent upon the perfect manner in which it takes salt and the length of time during which it can be preserved in an eatable state. Split and salted on the spot, it is packed in flats at once. Its flesh is also preserved in air-tight cans; its sounds are used for isinglass and for food; its roe is a good fish-bait; its liver yields a valuable oil. The name *ling* is also applied to the burbot (*Lota lota*), a fresh-water fish of the cod family found in the rivers of all northern regions. It much resembles the true ling. Revised by D. S. Jordan.

Ling.

Ling, Pehr Henrik: poet; b. at Ljunga, in the province of Småland, Sweden, Nov. 15, 1776; led as a young man a rather adventurous life, traveling through Germany and France; became in 1805 fencing-master at the University of Lund, in 1818 teacher in fencing at the military school of Karlberg, and in 1814 director of the newly erected gymnastic institute of Stockholm. In 1825 he received the title of professor, and in 1835 he was elected a member of the Swedish Academy. Ling represents the same movement in Sweden as Turnvater Jahn in Germany. His poetical productions, the allegorical poem *Gylfe* (1812), the epos *Asarne* (1816–26), and the dramas *Agne* (1812), *Eylif* (1814), *Den heliga Birgitta* (1818), *Engelbrecht Engelbrechtson* (1819), dramatizing the whole of Swedish history, were intended to awaken among the Swedes that heroism of feeling and thinking which characterized the ancient pagan Scandinavians; and his gymnastic exercises were at first simply a means of developing and strengthening the body, but by the thought and study which Ling bestowed on his profession he developed the simple gymnastic practices into a medical cure, the so-called movement cure, which has proved very effective in many chronic diseases, and has made the Swedish gymnastic system popular in all civilized countries. D. in Stockholm, May 3, 1839. Revised by P. Groth.

Linga, or **Lingam** [*Lingam* is the neut. nom. of a Sanskrit crude form *linga*, meaning mark or token]: in Hinduism, the male organ of generation, the emblem of the reproductive power of Siva the Regenerator. It is worshiped in the form of a plain column of stone or cone of clay rising out of an oval stone representing the *yoni* or female organ of generation, set up in temples dedicated to Siva. At the time of the Mohammedan conquest of India, in the eleventh century, there were twelve celebrated lingas at different places, the best known of which was that at Soma-nātha in Gujarat. R. L.

Lin'gard, John, D. D., LL. D.: historian; b. at Winchester, England, Feb. 5, 1771; studied at Douai, and was ordained a Roman Catholic priest in 1795; was afterward connected with the seminary at Ushaw, near Durham; was (1811–51) parish priest of Hornby, Lancashire; declined a cardinal's hat soon after the publication of his great work, *History of England* (1819–30, 8 vols.; 6th ed. 1854–55, 10 vols.). This work is one of great ability and excellence, though somewhat colored by the religious views of the writer. Ultramontanists find it tainted with Gallicanism. It has been translated into German, French, and Italian, and should always be consulted for the view of a conscientious and erudite Roman Catholic. The work was vigorously assailed, especially by *The Edinburgh Review*; but the defense of the author showed so much moderation and learning, as well as desire for the truth, that the criticisms of his assailants tended to strengthen rather than weaken confidence in the work. Author of a *History and Antiquities of the Anglo-Saxon Church* (1806) and an English version of the New Testament (1836). D. at Hornby, July 17, 1851. Revised by C. K. Adams.

Lingg, Hermann: poet; b. at Lindau, Germany, Jan. 22, 1820; studied medicine at Munich; became a physician in the Bavarian army; was pensioned in 1851, and has since devoted himself entirely to literature. In 1854 his first collection of poems was published with an introduction by Emanuel Geibel, who had discovered Lingg's poetic talents. This collection established his reputation as a poet, and he became a member of the circle of poets whom King Maximilian II. of Bavaria assembled in Munich. Lingg's best-known work is the epic poem *Die Völkerwanderung* (1865–68). Besides, he published a number of dramas and novels which possess less poetic merit. Julius Goebel.

Lingual Ribbon: See Mollusca.

Linguals: a group of consonants called also cerebrals or cacuminals, whose articulation is formed with the tip of the tongue turned slightly up and back. They are commonly indicated as *ṭ*, *ḍ*, *ṣ*, *ṛ*, *ṇ*, etc. The Sanskrit has not only the dental series *t*, *th*, *d*, *dh*, *n*, articulated with the tip of the tongue against the backs of the upper teeth, but also the lingual series *ṭ*, *ṭh*, *ḍ*, *ḍh*, *ṇ*, called by the native grammarians *mūrdhanya*, head-sounds. These had their origin in the speech habits of the pre-Aryan, Dravidian population of India upon which the Sanskrit as the language of a conquering race was impressed. The English *t*, *d*, *n*, being articulated farther back in the roof of the mouth than the corresponding French and German sounds, often appear to French and German ears as cerebral. A cerebral *r* is spoken in some parts of America. See Phonetics. Benj. Ide Wheeler.

Linguatu'lida [Mod. Lat., deriv. of Lat. *lingua*, tongue]: a group of parasitic animals usually regarded as *Arachnida*. They have worm-shaped bodies, with two pairs of adhering

hooks near the mouth. There are no eyes, respiratory, or circulatory organs. In their sexually ripe condition they live in warm-blooded animals and reptiles, one species occurring in and near the nose of the dog and wolf. The young, passing out, find entrance into the bodies of rabbits, whence they again pass to the dog when the animal is eaten.
J. S. K.

Linguistics: See Ethnology and Language.

Lin'gula [dim. of Lat. *lingua*, tongue]: a genus of Brachiopoda (*q. v.*), in which the two valves of the horny shell are nearly equal, and are without a hinge. The animal has a long fleshy stalk or pedunele, which is buried in the sand. The living species of Lingula are few, but widely distributed, one occurring on the shores of the Carolinas, while others occur on the west coast of the U. S., in the Hawaiian islands, Australia, and the Asiatic shores. The genus acquires peculiar interest from its great antiquity, fossil Linguläe, much like those of to-day, occurring in the oldest rocks; and through all geological ages the genus has maintained itself unchanged. The living species have few points of general interest, but it may be mentioned that the recent forms exhibit a power of retaining life under adverse circumstances which is possibly correlated with the vitality of the race.
J. S. Kingsley.

Lingu'lidæ [Mod. Lat., liter., those belonging to the Lingula family; *Lin'gula* (liter., dimin. of Lat. *lingua*, tongue, named from the shape) + Gr. patronymic ending *-ίδαι*, plur. of *-ίδης*, descended from]: a family of the class Brachiopoda (*q. v.*) and order *Lyopomata*, distinguished by the more or less linguiform shape of the shells, the slightly unequal valves, the want of articulating apophyses, and the development of a long vermiform peduncle which passes between the apices of the valves; the shell has rather the appearance of horn than of true shelly matter. The family is very interesting, being one of the very few which have survived in comparatively unaltered forms from the Lower Silurian epoch, some of the types of the earliest period being scarcely generically distinct from the living *Linguläe*, although the apparent slight differences may be the result of the simplicity of the shell.

Liniers y Bremont, lĕĕ-nĕĕ-ār'ee-brā-mōnt', Santiago Antonio Marie, de (Span. form of his Freneh name, Jacques Antoine Marie Deliniers-Brémont): naval officer and administrator; b. at Niort, Deux-Sèvres, France, Feb. 6, 1756. He was of a royalist family, and after the Revolution took service in the Spanish navy, attaining the rank of captain. In 1806 he commanded a squadron in the Rio de la Plata, defended Montevideo against the British, and attacked the British force which had occupied Buenos Ayres, compelling its capitulation (Aug. 12, 1807). The weak viceroy, Sobremonte, was deposed on the demand of the people, and Liniers put in his place (May 16, 1808). Meanwhile the British had been strongly re-enforced and had taken Montevideo; they now attacked Buenos Ayres and gained a battle under the walls (July 1), but Liniers defended the city so well that they were forced to retreat with great loss and eventually agreed to leave the country. The Spanish Junta Central was opposed to Liniers, and in Aug., 1809, Cisneros arrived to take his place. His measures precipitated the revolution of May 10, 1810. Liniers, who had retired to Córdoba, on hearing of the revolt collected a small force and marched on Buenos Ayres, with the intention of restoring the royal authority; but he was captured (Aug. 6), and by order of the revolutionary junta was shot near Buenos Ayres, Aug. 26, 1810.
Herbert H. Smith.

Linlithgow, lin-lith'gō, or **West Lothian**: county of Scotland, bordering N. on the Firth of Forth, E. and S. on the county of Edinburgh. Area, 120 sq. miles. In the southern part the soil is swampy; elsewhere it is generally fertile, producing wheat, barley, and oats. Very little of the arable land has remained unreclaimed. Horses, cattle, sheep, and swine are reared. Great numbers of cattle are bought and fattened, and dairy-farming is briskly prosecuted, the fresh butter and buttermilk being sent partly to Edinburgh and partly to Newcastle. Very little cheese is made. Pop. (1901) 64,787.—Linlithgow, the principal town, has interesting monuments, among which is the castle in which Mary Queen of Scots was born. It was built at various times; the west side is probably the oldest portion of the structure, and is believed to date from the time of James III. In the history of Scotland the palace has been quite conspicuous. It was burned in 1746 by Hawley's dragoons. Pop. of town 4,154.

Linn, John Blair: clergyman and author; b. at Shippensburg, Pa., Mar. 14, 1777. He graduated at Columbia College in 1795; entered the law-office of Alexander Hamilton; published anonymously two small volumes of miscellanies in prose and verse. In Jan., 1797, he brought out at the John Street theater, New York, a "serious drama, interspersed with songs," entitled *Bourville Castle, or the Gallic Orphan*. Shortly afterward he abandoned the law and entered the Presbyterian ministry, and was assistant pastor of a church at Philadelphia from 1799 till his death there, Aug. 30, 1804. In 1800 he wrote an Ossianic poem on the *Death of Washington*, and in 1801 published his principal poem, *The Powers of Genius*. In 1803 he engaged in a theological polemic with Dr. Priestley. In 1805 his brother-in-law, the novelist, Charles Brockden Brown, published, with a brief memoir, *Valerian*, a narrative poem by Linn, incomplete, but extending to 1,500 lines of blank verse, treating of the early struggles of Christianity against paganism.

Linnæ'a [Mod. Lat., named from *Linnæus*]: a genus of plants containing but a single species, *L. borealis*, the twinflower, of the honeysuckle family, found by Linnæus in Lapland in 1732, and named by Gronovius. It is a small trailing evergreen herb, with round leaves occurring in pairs, as do also the flowers, which are bell-shaped, of a pinkish color, and very fragrant. It abounds in the more northern regions of Europe, Asia, and in North America, occurs as far S. as Maryland, and as far W. as Colorado and California.

Linnæ'us, the Latinized name of Carl von Linné: the father of systematic botany; b. at Råshult, in Småland, Sweden, May 12, 1707. He was the son of a Lutheran vicar, who, we are told, on account of poverty, apprenticed his son to a shoemaker, but soon afterward sent him to Wexiö to school, where his fondness for natural science made him so careless of his other studies that his teachers advised the father to put him to some trade; but Rothman, the doctor of the place, took the boy into his house and gave him books upon botany and medical science to read; and sent him in 1727 to Lund, where he read books of botany under Prof. Stobæus. In 1728 he went to Upsala, attracted by the fame of Rudbeck, Professor of Botany, but the young Linné suffered much from hunger and cold, and being without money or friends began to despair, when Olaf Celsius, Professor of Divinity, met him by accident, gave him congenial employment upon his *Hierobotanicon*, took him into his own house, and introduced him to Rudbeck, whose assistant he became. In 1732 he explored Lapland under the patronage of the Academy of Sciences, and gathered material for his *Flora Lapponica* (1737). In 1735 he took the degree of M. D. at Harderwyk, in the Low Countries; resided at Hartecamp 1735–38, under the patronage of George Clifford, a banker of Amsterdam; published his *Systema Naturæ* (1735); *Fundamenta Botanica* (1736); *Bibliotheca Botanica* (1736); *Critica Botanica* (1737); *Hortus Cliffortianus* (1737); *Genera Plantarum* (1737); *Classes Plantarum* (1738); returned in 1738 to Sweden; was appointed in 1739 physician to the king and Professor of Botany at Stockholm; became in 1740 Professor of Medicine at Upsala, and was Professor of Botany there 1741–78, giving the university a worldwide fame and attracting thither large numbers of students from foreign lands; was ennobled in 1757. He died at Upsala, Jan. 10, 1778. Besides the works above mentioned, his principal writings are *Philosophia Botanica* (1751); *Fauna Suecica* (1746); and *Flora Suecica* (1746); works on materia medica (1747–50); and above all the *Species Plantarum* (1753). It would be hard to overestimate the importance of the work of Linnæus in the establishment of modern systematic botany and zoölogy, to which he gave the binomial nomenclature of species. The botanists of the U. S. in 1892 agreed that "the botanical nomenclature of both genera and species is to begin with the publication of the first edition of Linnæus's *Species Plantarum* in 1753." His library and collections were bought, after the death of his son, in 1783, by J. E. Smith, the first president of the Linnean Society in London, who also translated his *Lachesis Lapponica* into English (1811).

Linnet [M. Eng. *linet* (confused with O. Fr. *linot*, linnet < O. Eng. *līnete*. Named from feeding on flax (O. Eng. *līn*: Lat. *linum*. See Linen); cf. Germ. *hänfling*, linnet, deriv. of *hanf*, hemp]: a name given to various birds of the family *Fringillidæ* (finches), but proper to those of the genus *Linota*, of which *L. cannabina*, the common European linnet, is the typical species. These birds are remarkable for

the changes in their plumage during the breeding season. North America has several birds allied to the European linnet and similar in food and habits. For green linnet see GREEN FINCH. Revised by D. S. JORDAN.

Lino'leic Acid: an acid of the formula $C_{16}H_{28}O_2$, found in combination in linseed oil and poppy oil, from which it is obtained by saponification. It is a limpid oil of specific gravity 0·92 at 14° C., of a faint-yellow color, a slight acid reaction, and a high refractive power. It absorbs 2 per cent. of oxygen by long standing, and thickens so that it will hardly flow, but remains colorless, and forms a varnish on wood. It is due to this power that drying oils have their property of hardening when exposed to the air. I. R.

Lino'leum: See CARPETS.

Linseed Oil: the oil of flaxseed; extensively used for all kinds of painting, for making oil-cloths, oil-silks, printer's ink, etc., its manufacture being a most important industry, and the parent of many others. The oil-mills not only consume the greater part of the seed raised in the U. S., but large quantities are imported, especially from the East Indies. The seed is crushed and submitted to great hydraulic pressure, by which the oil is for the most part removed. When the seed is not heated the oil is light colored, and is called *cold-pressed* oil. When, however, the seed-paste is heated after grinding, and pressed while still hot, the oil is of a little darker color, but it is much more rapidly and thoroughly removed. The paste in this operation is heated by steam, and brought to a temperature not much higher than 212° F. It is placed in strong cloths or bags of equal size and holding equal quantities, which are placed in iron cases and laid up under the presses, where they are subjected to a gradually increasing pressure, equivalent at length to a weight of 300 to 800 tons. The cakes from cold-pressed oil are reground and heated with the rest. The total product of seed grown in the U. S. in 1890 is estimated at 9,000,000 bush. The amount of linseed imported in the same year was 2,391,175 bush. Revised by IRA REMSEN.

Linton, ELIZA LYNN: wife of William J. Linton, engraver; b. at Keswick, Cumberland, England, in 1822; published a novel, *Azeth, the Egyptian* (1846); *Amymone, a Romance of the Days of Pericles* (1848); and *Realities*, a romance of modern life (1851). She had since been connected with the press, especially *The Saturday Review*, in which her papers on *The Girl of the Period* attracted great attention. Among her later novels are *Sowing the Wind* (1866); *The True History of Joshua Davidson, Christian and Communist* (1872); *Patricia Kemball* (1874); *The Rebel of the Family* (1880); *Paston Carew* (1886). D. in London, July 14, 1898.

Linton, WILLIAM JAMES: wood-engraver and author; b. in London, England, in 1812; was apprenticed to G. W. Bonner, and in 1842 became partner with Orrin Smith; was first engaged on *The Illustrated London News*, and did the work of illustrating Jackson's *History of Wood-engraving*, published by the proprietors of that journal. His hand is seen in *The Lake Country* (1864) and in the book of *Deceased British Artists*, issued in 1860 by the London Art Union; in Josiah G. Holland's *Katrina* (New York, 1869); and in Bryant's *The Flood of Years* and *Thanatopsis* (1878). Mr. Linton, though eminent as an engraver, is still better known as the author of a *Life of Paine*; *Claribel, and Other Poems* (London, 1865); *The English Republic*; *The Flower and the Star* (Boston, 1878); *Some Practical Hints on Wood-engraving* (1879); *Wood-engraving, a Manual of Instruction* (1887); *Poems and Translations* (1889); and papers in *The Westminster Review*, *Examiner*, and *Spectator*, mainly on social topics. He edited *Rare Poems of the Sixteenth and Seventeenth Centuries* (1882), and with Richard H. Stoddard *English Verse* (5 vols., New York, 1883). In youth a zealous Chartist, he was interested in the revolutionary plans of his time, was a friend of Mazzini, entered heartily into the cause of the British and European workingmen, and defended the French Commune against the accusations of its enemies. Since 1867 Mr. Linton had resided in the U. S. D. in New Haven, Conn., Dec. 29, 1897.

Li'num [Mod. Lat., from Lat. *li'num*, flax. See LINEN]: a genus of plants of which the common FLAX (*q. v.*) is the most important. It includes several flax-plants not cultivated for fiber, but sometimes grown in gardens for ornamental purposes. Among these are *L. perenne*, or perennial flax, found in the western parts of the U. S., growing 18 inches high, and forming tufts of slender stems with delicate blue flowers; *L. grandiflorum*, a beautiful annual found in Algiers, with abundant scarlet flowers; *L. flavum*, a greenhouse species, and *L. berlandieri*, growing in Texas, both of which have yellow flowers.

Li'nus (2 Tim. iv. 21): according to tradition, the first Bishop of Rome after St. Peter, but it is doubtful whether he succeeded the apostle, or whether St. Peter consecrated him bishop, perhaps long before his own martyrdom. The dates of his life are uncertain, some giving the year of his death as 80; others as 78 or 67.

Linus (in Gr. *Λίνος*): a personage in Greek mythology of uncertain antecedents. (1) In Argos he was a son of Apollo by the Princess Psamathe. To escape detection Psamathe exposed the child, who was reared by shepherds, but when growing into manhood he was torn to pieces by his own dogs. (2) In Thebes Linus was the son of Apollo and the muse Urania; he was killed by Apollo on Mt. Helicon, because he dared to dispute Apollo's supremacy in music. According to another version, Linus, a celebrated minstrel, was slain by Heracles, who was instructed by him in music, and in a fit of impatience killed him with the lyre. In each version of the myth Linus dies a violent death. It is conceded now that the word *Linus* did not refer to an individual person, but was the name applied to the dirges that were sung throughout Asia in commemoration of the premature death of the husband-son (Tammuz, Hadad-Rimmon, Sandan, Atys, Adonis, etc.) of the great Asiatic mother-goddess, known to the Greeks as Cybele, Rhea, etc. Some think that Linus was the personification of a flower like Narcissus and Hyacinthus. See Brugsch, *Die Adonisklage und das Linoslied* (Berlin, 1852); Gruppe, *Die Griechischen Culte und Mythen in ihren Beziehungen zu den Orientalischen Religionen* (Leipzig, 1887) p. 543 ff. J. R. S. STERRETT.

Linyau'ti: a native town on the Chobe tributary of the Zambesi river, Africa, containing, when Livingstone visited it (1851), about 15,000 people, and then the chief center of trade in South Central Africa. This fact drew to it a party of missionaries, men, women, and children, nearly all of whom fell victims to the pestilential climate. The annihilation of these pioneers made a deep impression, and is the sole reason why Linyanti, surrounded by swamps, is still remembered. C. C. A.

Linz: city; the capital of the province of Upper Austria, on the Danube; 117 miles by rail W. of Vienna (see map of Austria-Hungary, ref. 5–D). Its fortifications, built in 1828–36, consisted of thirty-two bombproof towers, connected with each other by subterranean alleys, a method of fortification invented by Archduke Maximilian of Este, but superseded by later improvements in artillery, and now entirely abandoned. It is the seat of the provincial government and of a bishopric, has a theological seminary and two cathedrals, one dating from 1670, and one dedicated to the Immaculate Conception (built 1862–90). It has some manufactures of cloth, carpets, silk, leather, gold-lace, paper, and tobacco. By the treaty concluded here Dec. 13, 1645, religious liberty was granted by the Emperor Ferdinand to Hungary. Pop. (1891) 47,560.

Lion [from O. Fr. *lion* < Lat. *le'o*, *leonis*, lion: Gr. *λέων*; cf. O. H. Germ. *lëwo* (> Mod. Germ. *löwe*), O. Bulg. *lĭvŭ*. The word is probably not Indo-Europ., but was obtained by the Europeans from some unknown source]: next to the tiger the largest and most powerful of the *Felidæ*, or cat family, a full-grown male being a little over 10 feet long from tip of nose to tip of tail. The female is smaller. The scientific name is *Felis leo*. The color of the lion, which is nearly uniform over the body, varies from pale yellowish gray to almost chestnut brown. This coloration is largely protective, assimilating with the sand, or sun-dried grass of the animal's favorite haunts. The young are born spotted, and remain so for some time. The tail is tufted, and the male usually has a dark mane, and dark fringes of hair along the flanks. The mane begins to grow when the animal is two or three years old, and attains its full development in about three years. Some males have no mane, and lions show great individual variation, not only in this respect, but in size and color. Lions are not gregarious, but parties of six or seven may be seen together, and while these are usually members of one family, yet several adults are now and then seen together. The lion is found over the greater portion of Africa, and in Mesopotamia, Persia, and parts of Northwestern Hindustan. In other parts of Southwestern Asia, as well as in portions of Africa, the lion has been exterminated. Within the historic period lions occurred in Asia Minor,

and in the adjoining part of Europe as far as the Isthmus of Corinth. Except when pressed for food, the lion is rather lazy and indolent. He rests during the day, and preys during the night. The testimony of the famous hunters who have written of the lion is that he is rather timid than courageous, and that he entertains great fear of man. Dr. Livingstone gives a singular account of the roar of the lion. He says, comparing it with the voice of the ostrich, "in general, the lion's voice seems to come deeper from the chest than that of the ostrich, but to this day I can distinguish between them with certainty only by knowing that the ostrich roars by day, and the lion by night." Gordon Cumming gives a graphic description of the imposing character of the nightly concerts which the lions perform when they meet, often in considerable numbers, at some spring where they all come in order to drink, and then stop and challenge one another with mighty roars of defiance. Revised by F. A. Lucas.

Lipans: See Athapascan Indians.

Lip'ari (Lat. *Meligu'nis*, the ancient name = Gr. Μελιγουνίς): (1) one of the Æolian islands, situated near the north coast of Sicily, and the most important and populous of the group. Area, 13 sq. miles. It was a volcano, as appears from Aristotle, but the period of its extinction is unknown. With the exception of certain very precipitous and rocky portions, this island is most fertile, and its fruits and wines are excellent. Pop. 14,000.—(2) A town on the above island, situated on a rocky eminence protected by a fort. It is an old town, and many interesting antiquities exist in the neighborhood. The modern town, which has suffered severely from earthquakes, is not well built, but it has a handsome cathedral and some respectable public buildings. The inhabitants are skillful sailors, and carry on an active commerce with Sicily, etc. The port affords good anchorage, though a mole is required to make it secure. Pop. 4,000.

Lippe, or **Lippe Detmold**, lip'pe-det'mōlt: a small principality of Germany, between Hanover, Brunswick, and Westphalia, and comprising an area of 469 sq. miles. It is hilly, but very fertile, well wooded, and watered by the Werre, an affluent of the Weser. The southern part is covered by the Teutoburger Wald, famous as the place where Arminius destroyed the Roman legions under Varus. The inhabitants, numbering 139,238, belong to the Reformed Church. The principal town is Detmold.

Lippi, lĕĕp'pĕĕ, Filippo, called Fra Lippo Lippi: painter; b. in Florence, probably about 1412. He was a monk in a Carmelite monastery throughout his youth; was made chaplain of a convent in 1452, and later rector of a church in Legraia, in Tuscany. Endless romantic stories are told of his adventures, all of which are doubtful and probably untrue. In some way he became a skillful painter, and an heir of the ways of work of the great Masaccio, whose power he could never attain, but whose straightforward way of looking at the visible world was natural to the pupil also. His most important remaining works are frescoes in the Cathedral of Prato, behind the principal altar—the *History of St. Stephen* on one side, the *Life of John the Baptist* on the other. In a picture gallery of the same town is a picture of the *Virgin giving her Girdle to St. Thomas*, and two others. In the Academy of Florence is a large *Coronation of the Virgin*, with many curious episodes introduced, and a portrait of the artist; also a *Nativity*. In the Uffizi Gallery in Florence is a beautiful and uninjured *Virgin and Child with Angels*, and a landscape background; and in the Pitti Palace a *Virgin with Two Saints*. The *Vision of St. Bernard*, a very fine *Annunciation*, and three other pictures, are in the National Gallery of London. The frescoes in the Spoleto Cathedral have been much injured. D. at Spoleto, 1469. Russell Sturgis.

Lippi, Filippo, the younger, called Filippino Lippi: painter; b. at Prato before 1460. He was a pupil of Fra Filippo Lippi; probably was adopted by him; and is said by Vasari to have been his son. His style seems to have been modified by study of the works of Botticelli. His most important existing work is the series of frescoes in the Brancacci chapel in the Church of the Carmine, at Florence; and, soon after, those in the Strozzi chapel in the Church of Santa Maria Novella. These were painted between 1482 and 1490, the work having been previously laid out by Masaccio. Some of the compositions contain many figures, and show much power of composition, though of not so stately a character as that of his great predecessor. In the Church of Santa Maria Sopra Minerva, at Rome, he painted the interior of a chapel, finishing it about 1493. In the Church of the Badia, at Florence, is the famous *Vision of St. Bernard*, often engraved. In the Uffizi is a *Madonna* with saints. In the Munich Pinakothek is a noble picture, *Christ appearing to the Virgin* after the crucifixion. In the National Gallery are a *Virgin and Child with St. Jerome and St. Dominick*, and several about which there is dispute, for several existing pictures are ascribed to Lippi and also to Botticelli. There is also an important picture at Berlin, and others at Bologna, Naples, and Lucca. D. at Florence, 1504 or 1505. Russell Sturgis.

Lippincott, Sara Jane (*Clarke*): author and lecturer; b. at Pompey, N. Y., Sept. 23, 1823; was educated at Rochester, N. Y.; removed in 1843 to New Brighton, Pa. She has lived chiefly in Philadelphia and New York. She is well known as a writer for children under the pseudonym of *Grace Greenwood*. In 1853 she was married to Leander K. Lippincott, of Philadelphia. Among her works are *Greenwood Leaves* (2d series, 1850); *History of my Pets* (1850); *Poems* (1851); *Haps and Mishaps of a Tour in England* (1854); *Merrie England* (1855); *Stories from Famous Ballads* (1860); *Records of Five Years* (1867); and *New Life in New Lands* (1873). She has been active in anti-slavery and reform movements by means of lectures, and has been a correspondent of leading New York newspapers.

Lip'sius, Justus (*Joest Lips*): classical scholar; b. at Oberrische, near Brussels, in 1547; was educated at Ath, Cologne, and Louvain; became the secretary of Cardinal Granvella in Rome in 1563; Professor of Eloquence at Jena in 1572, after renouncing the Roman Catholic faith; at Louvain 1576; at Leyden in 1579; resigned his position on again returning to Catholicism, taking the chair of History at Louvain in 1592. D. Mar. 23, 1606. Lipsius's religious tergiversation and general lack of ethical equipoise can not command respect for him as a man, but as a scholar he calls for unqualified admiration, his position among the greatest representatives of classical learning being undisputed. His erudition is phenomenal, and his critical acumen of the highest order. His edition of Tacitus, whom he knew completely by heart, is one of the immortal masterpieces in the field of classical philology. It was published for the first time in 1574, and repeatedly re-edited thereafter. Of his other works the best known are editions of Velleius, Valerius Maximus, and Seneca. Lipsius was but an indifferent Greek scholar, and, like his great contemporary Casaubon, he had but little sympathy for classical poetry. His works (4 vols.) appeared in 1675. See F. van der Haeghen, *Bibliographie Lipsienne, œuvres de Juste Lipse* (2 vols., pp. xxviii., 598–709, Brussels, 1885); Reiffenberg, *De Justii Lipsii vita et scriptis commentarius* (1823); Nisard, *Le triumvirat littéraire au XVI^e^ siècle* (Paris, 1852); L. Müller, *Geschichte der class. Philol. in den Niederlanden* (pp. 24–29, 32–35).
Alfred Gudeman.

Lipsius, Richard Adelbert, D. D.: theologian; b. at Gera, near Leipzig, Germany, Feb. 14, 1830; studied at Leipzig, where in 1855 he became privat docent, and in 1859 professor extraordinary; in 1861 ordinary professor of Theology at Vienna, in 1865 at Kiel, and in 1871 at Jena. D. at Jena, Aug. 19, 1892. His principal writings were *Chronologie der römischen Bischöfe bis zur Mitte des vierten Jahrhunderts* (Kiel, 1869); *Die Quellen der ältesten Ketzergeschichte* (1875); *Lehrbuch der evangelisch-protestantischen Dogmatik* (Brunswiek, 1876; 3d ed. 1893); *Die apokryphen Apostelgeschichten und Apostellegenden* (1883–87, 2 vols.); *Die Hauptpunkte der christlichen Glaubenslehre* (1889; 2d ed. 1891); and many minor articles.—His father, Karl Heinrich Adelbert (1805–61), was a professor at Leipzig, author of *Grammatical Studies on Biblical Greek*.—His brother, Justus Hermann (b. at Leipzig, May 9, 1834), became in 1866 rector of a gymnasium in that city, and has published critical remarks on Sophocles (1860 and 1867) and Lysias (1864). Revised by S. M. Jackson.

Liquefaction of Gases: the conversion of gases into the liquid form. Since the boiling-point of all liquids is raised by pressure, and since gases are to be considered simply as vapors existing at temperatures and pressures such that they are more or less remote from their boiling-point, it follows that by the application of pressure, accompanied by reduction of temperature, the liquefaction of gases may be accomplished. Faraday was of this opinion, and made extended experiments upon the liquefaction of the so-called permanent gases. In the case of certain of these he failed. Carbon monoxide (CO), methane (CH_4), oxygen, nitrogen, and hydro-

gen, he found it impossible to liquefy at the lowest temperature he was capable of producing. This temperature was —110° C., and it was produced by mixing ether and solid carbon dioxide. The resulting liquid evaporated with great rapidity when placed under the bell-jar of an air-pump, and the temperature fell to the point just indicated. Oxygen, nitrogen, and carbon monoxide, even under pressures of many atmospheres, remained in gaseous form at this low temperature. Natterer in 1854 repeated Faraday's attempt with an apparatus which allowed of pressures up to 30,000 atmospheres. Even under these conditions the so-called permanent gases retained their form. The reason for the failure of Faraday, Natterer, and of other early experimenters, became apparent when it was shown by the investigations of Andrews that above the critical temperature all distinction between liquid and vapor disappears. Above this temperature no amount of pressure will suffice to liquefy a gas. The critical temperatures of the gases already mentioned lay below the range attainable by the use of the cooling mixtures at the command of Faraday and of his contemporaries; consequently all attempts were necessarily unsuccessful. It was not until 1878 that these gases were finally liquefied. On Dec. 24 in that year it was announced by Dumas at the sitting of the Academy of Sciences, in Paris, that Cailletet in that city, and Pictet, in Geneva, had both succeeded in liquefying oxygen. The Cailletet method was a comparatively simple one. The gas was compressed in a glass tube with heavy walls to a pressure of about 300 atmospheres. The glass tube containing the compressed gas was cooled in a freezing mixture. It was then suddenly relieved from pressure by the opening of a stop-cock, and the resultant fall of temperature was sufficient to fill the interior of the tube for an instant with a dense fog consisting of particles of the liquefied and possibly of the frozen oxygen. Pictet's process was more complete, and the results obtained were much more satisfactory. A double cooling-bath was used consisting of sulphur dioxide in the liquid form, within which was placed a bath of compressed carbon dioxide. The apparatus was so constructed that the latter was entirely surrounded by the sulphur dioxide bath. By means of separate pumps the compression of these substances (CO_2 and SO_2) was kept up continually to feed these baths, while other pumps, also continuously in action, maintained a vacuum in the vessels in which they were placed. Under these conditions the sulphur dioxide fell by the cooling effect of its own evaporation to —65° C., while the carbon dioxide in the inner bath sank to —140°. The gas to be liquefied was compressed to over 300 atmospheres in a glass tube, this tube being cooled by contact with the carbon dioxide of the inner bath. When the pressure was suddenly reduced it was converted into the liquid form flowing from the tube in a jet. Subsequent development of these processes, with the introduction of a new cooling substance, ethylene, a liquid which boils in the open air at —105°, and which can be further reduced materially in temperature when made to boil at low pressures, have made it possible to liquefy both oxygen and nitrogen and their mixture (atmospheric air) in large quantities. Carbon monoxide and marsh-gas have also yielded to these methods, and hydrogen is the only substance concerning the liquefaction of which the evidence is in the least measure unsatisfactory. Cailletet, indeed, succeeded in 1884 in cooling compressed hydrogen in a bath of boiling oxygen, and he observed, when he reduced the pressure suddenly, a momentary formation of fog within the tube. Olszewski placed the tube of compressed hydrogen in a bath of nitrogen boiling in vacuo. When he suddenly diminished the pressure upon the hydrogen from 160 to about 40 atmospheres, it went over into the form of a colorless liquid. In 1895 the latter observer succeeded by this method in determining both the critical temperature and the boiling-point of hydrogen. He found the critical temperature to be — 234·5° C. and the boiling-point — 243·5° C. At the Royal Institution in London Prof. Dewar has an apparatus by means of which liquid oxygen and nitrogen are prepared in large quantities. The physical properties of these substances at their boiling-points (—184° C. and —193° C., respectively) have been studied, and they have been used for cooling other forms of matter for the same purpose. Liquid oxygen was found by Dewar to possess magnetic permeability inferior only to that of the metals of the iron group.

By placing boiling oxygen in a vessel with walls of a highly reflecting power, and therefore of poor radiating power, surrounded by a vacuum, so that no heat losses may occur by convection or conduction, the liquid evaporates very slowly. In 1893 nearly a pint of liquid oxygen was thus sent from London to Cambridge. It was placed in a flask, the outer surface of which was coated with a mirror-like film of frozen mercury. The flask was placed in an outer vessel, and the intervening space was exhausted. The loss of oxygen during transit was small. E. L. Nichols.

Liqueurs, lĕc-kĕrz′: strong alcoholic drinks, usually founded on distilled spirit, and very rich and sweet. This is the most common use of the term, and such liqueurs are very numerous and of varied flavor. Bitters (*q. v.*) are sometimes classed as liqueurs. Some distilled spirits not sweet nor highly aromatic are called by this name, especially when unfamiliar, such as kirschwasser and vodki; of these the best known is the famous Absinthe (*q. v.*). Liqueur wines, called also dessert wines, are those which are very sweet and rich, such as Cyprus wine of the kinds usually brought to Europe; Muscatel of different sorts; Lunel and Frontignan, from the south of France; and Allatico of Tuscany. Of the distilled liqueurs some have almost gone out of use, such as Parfait Amour and Noyau, which were both very fashionable in France and England before 1825. Others of old date have kept their favor, such as Maraschino, and especially Chartreuse and Curaçao. A number of popular liqueurs are made in certain great monastic establishments in Europe. Of these Chartreuse and Bénédictin are the best known; but the Certosa of Florence has its own product, and many others are of local repute.

Liquid Air: See the Appendix.

Liquidambar: See Gum-tree.

Liquid Assets: See the Appendix.

Liquidated Damages: See Penalty.

Liquidator: See the Appendix.

Liquid Diffusion: a phenomenon which occurs when liquids capable of mixing are brought into contact and allowed to stand. It is found under such circumstances that the two liquids, which at first may have possessed a clearly marked surface of division, mix very gradually with one another without being subjected to the action of any extraneous forces, such as the action of gravity causing a heavier liquid to settle down through a lighter one to the bottom of the containing vessel, or of heat acting through the agency of convection currents, or of any mechanical disturbance.

Diffusion is a slow process, and it seems to consist of a true movement of the molecules of the liquid masses among themselves. At any rate, the moving particles are small enough to permit of diffusion through all sorts of porous membranes, even through materials such as porcelain, the interstices of which are too small to admit of the passage of the most minute microbes. The laws of diffusion have been carefully studied by a variety of methods, and many interesting and important facts with reference to this phenomenon have been established. It has been found, for example, that at a given temperature each liquid possesses a definite rate of diffusion, so that when two liquids are brought together with a separating wall or septum the rate of transfer through the partition of the two liquids will in general be different, and mixture will occur more rapidly on one side than on the other. The consequence is that one of the liquids will gain in volume at the expense of the other. This difference is sufficiently marked to produce a considerable change of level on the two sides of the dividing wall. The liquid rises on the side toward which the motion is more rapid until the column thus raised in excess of that upon the other side of the partition exerts sufficient pressure to produce a counterbalancing flow back through the porous diaphragm, after which no further rise can occur and the two diffusing liquids come into a condition of equilibrium, with a permanent difference of level on the two sides.

The chief of the earlier authorities on the diffusion of liquids is Graham (*Philosophical Transactions*, 1850 and 1861), whose results may be stated in the following form: (1) The velocity of diffusion varies with the nature of the substance in solution. (2) The quantities of a salt carried by diffusion in a given time, by solutions varying in concentration, are proportional to the degrees of concentration. (3) The amount of a salt diffused by a given solution increases rapidly with the temperature. The diffusion of adjacent liquids not separated by a septum is sometimes denoted simple diffusion. Diffusion through a septum is termed osmosis. The method of separation of the components of a mixture, sometimes employed in chemistry, by taking advantage of differences of rate of diffusion through a septum, is called dialysis. E. L. Nichols.

Liquids: a term used in phonetics to denote the various sounds expressed by the symbols *r* and *l*. In function they are both syllabic and non-syllabic; thus *able* (pron. *abl*) and *let*. In acoustic value they are best classed with the consonants. The dental or alveolar *r* may be trilled as in French and German, or untrilled as in English *right, very*. A uvular *r*, produced by trilling the uvula above the raised back of the tongue, is in recent times establishing itself in the speech of North Germany and Paris, and is known in English, e. g. in the Northumbrian burr. The common dental or alveolar *l* is produced by breath, voiced or unvoiced, passing between the sides of the tongue and the back upper teeth, the point of the tongue being placed against the gums or front teeth. The guttural *l* of Russian is produced by raising the back of the tongue toward the soft palate. BENJ. IDE WHEELER.

Liquids: substances which, as distinguished from solids, are characterized by lack of stability of form and by greater freedom of motion between molecules, and as distinguished from gases are characterized by stability of volume and by less freedom of motion between the ultimate particles. A liquid may be defined as matter existing in the state between the melting-point and boiling-point. (See FLUIDS.) Although the liquid state is common to all forms of matter, no gases being known which can not be condensed by proper application of pressure and adequate reduction of temperature, and but few solids (such as carbon) which have not been rendered fluid by the application of heat, only two of the chemical elements, mercury and bromine, are liquids at ordinary temperatures and pressures.

Temperature and *pressure* are the two factors which determine the maintenance of the liquid state, and one of these being constant, changes of the other will in general suffice to condense a gas or to volatilize a liquid. There is, however, a critical temperature for each substance above which no increase of pressure will bring about liquefaction. The critical temperature has been determined only for a few substances, of which the most important are given in the following table:

TABLE I.—CRITICAL TEMPERATURES, ABOVE WHICH LIQUEFACTION CAN NOT BE PRODUCED BY PRESSURE.

Hydrogen	−174° C.	Ammonia (NH_3)	+130° C.
Nitrogen	−123° C.	Chlorine	+141° C.
Oxygen	−105° C.	Sulphur dioxide	+155° C.
Methane (CH_4)	−75·7° C.	Ether ($C_4H_{10}O$)	+195° C.
Ethylene (C_2H_4)	+1·5° C.	Alcohol	+234° C.
Carbon dioxide	+31° C.	Chloroform	+260° C.
Acetylen (C_2H_2)	+37° C.	Carbon disulphide	+272° C.
Hydrochloric acid	+51·2° C.	Water	+365° C.

The temperature at which liquids go over into gaseous form by ebullition (BOILING-POINT, *q. v.*) varies with the pressure. The law of this variation has been worked out experimentally by Regnault and others with great precision. The following table gives the boiling-point of water at various pressures above and below the normal:

TABLE II.—BOILING-POINTS AT VARIOUS PRESSURES.

PRESSURE.	Boiling-point.	PRESSURE.	Boiling-point.
1 cm.	11·4° C.	76 cm. = 1 atm.	100·0° C.
5 cm.	38·3° C.	2 atm.	120·6° C.
10 cm.	51·7° C.	3 atm.	133·9° C.
20 cm.	66·5° C.	4 atm.	144·0° C.
30 cm.	75·9° C.	5 atm.	152·2° C.
40 cm.	83·0° C.	6 atm.	159·2° C.
50 cm.	88·7° C.	7 atm.	165·3° C.
60 cm.	93·6° C.	8 atm.	170·8° C.
70 cm.	97·7° C.	9 atm.	175·7° C.
		10 atm.	180·3° C.
		12 atm.	188·4° C.
		14 atm.	195·5° C.

Melting points of solids are to a much less degree subject to change with pressure. The effect, however, is not altogether inappreciable, and it obeys the following law, viz.: substances the density of which increases by fusion have their melting-point lowered by pressure and *vice versa* Water and iron belong to the former class. Sulphur, phosphorus, and, indeed, nearly all substances as yet investigated, are of the latter class.

While in the case of water the change is small, 120·8 atmospheres being necessary to lower the melting-point one degree centigrade (see ICE), it is very marked in the case of many substances of the second class. Hopkins (see Wüllner, *Physik.*, iii., p. 556) found for spermaceti, beeswax, sulphur, and stearin the values shown in Table III.

TABLE III.—CHANGE OF MELTING-POINTS UNDER PRESSURE.

PRESSURE.	Spermaceti melts at	Beeswax melts at	Sulphur melts at	Stearin melts at
1 atm.	51·0° C.	64·5° C.	107·0° C.	72·5° C.
519 atm.	60·0° C.	74·5° C.	135·2° C.	73·6° C.
792 atm.	80·2° C.	80·2° C.	140·5° C.	79·2° C.

Although the liquid state is intermediate between the solid and gaseous conditions, the physical constants of liquids are not always intermediate between the constants of the same materials when frozen or in the form of vapor. The specific heat of ice, for example, is 0·50, that of water is 1·00, that of steam is 0·48. Bromine in the solid state has a specific heat of 0·08, when liquid 0·10, when in the form of vapor 0·05. The index of refraction of ice is 1·31, of water 1·332, of steam 1·00025. Liquids are frequently spoken of as the incompressible fluids. They are, however, capable of measurable compression. They possess, in fact, less resilience of volume than many solids.

The following table from Everett's *Units and Physical Constants* (2d ed., pp. 52, 53) gives the compressibility of certain liquids:

TABLE IV.

LIQUID.	Coefficient of resilience.	Compression for one megadyne per cm^2.
Mercury (at 15°)	$5·42 \times 10^{11}$	$1·84 \times 10^{-6}$
Water (at 18°)	$2·20 \times 10^{10}$	$4·55 \times 10^{-5}$
Ether (at 14°)	$7·92 \times 10^{9}$	$1·26 \times 10^{-4}$
Alcohol (at 13·1°)	$1·12 \times 10^{10}$	$8·91 \times 10^{-5}$
Carbon disulphide (at 14°)	$1·60 \times 10^{10}$	$6·26 \times 10^{-5}$
Sea-water (17·5°)	$2·33 \times 10^{10}$	$4·30 \times 10^{-5}$

In comparison with these may be cited:

Steel, resilience of volume = $1·841 \times 10^{12}$.
Copper, " " " = $1·684 \times 10^{12}$.

The case of sea-water is of special interest on account of the influence of its compressibility upon the ocean-level. Tait, in his extended investigation of this property, in connection with the deep-sea explorations of the famous Challenger expedition, computed the loss of volume due to the compression of each layer of ocean-water by the superincumbent mass, and found the level of the sea to be more than 600 feet below that which would exist in the case of a strictly incompressible fluid.

Heat of fusion is a term by which the fact is expressed that in passing from the solid to the liquid state definite quantities of heat-energy must be expended. The heats of fusion of some of the more important liquids are given in the following table:

TABLE V.

SUBSTANCE.	Heat of fusion.	SUBSTANCE.	Heat of fusion.
Water, at 0°	79·2	Bromine, at −7·3°	16·2
Acetic acid ($C_2H_4O_2$), at 3°.	44·3	Cadmium, at 320°	13·7
Glycerin ($C_3H_8O_3$), at 13°.	42·5	Tin, at 228°	13·3
Beeswax, at 61°	42·3	Bismuth, at 266°	12·6
Phosphoric acid (H_3PO_3), at 18°	37·4	Iodine	11·7
Naphthalene ($C_{10}H_8$), at 80°	35·7	Sulphur, at 115°	9·4
Benzol (C_6H_6), at 2°	29·1	Phosphorus, at 44·2°	5·0
Zinc, at 415°	28·1	Mercury	2·8

In order to convert liquids into vapor form further energy must be expended, which may be expressed in heat-units under the name of the heat of vaporization. This quantity, a variable one, diminishing at the boiling-point, is caused to rise by pressure, and vanishes altogether at the critical temperature. Table VI. contains some values of the heat of vaporization of various liquids:

TABLE VI.

SUBSTANCE.	Temperature of vaporization.	Heat of vaporization.
Bromine	58°	45·6
Iodine	....	23·9
Mercury	350°	62·0
Sulphur	....	362·0
Nitrous oxide (N_2O)	....	100·6
Ammonia (NH_3)	7·8°	294·2
Sulphur dioxide (SO_2)	....	88·3
Water	100°	535·9
Carbon disulphide (ES_2)	46·2°	86·7
Carbon dioxide (CO_2)	0°	49·3
Alcohol (C_2H_6O)	....	208·9
Ether ($C_4H_{10}O$)	34°	89·9

The following table, deduced from the results of Regnault, under the assumption that the specific heat of water in the liquid form is a constant, will serve to illustrate the falling off in heat of vaporization with rise of temperature:

TABLE VII.

Water vaporized at	Heat of vaporization.
0°	606·5
100°	537·0
230°	446·6

It will be seen that in Tables V. and VI. much the largest values are those for water, which substance also, as will be noted from Table VIII., possesses a very much greater specific heat than any of the ordinary liquids:

TABLE VIII.—SPECIFIC HEAT OF VARIOUS LIQUIDS.

SUBSTANCE.	Range of temperature.	Specific heat.
Lead (molten)	340° C. to 450° C.	0·040
Bromine	13° C. " 45° C.	0·107
Phosphorus	49° C. " 98° C.	0·204
Mercury	17° C. " 48° C.	0·033
Sulphur	119° C. " 147° C.	0·234
Bismuth	280° C. " 380° C.	0·036
Tin	250° C. " 350° C.	0·0637
Alcohol (C_2H_6O)	16° C. to 30° C.	0·612
Carbon disulphide (CS_2)	14° C. " 29·5° C.	0·247
Chloroform ($CHCl_3$)	18° C. " 30° C.	0·233
Ether ($C_4H_{10}O$)	25° C. " 35° C.	0·546
Acetic acid ($C_2H_4O_2$)	15° C. " 20° C.	0·462
Benzol (C_6H_6)	19·5° C. " 30·5° C.	0·4158
Water (according to Regnault)	0°	1·0000
	50°	1·0042
	100°	1·0130
	150°	1·0262
	200°	1·0440

Nearly all liquids, with the exception of molten liquids and certain solutions, are capable of transmitting light. Since rays penetrating them are retarded by different amounts, according to the wave-length, dispersion occurs as well as refraction. Table IX. presents the index of refraction of such liquids as have been systematically studied, for the wave-lengths corresponding to the Fraunhofer lines. The data given here are confined to the temperature of 15° C. For corresponding values applying to other temperatures, the reader is referred to Landolt and Boernstein (*Physikalisch-Chemische Tabellen*, pp. 206–209), from which work many of the numerical data of this article are taken. For the refractive index of certain liquids for longer waves, see Rubens (Wiedemann's *Annalen*, vol. xlv., 1892).

TABLE IX.—REFRACTIVE INDICES OF LIQUIDS AT 15° C.

WAVE-LENGTH.	CS_2.	$CHCl_3$.	C_2H_6O.	$C_4H_{10}O$.	C_6H_6.	H_2O.
A	1·6114	1·4440	1·3600	1·3529	1·4905	
B	1·6177	1·4458	1·3612	1·3545	1·4939	
C	1·6209	1·4467	1·3621	1·3554	1·4955	1·3316
D	1·6303	1·4492	1·3638	1·3566	1·5002	1·3339
E	1·6434	1·4525	1·3661	1·3590	1·5066	
b	.....	1·4532	.....	.....	1·5078	
F	1·6554	1·4554	1·3683	1·3606	1·5124	1·3379
G	1·6799	1·4611	1·3720	1·3646	1·5234	
H	1·7035	.....	1·3751	1·3683	1·5329	

Phenomena accompanying change of state are among the most interesting of those which the study of liquids afford. The properties of liquids differ so greatly from those of solids on the one hand and of gases on the other that the

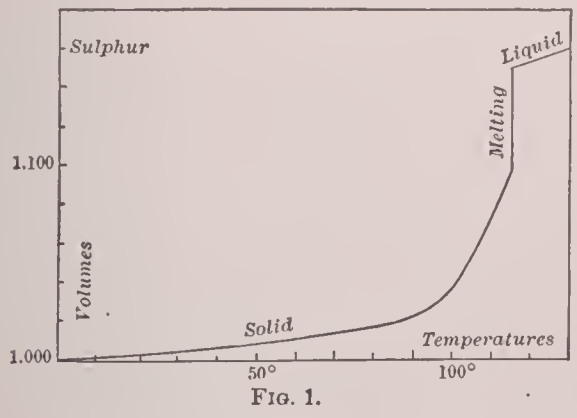


FIG. 1.

melting and vaporization points are points at which very sudden changes must occur, the abruptness in many cases amounting almost to discontinuity of condition. Actual discontinuity is the exception, however, the changes, so far as physicists have been able to trace them, tending to occur by rapid but continuous process. The difference of density between solids and the corresponding liquid has already been alluded to. A careful study of volume-changes near the melting-point often reveals this tendency to change by continuous process, the coefficient of expansion taking on abnormal values as the point of fusion is approached.

Kopp (*Liebigs Annalen*, vol. xciii.) has shown this in the case of sulphur. His results are presented graphically in

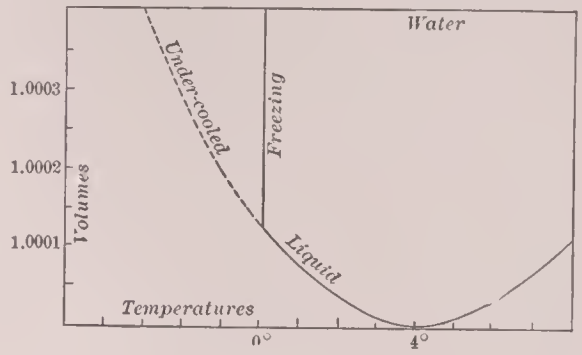


FIG. 2.

Fig. 1. Water affords a more familiar and more remarkable instance, the coefficient being reversed from a positive to a negative value at 4°, as if in preparation for the great increase in volume to be undergone at 0°. (See Fig. 2.) In vaporization also this tendency shows itself, particularly in proximity to the critical temperature, the coefficient of expansion of the liquid rising to extraordinary values just before the change of state occurs. The classical measurements of Andrews exhibit this property in the case of carbon dioxide in the most striking manner. (See Fig. 3.) This represents the changes of volume brought about by changes of pressure, the substance being maintained at a constant temperature. It will be noticed that at temperatures below 30° there is apparent discontinuity, but above that temperature the broken line of volumes becomes a curve, the double turn in which indicates a maximum value of the coefficient of expansion which is greater than the coefficient of either the gaseous or the liquid carbon dioxide.

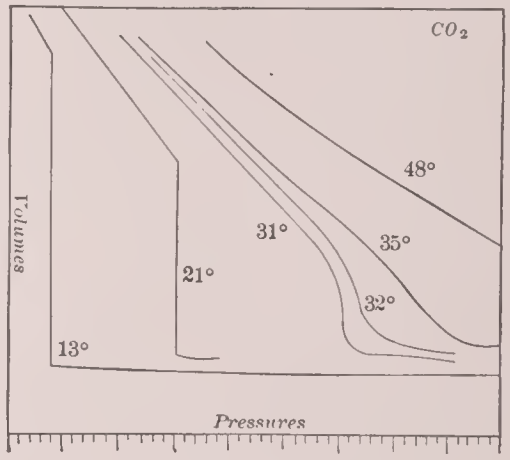


FIG. 3.

Superheating and Supersaturation.—It is probably on account of this difference of condition between the states of matter and the tendency to continuity of change that superheating and supersaturation are due. It is found that when a liquid is cooled below its melting-point in the absence of the corresponding solid of kindred crystallographic forms, it will sometimes maintain its fluidity, although in a condition of equilibrium increasingly unstable as the temperature falls. Such a liquid is said to be supersaturated. The same term is applied to any liquid which under analogous circumstances holds in solution a larger amount of some solid than it is capable of retaining in the presence of undissolved particles of the latter.

In the case of liquids and vapors an analogous phenomenon (superheating) is observed. Liquids from which all gases have been removed (by previous boiling or otherwise) are found capable of retaining their state when heated many degrees beyond the boiling temperature. When vaporization of the unstable superheated liquid finally takes place, the change is always sudden, and frequently of explosive violence. See experiments of Donny, *Ann. de Chimie et de Physique* (3), 16; of Dufour, *Pogg. Ann.*, 124; and of Krebs, *Pogg. Ann.*, 136. The last-named observer succeeded in heating water, previously freed from air, to 200° C. without boiling.

As has been pointed out by James Thomson (*Proceedings of the Royal Society*, 1871), the changes of volume brought about by the change of state are continuous when super-

heating occurs, following a curve (similar to *a b c d e f g* in Fig. 4) instead of a broken line, *a b d f g*, which is the

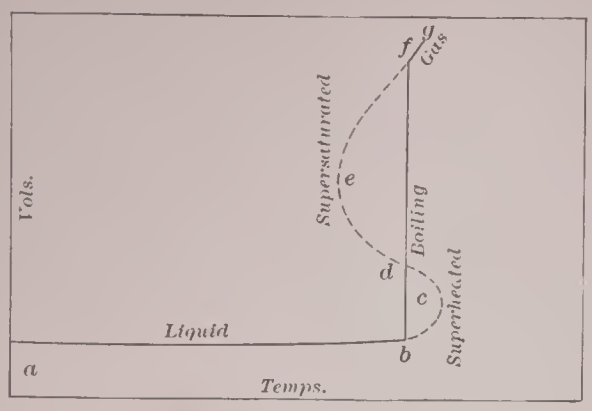


FIG. 4.

line indicating change of volume when a liquid is vaporized at the boiling-point.

Maxwell, in his *Theory of Heat* (p. 126), held that the counterpart of this phenomenon, supersaturation of a vapor, with return to the liquid state without discontinuity, might be looked for provided the necessary conditions could be fulfilled. The observation has since been recorded (*Trans. of the Kansas Academy of Science*, vol. ix., p. 91) in the case of isolated bubbles of the vapor of water or of carbon disulphide cooled in a surrounding liquid medium, respectively oil and water, to a point considerably below their condensing temperatures before liquefaction took place.

The spheroidal state is a name given to the condition assumed by any liquid when brought into contact with a surface the temperature of which is very high as compared with the boiling-point of the liquid. Under these circumstances rapid volatilization produces a cushion of vapor which effectually separates the liquid and the heated surface, and which by virtue of its very poor thermal conductivity protects the former. The cooling due to evaporation keeps the liquid permanently below its boiling-point. The surface film tends to gather the fluid mass within into spheroidal form, whence the name. That the spheroid of the liquid is not in contact with the neighboring solid may be shown in various ways; one of the most striking demonstrations is by means of a drop of water placed upon the bottom of an inverted crucible of platinum, which is kept in a state of incandescence by the flame of a blast-lamp. The thickness of the cushion of steam upon which the spheroid rests is sufficient to allow the observer to look through beneath the spheroid of water to any bright object beyond.

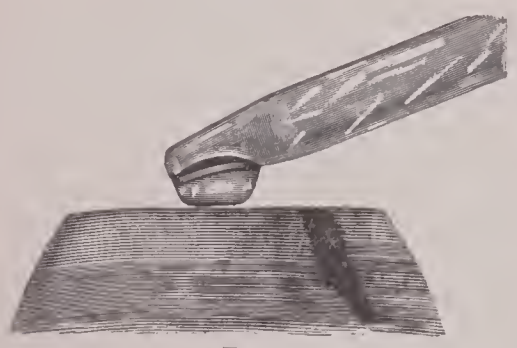


FIG. 5.

Fig. 5 is from a photograph, and shows a water-drop at the end of a pipette, and pressed down upon the face of the hot crucible so strongly as greatly to flatten the drop. The thickness of the intervening steam cushion is shown by the broad line of light beneath the drop. The photograph was taken by transmitted light for the purpose of displaying that feature.

Surface Tension.—Among the most interesting of the phenomena pertaining to liquids are those by which the properties of the surface film are made manifest. The domain is an extensive one, including all that goes under the name of capillarity, with a variety of allied phenomena familiar to the student of physics.

Experiments upon the Surface Film.—That the free surface layer of all bodies of liquid forms a film possessing remarkable properties may be shown in many ways. This film is composed of molecules in all respects identical with those situated below the surface. Its properties are due to the molecular forces between the individual particles of the outermost layer. These forces give to the surface layer the property of a stretched film or skin, perfectly flexible, yet always showing a marked contractile tendency. The presence of the film is shown in the well-known experiment which consists of floating steel sewing-needles upon the surface of water. In order to float the needles must displace their own weight of the liquid, or be supported by considerable forces from below. Observation shows that in point of fact a floating needle lies in a hollow produced by the bending of the film under it, and it is the elastic reaction of the film which finally becomes sufficient to overcome the action of the force of gravity. The considerable magnitude of these contractile forces is beautifully shown in the following experiment, due to the ingenuity of Prof. Ernest F. Nichols. (See *Physical Review*, vol. i., No. 4, 1894.) An ordinary rubber band is floated upon the surface of a vessel of water. The forces upon it due to the film of the region inclosed by the band are balanced by those of the surface surrounding the latter. A drop of oil upon the surface inclosed will, however, instantly weaken the film covering that portion of the liquid. The outer film immediately pulls the rubber band outward, tending to give it a circular form. The distortion is very marked when, finally, the elastic forces of the stretched vulcanite balance those of the stronger film. A drop of oil applied to the surface without will reduce its tension to equality with that of the inclosed region, whereupon the band is instantly relaxed and returns to its original form. Figs. 6 and 7 are from photographs. They show the rubber band before oil has been applied to the inclosed film, and after that operation. It is instructive to compare this with the celebrated experiment of van der Mensbrugghe, which in Figs. 8 and 9 is illustrated by means of photographs from the same band. Fig. 8 shows a flat soap film bounded by a metal ring, within which floats a looped thread of silk. This divides the film, as in Nichols's experiment, into two regions. Now in the case of the soap film the contractile strength of the inner region may not merely be reduced; we may go further and remove the in-

FIG. 6.

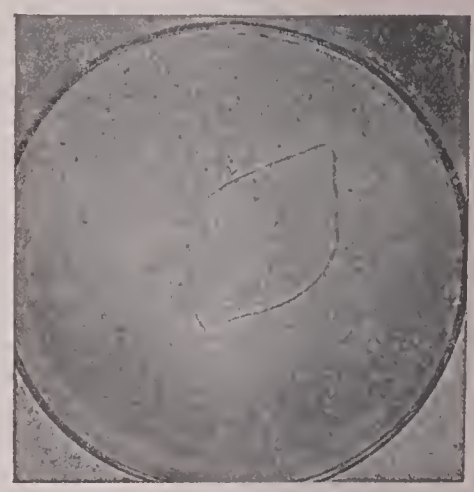


FIG. 7.

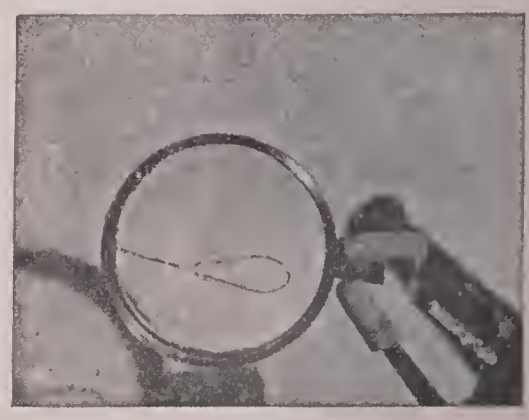


FIG. 8.

FIG. 9.

ner film altogether by piercing it with a splinter of wood. The outer film instantly draws the loop of thread, which now forms one of its boundaries, into a tense ring. (See Fig. 9.) The analogy between the two experiments is complete. When the surface film comes into contact with any solid and the molecular forces between, liquid and solid are brought into play, the result is *capillary action*, with the many striking phenomena that are classified under that head.

E. L. NICHOLS.

Liquorice, or **Licorice** [viâ O. Fr. from Lat. *liquiri'tia*, by analogy of *lique're*, etc. (see LIQUIDS), from Gr. γλυκύρριζα, licorice, liter., sweet-root; γλυκύς, sweet + ῥίζα, root; cf. Germ. *lakritze*]: the dried extract of the roots of *Glycyrrhiza glabra* and *echinata*, leguminous herbs of Southern Europe, Africa, and Asia, largely cultivated in Central Europe. The extract is a hard, black mass, containing a large percentage of an uncrystallizable sugar called glycyrrhizin. It is prepared very extensively in Spain, Italy, and Russia, and to some extent in France, England, Germany, and the U. S. It is a valuable demulcent and expectorant medicine, and is employed extensively in flavoring chewing-tobacco, as well as in pharmacy as an excipient in pill-masses. The hard, woody root is also used in medicine and in porter and stout breweries. *Glycyrrhiza lepidota* of the western parts of the U. S. has the flavor of true liquorice, as have *Galium circæzans*, *G. lanceolatum*, etc., rubiaceous herbs of the U. S., which are used in domestic medicine and called "wild liquorice."

Liquor Laws: See the Appendix.

Lisboa, BALTHAZAR DA SILVA: See SILVA LISBOA.

Lisboa, lĕĕs-bō'ăă, JOÃO FRANCISCO: author; b. at Iguará, Maranhão, Brazil, Mar. 22, 1812. He was destined for commercial life, but deserted it; managed to obtain an education, and was long a journalist, supporting the liberal party. In 1835 he was made secretary of the province, and in 1838 was elected to the provincial legislature. In 1852 he began the publication of a kind of literary magazine, written by himself, and called the *Jornal de Timon*. It consisted of political and satirical essays, aimed at both parties, and of historical papers—some of the latter of great importance. Twelve numbers, or volumes, were published, of which the last two, issued at Lisbon in 1858, are devoted to the history of Maranhão, and contain many original documents. In 1856 the imperial Government sent Lisboa to Europe to collect historical documents, and while thus engaged he died at Lisbon, Portugal, Apr. 26, 1863. He left several works in manuscript, of which one, *Vida do Padre Antonio Vieira*, was published in 1874. HERBERT H. SMITH.

Lisboa, JOSÉ DA SILVA: See SILVA LISBOA.

Lisbon [: Portug. *Lisboa* < Lat. *Olisipo*, the ancient name]: capital of Portugal and residence of its king; one of the most important commercial centers in the world; on the northern shore of a bay, Rada de Lisboa, 4 miles broad, formed by the Tagus at its influx into the Atlantic Ocean (see map of Spain, ref. 17–A). It is 9 miles from the mouth of the Tagus, and is 412 miles by rail W. S. W. of Madrid. Built on the declivities of seven hills, with numerous white cupolas and magnificent monumental buildings towering above the mass of 43,000 houses, interspersed with lovely terraces, Lisbon offers, when approached from the sea, an aspect at once charming and imposing. The bay forms a harbor large enough to accommodate at the same time all the fleets of Europe, and so deep that the largest ships can anchor immediately at its docks. The entrance to this harbor is defended by several forts, of which one, consisting of an interesting old Moorish tower called Torre de Belem, is situated on a sandbank in the bay. The city is 10 miles in circuit, and is divided into four quarters—Alhama, Rocio, Bairro Alto, and Alcantara—besides several extensive suburbs, including those of Belem and Olivaes, annexed in 1885. The old city, especially the quarter of Alhama, has irregular, narrow, and dark streets. The newer parts, built since the great earthquake (Nov. 1, 1755), which did not reach Alhama, are more regular and beautiful, and contain many palace-like buildings. The finest part is the quarter of Rocio, extending along the river and containing many splendid buildings and open places. Among the squares the Praça do Commercio is the most remarkable, situated on the Tagus, containing in the center the equestrian statue of Joseph I., and surrounded with magnificent buildings, the exchange, the royal library, the custom-house: the market-place is noteworthy also, and the immense place of Dom Pedro in the northern part of the quarter of Rocio, bordered on one side by the monastery of S. Domenico and the buildings formerly belonging to the Inquisition. Still farther to the N. stretches the public promenade. The most beautiful streets are Rua Augusta, which is the business center and contains many fine jewelry-shops, Rua do Oura, and Rua da Prata. The city has 64 churches and about 200 chapels; the former monasteries, mostly magnificent buildings, situated at the most elevated points, are now used for public purposes. The monastery of Belem is perhaps the most remarkable building of the city. It was founded in 1499 by King Emanuel the Great, on the spot where Vasco da Gama had embarked two years before, and its style is a mixture of Moorish, Byzantine, Norman, and Gothic elements. The material is white limestone, which has now become yellowish like old ivory. The least beautiful part of this building is the church, which contains the tombs of Camoens and Vasco da Gama. The whole building is used as a hospital for foundlings and orphans. The monastery of the Heart of Jesus is also an interesting structure, founded in 1770 and provided with a splendid cupola of white marble, an imitation of the Church of St. Peter in Rome: furthermore, the Church of the Patriarchs, with its gigantic cupola, situated to the N. E. of Monte do Castello; the marble Church of S. Roque; the basilica of S. Maria; the Church of Carmo, in Gothic style; and the Church of S. Vincent de Flora, the largest of the city, and the burial-place of the dynasty of Braganza. The most remarkable palaces are the royal palace of Ajuda, the palace of Nossa Senhora das Necessidades, and the palace of Bemposta. Other noteworthy buildings are the theater of S. Carlos; the national theater, which was formerly the palace of the Inquisition; the arsenal, the custom-house, the corn-market, and the polytechnic school. The educational institutions are very numerous; there are schools of every kind, including a military and a naval school, an academy of science, observatories, a geographical academy, a museum of natural history, and a conservatory of music. The city receives its water through the Alcantara aqueduct, constructed by Emanuel de Maya. The main stream comes from the village of Canassas, 2½ miles from Lisbon, and traverses the valley of Alcantara on thirty-five arches, of which the largest has a height of 230 feet and a diameter of 107 feet. The promenade on the top of the aqueduct offers a most beautiful view. The Gallegos (Spaniards from Galicia), who carry the water from the various fountains throughout the city, act as porters and perform other services, form a corporation of their own and number about 35,000. The hilly surroundings and the mountain region of Cintra are full of charming valleys, interesting peaks, and beautifully situated churches, monasteries, and mansions. The industries of the city are not considerable. Gold and silver ware and jewelry are manufactured, and spinning and weaving establishments, iron-foundries, and manufactures of silk, hats, boots, cutlery, stoneware, tobacco, chemicals, paper, soap, and steel are in operation. The commerce is very extensive. Lisbon is the largest port in the kingdom, and its custom-house is a substantial and spacious building, in which merchants are allowed to deposit their goods free of duty for one year, or for two years in the case of Brazilian produce. More than 2,500 vessels (including coasters) annually visit the port. The average value of the annual imports exceeds $30,000,000, and that of the exports $30,000,000. The most active commerce is carried on with Brazil and Great Britain, tropical products being imported from the former and manufactured goods from the latter, while wine and oil are exported to both. Lisbon had existed as a Roman *municipium* under the name of *Felicitas Julia*; later on it was taken by the Goths and by the Moors. When in 1147 Alfonso I., at the head of the crusaders, conquered and Christianized the city, it was called El-Oshbuna. In 1580 the Duke of Alva occupied it for Philip II. of Spain, and the Invincible Armada sailed from its port in 1588, but in 1640 the Spaniards were expelled and the dynasty of Braganza ascended the throne of Portugal. On Nov. 1, 1755, an earthquake destroyed the greater part of the city and killed 30,000 persons, but in an incredibly short time the place was rebuilt. In 1807–08, during the wars of Napoleon, the French held the city for a short time, but since then a long period of peace has greatly promoted its prosperity. Pop. (1892) 243,000.

Lisbon, OHIO: See NEW LISBON.

Lisburn: town; in the county of Antrim, Ireland; on the Lagan; 8 miles S. W. of Belfast (see map of Ireland.

ref. 5–J). It is celebrated for its manufactures of damasks and fine linen stuffs, a branch of industry established by a settlement of Huguenots after the Revocation of the Edict of Nantes. The parish church, which has a beautiful octagonal tower, was constituted the cathedral church of the united dioceses of Down and Connor and Dromore by Charles II., and contains a monument to Jeremy Taylor, who was bishop of the see. Pop. (1891) 9,517.

L'Islet: town of L'Islet County, Quebec, Canada; station on the Intercolonial Railway; 45 miles N. E. of Quebec (see map of Quebec, ref. 4–D); on the right bank of the St. Lawrence (which has here a width of about 20 miles) and opposite Crane island. Pop. 2,500.

Lisieux, lē̆ē′zi-ö′ [Fr. < Lat. *Lexobii*, *Lexovii*, a people at the mouth of the Lequana, or Seine]: town; in the department of Calvados, France; on the Touques, at the very point where it is joined by the Orbiquet; 30 miles by rail E. by S. of Caen (see map of France, ref. 3–D). Though its position at the junction of two rivers makes it subject to disastrous inundations, it is one of the most prosperous cities of Normandy, forming the center of a very considerable industrial activity, the arrondissement having more than 200 factories, producing linens (cretonnes), woolens, cottons, and flannels, besides spinning-mills, bleaching-fields, dye-works, etc. There is a large trade in grain, hemp, and cider. The Cathedral of Lisieux is one of the most interesting specimens of the transition from the Roman to the Ogival style. It was founded in 1045, and the greater part was finished in 1233. It is 360 feet long, 90 feet broad, 65 feet high, and its southern tower, rebuilt in the sixteenth and seventeenth centuries, rises 230 feet. It is dedicated to St. Peter. The Church of St. Jacques, dating from the fifteenth century, is also an interesting building. Pop. (1896) 16,349.

Lis pendens: a phrase meaning literally a pending or continuing suit or action, but used in general to designate a rule of law prevailing, with certain exceptions and restrictions, in courts of equity and in courts of law, that during the pendency of a suit neither party can alienate nor transfer property which is the subject of the action so as to affect the rights of his adversary; or, in other words, that all persons hold any rights acquired during the pendency of the action in the subject which it affects subject to the rights of the parties as settled by the result of the suit. The rule is in effect the same as that expressed in the maxim *pendente lite, nihil innovetur*, that is, during the pendency of an action no change will be allowed to be made (in the existing state of things).

Origin and Basis of the Rule.—The rule has been by some authorities supposed to have been adopted by analogy from proceedings in real actions at common law, but is more probably ultimately derived from the Roman or civil law. (Mackenzie's *Roman Law*, 329.) Although it had already been long acted upon as a principle of practice in the proceedings of courts, it was first formally stated and established by Lord Bacon in 1618 as one of his rules or ordinances governing the administration of justice in courts of chancery. Numerous authorities have referred the rule concerning the effect of a *lis pendens* (pending action) to the doctrine of constructive notice, but the better opinion now is that it is based upon the necessity that, in order to put an end to litigation, the decision of the court shall be binding not only on the parties to the suit, but on third parties who claim title or rights under them by alienation or transfer made during the pendency of the suit, whether such alienees had or had not notice of the pending action. The rights of the parties are the same in either case.

When the Rule Becomes and Ceases to be Operative.—The rule *lis pendens* is operative only when the court has full jurisdiction over the person and over the property, which must be of such a character as to be affected by the rule, and must be described with such certainty as to enable it to be identified by the description. For this purpose the court in general has full jurisdiction on the filing of the bill and the service of the subpœna; and its jurisdiction ceases upon the final dismissal of the action, either by decree or judgment or from any other cause. In the U. S. the rule also ceases to be operative in cases of negligent failure to prosecute, but the decisions are not uniform as to what constitutes such negligence as to destroy the *lis pendens*. The reasonable rule which has been followed in many of the cases would seem to be that the prosecutor should be estopped from claiming the benefit of *lis pendens* by such negligence as under the circumstances of the case justifies the belief that the suit has been abandoned. In the U. S. the question whether a *lis pendens*, valid in the State in which the action is pending, shall be recognized as valid under the laws of another State has been variously decided.

Property Subject to the Rule.—Real property has universally been held to be subject to the operation of *lis pendens*, and it is settled that the rule applies also to personalty, but the decisions of the different courts limiting the classes of personal property subject to it are not uniform. With the exception of a few cases in Pennsylvania, however, negotiable paper of all kinds has been held to be exempt from its operation. The rule is undoubtedly beneficial in its relation to real estate, but in its application to personal property, which is the subject of ordinary commerce, it is liable to work great injustice, and the courts will not aid in setting the rule into operation by presuming facts material to that end.

Statutory Regulation.—To alleviate the harshness of the "constructive notice" fastened upon a purchaser by force of this rule, the matter has been regulated by statute, both in England (2 Vict., c. xi., sec. 7) and in many of the U. S., so far as real estate is concerned. For a fuller statement of the law of *lis pendens*, see the treatises of Story, Adams, and Pomeroy *On Equity Jurisprudence*; Bennett, *On Lis Pendens*, and the various statutes. The substance of the legislation is that written notice of the pendency of the action is to be filed in a designated office, giving sufficient information of the names of the litigants, the property affected, and the object of the litigation. Constructive notice is given from the time of the filing. F. Sturges Allen.

Lis'sa (anc. *Issa*, Slav. *Vis*): an island in the Adriatic, in lat. 43° 1′ N., lon. 16° 6′ E., in the Dalmatian Archipelago. Area, 35 sq. miles. Pop. 7,900. The fortifications of its two harbors—especially of that upon the east side, near the small town of Lissa—are so strong that they almost rival those of Malta. This island was an important naval station under the Romans, a stronghold of the corsairs during the Middle Ages, an emporium of contraband British merchandise during the wars of Napoleon. Here the Italian squadron was defeated by the Austrian squadron in the war of 1866. Revised by M. W. Harrington.

Lissa: town; in the province of Posen, Prussia; 40 miles S. by W. of Posen (see map of German Empire, ref. 4–H). It has large liqueur, wax, and tobacco factories, a celebrated bell-foundry, and extensive manufactures of woolen and linen stuffs. In the sixteenth century it was the chief seat of the Bohemian Brethren. Pop. (1890) 13,116.

Lissencephala [Mod. Lat., from Gr. λισσός, smooth + ἐγκέφαλος, brain]: a name given by Owen to a class of mammals characterized by the comparative smoothness of the surface of the brain. The corpus callosum is well developed, but the cerebrum is small, leaving the cerebellum and part of the olfactory lobes exposed. The class includes the edentates, insectivores, rodents, and bats, and is the equivalent of Bonaparte's *Ineducabilia*. F. A. L.

List, list, Friedrich: economist; b. at Reutlingen, in Würtemberg, Aug. 6, 1789; was appointed Professor in Political Economy at the University of Tübingen in 1817, but gave up this position in 1819, in order to work in a more direct and practical way for the development of German industry and commerce. Having been elected a member of the diet of Würtemberg, he exposed in a petition to the Government the vices of the administration, and was condemned in 1822 to ten months' imprisonment. He fled, and lived for some time in Switzerland and Alsace, but returned home in 1824, and was imprisoned in the fortress of Asperg. As he declared that he wished to emigrate to the U. S., he was pardoned after a short time, and he then settled in Pennsylvania, where he soon attracted the attention of the most prominent men by his work, *Outlines of a New System of Political Economy* (1827), in which he attacked the ideas of Adam Smith, and advocated an economical development on an exclusively national basis. Having discovered a rich deposit of anthracite on his grounds, he aided in founding the two towns of Tamaqua and Port Clinton, and returned in 1833 to Europe in possession of an independent fortune. He was for a short time U. S. consul at Hamburg and then at Leipzig, but afterward settled in Augsburg, and began to agitate for the formation of a system of railway lines as the only suitable means of transportation. His writings—*Ueber das sächsische Eisenbahnsystem* (1833); *Ueber ein deutsches nationales Transportsystem* (1838); *Das nationale System der politischen Oekono-*

mie (1841); besides a large number of minor articles in the papers—had some weight, but his ideas were too far advanced to be fully appreciated. In 1846 he visited England in the hope of securing a comprehensive commercial alliance between that country and Germany, but failed in his mission. In a fit of despondency caused by this disappointment and by his ill-health and loss of property, he shot himself at Kufstein, in the Tyrol, Nov. 30, 1846.

Lista y Aragón, ALBERTO: poet; b. at Triana, a suburb of Seville, Spain, Oct. 15, 1775. After studying in the University of Seville, he became in 1796 Professor of Mathematics in the Colegio de San Telmo in that city. Compelled to flee to France during the political troubles of the beginning of the nineteenth century, he returned in 1817 and taught mathematics successively in Bilbao, Madrid (1820), Cadiz (1838), Seville, in which latter place he was made dean of the philosophical faculty of the university. In 1822 he published a collection of poems (2d ed., enlarged and revised, 2 vols., 1837). In 1828 he worked on the supplement to the edition of Mariana's *Historia de España*, published in that year. In 1829 he began to issue a translation of the historical works of the Comte de Ségur. D. at Seville, Oct. 5, 1848. He was a member of the Spanish Academy and of the Academy of History and edited *Trozos escogidos de los mejores hablistas castellanos en prosa y verso.* His poems are printed in vol. lxvii. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1875). See Ochoa, *Biografía del Señor D. Alberto Lista y Aragón* (1848). A. R. MARSH.

Lister, Sir JOSEPH, M. D., LL. D., F. R. S.: surgeon; b. at Upton, Essex, England, Apr 5, 1827; was educated in London, receiving M. B. degree in 1852; in 1855 passed the examinations for a fellowship in the Royal College of Surgeons of Edinburgh; was Professor of Clinical Surgery in Glasgow, in Edinburgh, and in 1877 in King's College, London. His early investigations in physiology and pathology suggested the idea that putrefaction and other fermentative changes were caused by germs; from this idea the more important thought developed that the bad results occurring in surgical operations were often due to germ or septic infection, and that if these operations should be performed with antiseptic precautions better results would be obtained. This principle has been gradually elaborated from the time of its announcement, in 1869, and it has revolutionized surgery and placed mankind under obligations to its originator. In 1878 Edinburgh University conferred the degree of M. D. on him; in 1880 both Oxford and Cambridge conferred upon him the degree of LL. D.; in 1883 he was created a baronet, and in 1897 was raised to the peerage as Lord Kinnear. His Croonian lectures in 1863 were on the coagulation of blood. In 1869 he published his observations on the ligature of arteries on the antiseptic system. Among his more important publications are *Remarks on a Case of Compound Dislocation of the Ankle, with other Injuries, Illustrating the Antiseptic System of Treatment* (Edinburgh, 1870); *On the Effects of the Antiseptic System of Treatment upon the Salubrity of a Surgical Hospital* (Edinburgh, 1870); *A Contribution to the Germ Theory of Putrefaction and other Fermentative Changes* (Edinburgh, 1875). S. T. A.

Listing, JOHANN BENEDICT: physicist; b. at Frankfort-on-the-Main, Germany, July 25, 1808; began his scientific career as assistant to von Waltershausen 1834–37; taught in the technical high school in Hanover for two years; was then appointed Professor of Physics in the University of Göttingen (1839), where he remained until his death on Dec. 24, 1882. He was known to science for his contribution to physiological and geometrical optics, and through his investigation of certain important properties of space. He was one of the first to elaborate the theory of thick lenses, and his work upon knots and linkages anticipated by nearly half a century the better known researches of Tait. He enunciated a law relating to the movements of the eye in vision, known as Listing's law. He was not a voluminous writer, and his work was published chiefly in the form of unpretentious communications to the local academy of sciences (*Akademie der Wissenschaften zu Göttingen*). They were of a high order, however, and when brought to the notice of other investigators, sometimes after the lapse of many years, they received recognition. His very important researches in the geometry of position (*Der Census räumlicher Complexe*, Göttingen, 1861) were first brought into general notice outside of Germany, twelve years later, by Maxwell (*Electricity and Magnetism*, vol. i., p. 16, 1873).

E. L. NICHOLS.

Liston, JOHN: actor; b. in London, England, 1776; was educated in Dr. Barrow's school, and became second master of St. Martin's School, whence he was expelled for taking part in stage-plays with the pupils. He then went upon the stage and became one of the best comic actors in England during the first third of the nineteenth century. His fame is celebrated by Lamb, Hood, and all the wits of the period. His reign at the Haymarket began in 1805, at Drury Lane in 1823, and at the Olympic in 1831. He left the stage in 1837, and died Mar. 22, 1846.—His wife (Miss TYRER), though of almost dwarfish stature, was a favorite actress as well as singer. Revised by B. B. VALLENTINE.

Liston, ROBERT, F. R. S.: surgeon; b. at Ecclesmachan, Scotland, in 1794; studied medicine in Edinburgh and London; practiced at Edinburgh 1818–35; was lecturer on Anatomy and Surgery and surgeon to the infirmary; became Professor of Clinical Surgery at University College, London, 1835; surgeon to the North London Hospital in 1843; examiner to the College of Surgeons 1846. D. Dec. 7, 1847. Dr. Liston was one of the ablest and most successful of operative and clinical surgeons, and wrote several able professional treatises, of which the most important were *Elements of Surgery* (in three parts, Edinburgh and London, 1831 and 1832), followed by a second edition in one volume in 1840, and *Practical Surgery* (London, 4 editions, 1837–46).

Listow'el: a village and railway junction of Perth co., Ontario, Canada; on the Maitland river (see map of Ontario, ref. 4–C). It is a very important trading center, and ships large quantities of grain. It has a weekly and a monthly publication. Pop. 2,587.

Liszt, list, FRANZ: pianist and composer; b. at Raiding, in Hungary, Oct. 22, 1811. His father, an accountant or steward of Prince Esterhazy, but of musical taste sufficient to appreciate the astonishing talent of his son, put him to the piano at six years of age. At nine he gave a concert, and so much interested certain noblemen that he was sent for instruction to Vienna. There he studied for eighteen months with Czerny and Salieri, making such progress that he gave a public concert in Vienna; emboldened by brilliant success, his father in 1823 took him to Paris; refused admission to the Conservatoire as a foreigner, he gave concerts and played before the Duke of Orleans till the musical world was wild with enthusiasm. Flattery might have spoiled him had not his father held him severely to his work, compelling him, it is said, to execute daily twelve fugues of Bach, transposing them in different keys. In 1824–25 the boy achieved triumphs in the provinces and in England. At this time (1825) he composed an opera, *Le Château des Amours*, which has disappeared. Again in Paris he took lessons in composition of Reicha. In 1827 his father died, and Franz fell into a morbid state, gave himself up to romantic fancies and religious enthusiasms, became a Saint-Simonian, and in 1830 composed a *Symphonie révolutionnaire*, which was never published. This condition lasted two or three years. The playing of Paganini revived his passion for art, and made him resolve to be the Paganini of the piano. His labors were renewed, and he astonished Europe with his mastery of the instrument and the ease with which he executed the most difficult works of Bach, Handel, Beethoven, and Weber. His gift at improvisation was as wonderful as his power of execution. In 1848 he was made Kapellmeister at Weimar. Honors came thick upon him. The cities of Odenburg and Pesth presented him with the rights of citizenship: the Hungarian nobles gave him a sword of honor; the King of Prussia made him a member of the Order of Merit; the faculty at Königsberg created him doctor of music; the Grand Duke of Saxe-Weimar appointed him chamberlain; in 1845 he was decorated with the Legion of Honor, and in 1861 was raised to the rank of commander. On Apr. 25, 1865, Liszt received the clerical tonsure in the chapel of the Vatican with the title of *abbé*, but belonged to the so-called secular clergy. Liszt was an admirer, patron, and friend of Richard Wagner, to whom he gave one of his two daughters in marriage; the other, wife of Émile Ollivier, is dead. Liszt died at Bayreuth, Bavaria, July 31, 1886. The works of the artist consist of fantasias, *poëmes symphoniques* (twelve in number), *Faust*, and the *Divina Commedia*, grand symphonies, two oratorios, *Die heilige Elizabeth* and *Christus*, and transcriptions innumerable. He was a writer as well as a musician, and has a position in literature as well as in art. In 1852–54 he published a life of Chopin (translated into English by Walter Cook, 1877) and essays on the *Tannhäuser*

and *Lohengrin* of Wagner; in 1859 a dissertation on *Bohemians and their Music in Hungary*. Liszt was a man of ardent impulses and lavish generosity. His instrumental music has more tumult than grace, more force and sound than delicacy, and often only the mastery of instrumentation saves it from the reproach of being grotesque and fantastical. His vocal compositions have less reputation than his instrumental, with the exception of two or three songs.

Revised by DUDLEY BUCK.

Litany [M. Eng. *letanie*, from O. Fr. *letanie* > Fr. *litanie* < Lat. *litani'a* = Gr. λιτανεία, prayer litany, deriv. of λιταίνειν, pray, pray publicly, deriv. of λιτέσθαι, λίσσεσθαι, beg, pray. Cf. λιτή, prayer]: a term originally used in a general sense to denote any sort of united prayer, whether public or private, whether penitential, intercessory, supplicatory, or deprecatory. It thus occurs in the writings of Eusebius and Chrysostom and in the laws of Arcadius. Some trace, however, of a more technical meaning is found in the epistle of Basil to the church of Neo-Cæsarea, where it seems to denote a religious proceeding somewhat similar to the so-called *rogationes* (*Litania, quæ Latine Rogatio dicitur, inde et Rogationes—Ordo Romanus*), which, according to Sidonius Apollinaris, came into use in Gaul in the beginning of the fifth century, and consisted in processions of the community, fasting and in sackcloth, for the purpose of procuring fine weather or rain, etc. The earliest and simplest form of litany is the *Kyrie Eleison*, repeated three, six, twelve, forty, or more times. Gradually both the form and the purpose of those *rogationes*, or litanies, were regulated by law. One of the *novels* of Justinian forbids litanies to be celebrated without the presence of the bishop and the clergy, and orders that the crosses which were carried about in procession should be borne only by priests and deposited nowhere but in the church. The synod of Orleans (511) prescribes for all Gaul that the litanies before Ascension shall be celebrated for three days, and that during those days all menials shall be exempt from work, so as to be able to attend divine service. A synod of Paris (573) ordered litanies to be held for three days at the beginning of Lent, and in 590 Gregory I., on account of the pestilence which had followed a great inundation, ordered that a *litania septiformis*, or sevenfold procession, should be performed by clergy, laity, monks, virgins, matrons, widows, poor, and children. In 747 the synod of Clovestoe prescribed that litanies or rogations should be celebrated by all the clergy and people on Apr. 25 and on the three days before Ascension, whence those days are still known in the English Church as rogation days. Thus in course of time litany became, in the liturgical services of the Christian churches, a name applied to various supplicatory acts addressed to God or to the saints, or both, but applied especially to solemn prayers in which the people take responsive parts. The principal litany of the Roman Catholic Church is the Litany of the Saints; the Anglican churches have a service called the Litany and Suffrages; the Lutherans and some other Protestants have litanies.

Revised by W. S. PERRY.

Litchfield: town; capital of Litchfield co., Conn. (for location of county, see map of Connecticut, ref. 8–E); on the Shepang, Litchfield and Northern Railroad; 30 miles W. of Hartford. It is between the Naugatuck and Shepaug rivers, 1,800 feet above sea-level; was for years the seat of one of the most celebrated law schools in the country; contained the first ladies' seminary established in the U. S.; and, from its invigorating climate, has been a popular summer resort. It derives power for manufacturing from Bantam Lake near by, has valuable beds of nickel ore, manufactures paper, oil, satinets, and nickel-ore smelters, and contains a national bank with capital of $200,000, a savings-bank with deposits of over $1,000,000, 2 libraries, 2 parks, and a weekly newspaper. Pop. (1890) township 3,304, borough 1,058; (1900) township 3,214, borough 1,120.

Litchfield: city (founded 1854, incorporated 1859); Montgomery co., Ill. (for location of county, see map of Illinois, ref. 8–D); on the Clev., Cin., Chi. and St. L., the St. L. and Chi., and the Wabash railways; 42 miles S. of Springfield, 47 miles N. E. of St. Louis. It is in a coal, natural-gas, and lubricating-oil region; has flour-mills, grain elevators, and a coal mine; and manufactures foundry and machine-shop products, cars, carriages, threshing-machines, paint, brooms, brick and tile, and cider and ginger-ale. There are gas and electric lights, Holly water-works, public library, public parks, an Ursuline convent, and 2 monthly and 2 daily newspapers. Pop. (1890) 5,811; (1900) 5,918.

Litchfield: village; capital of Meeker co., Minn. (for location of county, see map of Minnesota, ref. 9–D); on Lake Ripley and the Great Northern Railroad; 67 miles W. of Minneapolis. It contains 10 churches, woolen and flour mills, iron-foundry, and 3 weekly newspapers; is in an agricultural and stock-raising region; and has a popular summer resort, Brightwood, on the lake. Pop. (1900) 2,280.

Literature of Education: See the Appendix.

Lithæmia: See GOUT.

Lith'arge: See LEAD.

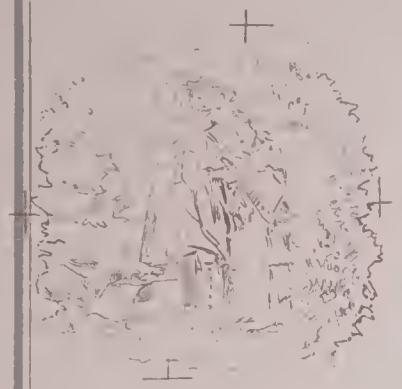
Lithates: See URATES.

Lithic Acid Diath'esis [*diathesis* is from Gr. διάθεσις, condition, liter., arrangement, deriv. of διαθεῖναι, put separately, arrange, distribute; διά-, apart + θεῖναι, τιθέναι, put]: that condition of the general system which favors the production of lithic acid or its salts in the urine. The diathesis is closely allied in many respects, and doubtless in nature, to gout. There is little certainty regarding the true pathology of the disease. Some look upon it as a disorder of the blood, a dyscrasia, primarily, with secondary affection of other organs; others believe the root of the trouble to lie in improper action of the stomach; while still others regard the disease as one of the liver. This condition is unquestionably a widespread one, and lies at the root of many of the vague disorders characterized as faulty assimilation, dyspepsia, and nervousness. Its symptoms are manifested in disorder of many organs; and, as different groups may be prominent in different cases, a very varied picture is presented. In one case gastric disturbances and dyspepsia are prominent; in others nervous disorders, headaches, nervousness, sleeplessness, and all sorts of undefined forms of depression; in still other cases the prominent manifestations are met with in the urinary system. There may be excess of uric or lithic acid in the urine, either free or combined with the bases ammonium, sodium, or lime, and all of these may be deposited as sediments. Frequently this excess of lithic acid causes deposition in the urinary passages themselves, and stone in the kidney may occur. The treatment of this condition is directed to the establishment of a better general tone of the system rather than to any particular organ. At times palliatives may be called for, but on the whole a general plan of hygienic treatment promises the best results. Most prominent in the curative measures is regulation of diet and especially the avoidance of certain substances known to produce an acid condition of the urine. Starches and sugars are particularly prone to occasion disturbance of the stomach as well as general disorders; and the patient is therefore warned to partake of as little farinaceous or saccharine food as may be possible. For lithic acid, see URIC ACID.

WILLIAM PEPPER.

Lithifaction: See GEOLOGY.

Lith'ium [from Gr. λίθος, stone; cf. λίθειος, of stone]: a rare metal. The existence in the mineral petalite of an alkali differing from potassa and soda was discovered by Arfvedson in the laboratory of Berzelius in the year 1817. It occurs in *lepidolite*, *spodumene*, *amblygonite*, *triphylite*, some *tourmalines*, and other mineral species, and is a frequent constituent, in small proportions, of mineral waters. Lithium was first obtained by electrolysis of the fused chloride by Bunsen. It is a silver-white metal, somewhat softer than lead, and lighter than any other known solid body, having a density of only ·5835; so that it floats even on petroleum and naphtha. It has also the smallest atomic weight of any element except hydrogen, this weight being only 7. *Lithium hydrate*, corresponding to the hydrates of potash and soda, is a strongly caustic alkaline body like these, but is not deliquescent in the air, nor is it volatile at intense heats. The smallest traces of lithium are detectable by means of the spectroscope, which gives a spectrum consisting entirely of two lines—one a brilliant intense crimson, and the other a faint yellow. Lithium imparts to flame this beautiful crimson tint, and, were it cheap enough, would be a valuable agent in fireworks. An interesting practical application of the characteristic flame-color of lithium has sometimes been made. In cases of suspicion that a well or cistern is being poisoned by percolation from a privy or drain, a little lithium may be put into the supposed source of contamination. In case of percolation it will soon be easily detectable with the spectroscope, with chemical certainty, in the water of the well. *Lithium chloride*, corresponding to common salt, the chloride of sodium, is easily prepared. It crystallizes in regular octahedra, which taste like com-



KEY PLATE. ALL THE COLOR PLATES ARE MADE TO FIT THIS PLATE, THUS SECURING REGISTER.

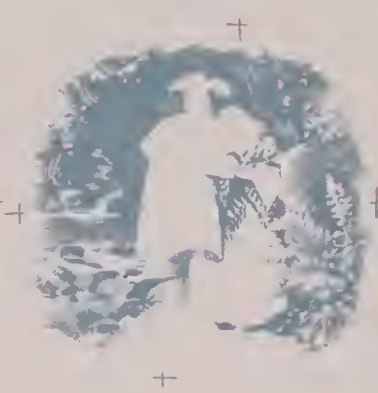
YELLOW,
USUALLY FIRST PRINTING.

RED,
USUALLY SECOND PRINTING.

RED ON YELLOW.

BROWN,
PRINCIPAL DRAWING COLOR.

BROWN ON RED AND YELLOW.



DARK BLUE.

DARK BLUE ON BROWN, RED AND YELLOW.

PINK.

PINK ON DARK BLUE, BROWN, RED AND YELLOW.

LIGHT BLUE.

LIGHT BLUE ON PINK, DARK BLUE, BROWN, RED AND YELLOW.

BUFF.

BUFF ON LIGHT BLUE, PINK, DARK BLUE, BROWN, RED AND YELLOW.

GREY.

FINISHED PICTURE, WITH GREY ADDED TO PREVIOUS COLORS.

COLOR LITHOGRAPHY IN EIGHT PRINTINGS.

DEVELOPMENT OF A PICTURE, SHOWING PROGRESSIVE PROOFS.

mon salt. It is, however, deliquescent, unlike the chlorides of sodium and potassium, and is more soluble than these.

Revised by Ira Remsen.

Lithium, Medicinal Uses of.—*Lithium carbonate* and *citrate* are sometimes used in medicine as alkalies, and have been specially recommended in gout, because of their forming an easily soluble salt with uric acid. In reality, they are of little value in gout, as they unite more readily with the acid sodium phosphate of the blood than with the uric acid. The citrate, however, is preferable to the carbonate, from being more soluble and less disagreeable to the taste.

Revised by H. A. Hare.

Lithofracteur: See Explosives.

Lithography: the art of drawing on stone with a chemically prepared ink or crayon, or engraving on stone with a needle or diamond point and printing therefrom with lithographic ink.

History of the Art.—The invention of lithography is commonly ascribed to Alois Senefelder, who in 1796 first practiced the art in the printing of music in Munich, where he was an actor, although it is claimed that Simon Schmidt, in Germany, and William Blake, in England, both utilized the same or a similar method for producing work as early as 1788. Neither of these two, however, fully appreciated the value of his invention. Senefelder devoted himself to the development of the art, and was the teacher of some of the earlier practitioners. Even the much later improvements are found suggested in his writings. In 1818 he published a somewhat complete account of his processes. About the same time those who had studied of him founded establishments in many cities of Europe, where very good lithography was done. Gottfried Engelmann, of Mulhouse, in Alsace, had been an assistant of Senefelder's in Munich. He established himself first in his native place, and then in Paris about 1817. He also published a book about the art and its possibilities. The Baron Lasteyrie started another workshop in Paris a short time afterward. Rémond Jules Lemercier was one of the earliest French lithographers. His connection with the art lasted till his death, and his relatives and successors, R. J. and Alfred Lemercier, have received honors and decorations for their services in this direction. In Germany Franz Hanfstängl grew up from boyhood in the practice of lithography. He went to Paris and worked with Lemercier, and in 1835 undertook to reproduce the pictures of the famous Dresden Gallery. This work went on for fifteen years, and resulted in the completion of a very considerable work—sixty parts, of three prints each. A similar work was undertaken at Berlin by Simion in 1840. Ferdinand Piloty established himself in Munich about 1830, and formed a partnership with an artist named Loehle. In the work of these lithographic establishments it was the custom to give the name of the draughtsman on stone, as well as that of the painter, showing that it was the custom to give to a specialist the duty of producing the lithograph; but many artists of great ability, and even some of celebrity, found it easy to express their thoughts in this medium. Adolf Menzel as early as 1833 produced his *Artist's Earth-pilgrimage.* Before that time Géricault, in Paris, had some successful lithographic drawings. Carle Vernet, father of the better-known Horace, was one of the earliest; then came Eugène Delacroix, the younger Fragonard, Tony Johannot, Alexandre Decamps, and Hippolyte Bellangé, and there grew up also some specially competent lithographers, trained to render on stone the work of the admired artists of the day, as, for instance, the celebrated Julien, afterward so well known for his *études à deux crayons*, and Mouilleron, who was especially successful with the pictures of Delacroix. Charles Samuel Girardet is another such artist of great ability. The triumph of lithography, however, was in the hands of some artists who devoted themselves to it principally as the medium best suited to their genius and to what they had to say. Such were Nicholas Toussaint Charlet (b. 1792; d. 1845) and Denis Auguste Marie Raffet (b. 1804; d. 1860). These two artists cherished the memories of the old armies of Napoleon, and loved to recall in vigorous prints sold cheaply the bravery and the humor of the "grumblers" of the empire. Then when the expedition to Africa and the subsequent wars there under Charles X. and Louis Philippe gave them a new military life to describe, Raffet turned to that, and published a great number of most spirited compositions—models of descriptive art.

The Materials Used.—The stone used in lithography is a closely grained limestone, which is found in different parts of Europe and America; the best stone, however, is found in Solenhofen, in Bavaria, Germany, from which place almost the entire world receives its supply, although in later years quarries have been opened in Canada and in some of the Southern and Western States, all of which promise good results. The lithographic stone before it is shipped from the quarry is sawn into slabs from 3 to 4 inches in thickness (thinner ones would be liable to break under the pressure which they have to undergo in printing), and in size from 6 by 8 inches to 44 by 62 inches, though these larger sizes are scarce when of good quality and without flaws, such as having open veins or soft lime-spots. The stones vary in color from a dull gray to light-creamy gray, the colder and darker the color the harder the stone.

The crayon or chalk, as it is sometimes called, which is used in lithography, is of a greasy composition, composed principally of wax, soap, tallow, shell-lac, turpentine, and lampblack, and most nearly resembles a small, hard, black tallow candle, and being exceedingly brittle it is sharpened from the point upward.

The ink which is used for drawing with the pen on the stone is composed of the same ingredients as the crayon, though containing a trifle more grease, and is rubbed dry on a plate or saucer, after which it is dissolved with water until it is sufficiently liquid to flow easily.

The Process.—The stone is carefully leveled and grained, or, if it be used for pen-work, polished; the graining being done by putting fine sand and water between two of the stone slabs and rubbing them together until the lower one has a grain as nearly as possible resembling the grain of fine drawing-paper; the polishing is done with pumice or Scotch stone. Sheets of glass, zinc, and aluminium are sometimes substituted for lithographic stone, but as yet no substance has been discovered which for perfect working surface equals the stone.

The lithographic stone when ready for the drawing is so sensitive to anything of a greasy nature that even to touch the surface with the fingers would smut it, and the places so touched would be liable to print almost the same as though they were a part of the drawing. After the stone has been grained or polished, the drawing is made thereon precisely as though it were being drawn on paper, though necessarily reversed; but it is of the greatest importance that no errors be made, for, while some slight corrections can be made after the drawing has been finished, there is always more or less risk in doing so, owing to the sensitiveness of the stone, or the fear of destruction of the grain.

When the drawing is completed it is bathed with a solution of nitric acid and gum arabic, the object of which is to keep the grease of the crayon or ink from spreading, and at the same time to render those parts of the stone having no drawing on them more porous and more capable of absorbing moisture. Great care has to be taken not to have the solution either too strong or too weak; if it contains too much acid the finer and more delicate parts of the drawing may be eaten away; on the other hand, should the solution be too weak, the drawing is apt to fill in and become heavy. It must here be explained that the whole principle of lithography rests on the antagonism of grease to water, and it is necessary to bear this continually in mind.

After the acid and gum have been allowed to dry the stone is first washed with water, and after this all indication of the drawing is washed off the stone with turpentine, leaving only the grease of the ink or crayon on the surface, which being again washed, this time with pure water, is now ready for printing.

The stone having been moistened either with a wet sponge or damp roller (the moisture of course being repelled by the grease of the drawing), the printing-roller, charged with ink, passes over the stone, the ink naturally adhering only to those places where the stone is dry, or, in other words, where the drawing is. A sheet of paper is then placed on the stone and run through the press. This process of dampening, rolling, and pulling through the press is necessary for each impression made, and while but from 200 to 500 impressions can be made per day on a hand-press, from 5,000 to 8,000 can be made on a large power-press.

Engraving on stone is done very much as engraving on steel or copper, but in printing the engraved lines are filled in with ink applied with a dabber in place of a roller.

When, about the year 1860, the demand for lithographs greatly increased, the process of transferring was invented. By this process it is possible to transfer any given number of smaller subjects (which at one time had to be printed

singly from the original stones) on a large stone, and thereby it has been made possible to print forty or sixty or more subjects at one time. This method of transferring is done by making from the original stones or from plates as many impressions as are desired on specially prepared sensitive transfer-paper, with an ink of the same general substance as the original lithographic ink or crayon, but of a semi-liquid consistency; then, after having fastened these impressions side by side on a large sheet of paper or zinc, this is placed face downward on a clean and smoothly polished stone of requisite size, and pulled through the press with sufficient pressure to transfer the carefully made impressions from the transfer-paper to the stone. The transfer is then prepared just as though it was an original drawing, and from 5,000 to 20,000 impressions can be made from it, according to the quality of the work. Engraved work can be transferred the same as crayon or ink work.

Colored or chromo lithographs, as they are more generally called, are often printed in as many as twelve or fifteen colors, which, when artistically handled, will produce twice or three times as many shades and tints, and it is not uncommon to use twenty or thirty colors to reproduce an especially fine water-color drawing or oil-painting, in order to give in facsimile every shade and tint of the original, each color used requiring a separate stone.

The ink used in lithographic printing is similar to ordinary printing-ink, but usually of a much finer quality. The paper also should be selected with great care, especially in cases where the work is to be printed in many colors, so that the danger from stretching, owing to successive moistenings as it passes over the dampened stone between each successive printing, and the consequent fear of misregistration of the colors, is as far as possible minimized.

In later years photography has been more or less applied to lithography, the result being not only the very common process of photo-lithography by which architectural and mechanical drawings, more especially, are accurately reproduced from pen-drawings at a small expense, but also the exquisite effects produced in comparatively few printings by transferring negatives to stone through the medium of the "half-tone" or screen process. G. H. Buek.

Lithology [from Gr. λίθος, a stone + λόγος, science]: See Petrology.

Lithosphere: See Geology.

Lithotomy, **Lithotrity**, or **Lithotripsy**, and **Litholapaxy** [*lithotomy* is from Gr. λιθοτομία, stone-cutting, deriv. of λιθοτόμος, cutting stone, stone-cutter; λίθος, stone + τέμνειν, cut; *lithotrity* is from Gr. λίθος, stone + Lat. *te're're*, *tri'tum*, rub, grind; *lithotripsy* is from Gr. λίθος, stone + τρίβειν, to grind; *litholapaxy* is from Gr. λίθος, stone + λάπαξις, evacuation]: surgical operations by means of which the extraction of a stone from the bladder is effected. The term *lithotrity* refers to the older method of crushing and removing a stone at several operations or "sittings," whereas the term *litholapaxy* refers to the modern improvement by which it is completely removed at one time or by a single operation, including its crushing and the evacuation of the fragments. Urinary calculi are composed most frequently of substances existing normally in a state of solution in human urine, such as uric acid, urate of ammonia, and the phosphates of calcium and magnesium. Sometimes, however, they are composed of substances met with only in morbid urine, such as oxalate of calcium, cystine, etc. Besides these ingredients, of which they mainly consist, calculi always contain more or less animal matter, such as dried blood, vesical mucus, etc. Occasionally they are found to consist almost entirely of a single ingredient, but more frequently of two or more different constituents arranged in irregular concentric layers. In certain conditions these ingredients solidify and form concretions. The initial process in their formation commonly takes place in the kidneys; the product then descends along the ureter (a fleshy tube for conveying the urine) into the bladder, from which it is often expelled in urinating, and thus got rid of. If, however, it remains in the bladder, it becomes a nucleus upon the surface of which successive deposits of solid matter take place, until a calculus is formed, which in process of time may attain a formidable size—too great, in fact, to admit of its safe removal by any surgical operation. Any foreign substance introduced accidentally or intentionally into the cavity of the bladder will also become a nucleus upon which incrustations of solid matter will take place. Instances have occurred where bullets, fragments of surgical instruments, and other foreign bodies have formed the nuclei of stone in the bladder. Calculi may exist single or multiple in the bladder; where multiple, there may be two or more of nearly equal size, or there may be a large number of every variety of size from a pin's head to a horse-chestnut. When there is but a single calculus, it is more generally of a flattened, ovoid shape, or globular, though sometimes it may resemble an hour-glass in shape, or have any irregular form. Its surface is sometimes smooth, sometimes rough, uneven, and studded with pointed eminences. When two or more are found in the same bladder, their surfaces are marked by smooth facets, produced by their contact with each other. If a concretion remain permanently in the cavity of the kidney, it may in the process of its growth become molded into the shape of the cavity. Calculi are met with in both sexes, though more frequently in males than females, owing in part to the greater facility with which the nuclear concretion can be expelled from the female than from the male bladder. No age is exempt from this malady; it has been met with in the infant at birth, and at all subsequent periods of life up to the most advanced age. Certain localities have been regarded as favoring the production of this malady by the properties of the drinking-water in use.

At all times there have been remedies advocated as possessing the property of dissolving the stone in the bladder, and patients afflicted with the disease, naturally shrinking as they do from the alternative of a surgical operation, have been too ready to give credence to the vaunted efficacy of such remedies, and by long perseverance in their use have lost precious time. The stone has increased in size, and the danger from a surgical operation has thereby been enhanced, while the chances of recovery have been diminished. The removal of a stone by a surgical operation is the only reliable means of cure, and the earlier it is resorted to the better the chance of recovery.

Lithotomy is a cutting operation by which an opening is made from the surface of the body into the cavity of the bladder at certain points where this organ lies nearest to the surface. Through the opening thus made an instrument (forceps) is introduced into the bladder, the stone seized and brought away. This operation has been in use since the earliest period in the history of surgical art. The operation is performed according to two principal methods: (1) The hypogastric or supra-pubic method, by means of which the cavity of the bladder is reached through an opening made at the lowest point of the abdomen, exactly in the median line of the body, and above the pubis. (2) The perineal or sub-pubic method, by which the bladder is reached through an incision made in front of the anus, between it and the scrotum, in the space known as the perineum. This method is more generally and frequently employed, as the safer and the one of wider application. It admits of three varieties in its mode of execution, distinguished from each other by the different directions in which the incisions required for its performance are made: First variety, known as the median operation, in which the incision is made exactly in the median line of the perineal space between the anus and scrotum. Second variety, termed the lateral operation, in which the incision, beginning at a point in the median line in front of the anus, is carried obliquely outward and backward to the left side of the anus. Third variety, known as the bilateral operation, in which the incision extends in a curved line across the perineal space in front of the anus, and to an equal distance on either side of the median line. Each of these varieties has had able and zealous advocates; the choice of operative methods must, however, be determined by a judicious discrimination of the conditions of each case that comes under consideration. By the suprapubic method a stone weighing as much as 34½ oz. has been successfully removed.

Lithotrity, or *lithotripsy*, is a bloodless operation by which a stone in the bladder is reduced to fragments small enough to be expelled through the natural canal in urinating. Though some traces of a conception of this method are found at an earlier period in the history of surgery, it was not till the second decade of the nineteenth century that Civiale, of Paris, undertook his experiments, which resulted in the developments of the method now in use, and which is ranked among the acknowledged resources of surgical art. On Mar. 22, 1824, a commission of the Academy of Medicine, of Paris, reported upon it as follows: "Desirous of avoiding, on the one hand, the enthusiasm which exaggerates everything, and on the other that prejudice which seeks to depreciate everything, we consider the new method

proposed by Dr. Civiale for destroying stone in the bladder without the use of lithotomy as alike creditable to French surgery, honorable to the author, and consolatory to humanity; that, notwithstanding its insufficiency in some particular cases, and the difficulty of its application in others, it can not fail to establish an epoch in the healing art, and to be regarded as one of the most ingenious and salutary resources." After a test of fifty years the expectations expressed in this report have been fulfilled, and lithotrity now holds an honorable rank among the resources of surgical art. The operation consists essentially in the introduction of an instrument known as a lithotrite, of adapted shape and size, through the natural canal into the bladder. With it the stone is seized and crushed by pressure exerted with the hand alone, or with a screw-power that may be applied at pleasure at the handle of the instrument. An old mode of crushing the stone was by percussion applied at the handle of the instrument by means of a hammer. A portion of the finer *débris* resulting from the crushing may be brought away in the jaws of the instrument. Unless the stone is quite small, the operation requires to be repeated at regulated intervals till the whole calculus is reduced to fragments small enough to be expelled with the urine. In his early experiments Civiale directed his efforts, after the seizure of the stone, to perforating its substance in different directions with drills, and thereby diminishing its resistance and facilitating its being crushed by pressure. Straight instruments alone could be employed for this purpose, and hence greater difficulty was encountered in their introduction into the bladder. These instruments, moreover, were complicated in their construction, and required a varied manipulation in their use, and were therefore more liable to injure the bladder and occasion serious accidents. These objections led to the early abandonment of the perforating process, and the substitution of the crushing process alone. This latter process is effected by means of curved instruments, which in their form more nearly resemble the catheters and sounds in common use among surgeons. The operation of lithotrity is particularly adapted to patients of adult age, in whom the expulsion of fragments is facilitated by the greater caliber of the urinary canal. In early life, under the age of fifteen years, and especially under ten years, the operation of perineal or sub-pubic lithotomy is successful in so large a proportion of the cases operated on that we scarcely need a better resource, especially as we now have the aid of anæsthetics, by which patients are spared the pain of the operation. The descent of a concretion from the kidney into the bladder is accompanied by an attack, usually violent, of kidney (renal) colic. Its presence in the bladder itself is characterized by disturbance of its functions, such as frequent calls to urinate, sudden arrest of the outflowing stream, pain felt on the close of the act, and referred to the neck of the bladder and end of the penis, pain also from the jolting of a vehicle, and the appearance of blood in the urine. A practical injunction should be borne in mind by patients suffering from symptoms of stone in the bladder: to wit, that in the early stage of the disease, while the stone is of small size, its removal by the operation of lithotrity may be regarded as almost entirely without danger, and sometimes can be accomplished by a single operation. Hence the importance of having its presence ascertained by a skillful exploration of the interior of the bladder at the earliest period. If patients suffering from this malady would early avail themselves of lithotrity, which has none of the terrors of a bloody operation, much suffering might be averted and many lives saved.

A still greater improvement on previous methods of crushing vesical calculi was devised by Jacob Bigelow, M. D., of Boston (d. 1879). It consists of complete removal of the calculus at one sitting. Its feasibility is based on facts which experience demonstrated, that the urethra was capable of a certain amount of dilatation, permitting the introduction of instruments of larger size than those heretofore in use, and that the bladder was not so resentful of prolonged manipulation as had been supposed. Accordingly, whereas sittings had been previously limited to ten minutes or thereabouts, and the stone crushed at intervals or piecemeal, now the patient is anæsthetized, or not, the lithotrite introduced, the calculus broken up, and then, after its withdrawal, a catheter or tube of large size is passed into the bladder, a stream of water driven in by a rubber bulb (the so-called washing-bottle apparatus), and then drawn out with some force. As the water returns it brings back with it such small fragments as may pass through the tube, which sink to the bottom of the apparatus by their weight. After thus flushing the bladder several times the tube is withdrawn, the lithotrite reintroduced, more calculous material broken up, which is to be again washed out, and so these manœuvers are alternately repeated until the last fragment of stone has been removed. In case of a stone of considerable size or hardness, this may take an hour or more of time. Large, soft calculi are quite amenable to this method. Choice as between the cutting or the crushing operation should be left to the surgeon and not decided by the patient. It must hinge on many things which no layman is capable of properly weighing; but this fact needs to be emphasized, that when once there is a stone in the bladder no time should be lost in effecting its removal, since the consequences of delay are often disastrous.

The lithotrite: *a b*, jaws; *c*, stone; *d*, screw; *e*, spring catch.

Revised by Roswell Park.

Lithua'nia (Lith. *Letura*; Pol. *Litwa*; Germ. *Litauen*): in the Middle Ages an independent and powerful state, comprising those large tracts of mostly low and level land which extend from the Baltic to the Black Sea, between the Niemen and the Düna in the N. and the Don and the Bug in the S. In the eleventh century the Lithuanians were tributary to the Russians, but in the twelfth they threw off the yoke. In 1235 Ringold formed the country into a grand duchy. In 1320 Gedemin conquered Volhynia, Kiev, and Tchernigov from Russia. In 1386 Jagellon united Lithuania with Poland, having married Hedwig, a daughter of King Lewis of Poland and Hungary. By the division of the Polish kingdom one small part of Lithuania went to Prussia, forming the government of Gumbinnen, while the rest was incorporated with the Russian crown, forming the present provinces of Vilna, Grodno, Moghilev, Vitebsk, and Minsk. The Lithuanians in race and language belong to the Lettic group. See Lettic Race.

Lithuanian Language: a language uniting with the Lettic and the extinct Old Prussian to form a compact language-group which belongs to the Indo-European family, and within that family holds peculiarly close relations to the Slavic languages. The Lithuanian territory as existing to-day may be roughly bounded as follows: From the Russian frontier town Polangen, in a southerly direction, somewhat back from the Baltic coast (which is here Lettic), to Memel, and from there along the east coast of the *Kurisches Haff* as far as Labiau; from Labiau in a southeasterly direction to Goldap, and from there at first easterly, then southeasterly, to Niemen; from here E. N. E. to within a few leagues of Wilna, and then circling about the city of Wilna northeasterly to the boundary of Kurland, which from that point on to Polangen forms the northern boundary of the Lithuanian territory. Within these limits until within about two generations ago the Lithuanian was the universal folk-speech, but since that time it has been rapidly repressed, especially in Prussian Lithuania, where it offers vigorous resistance to the German in the northerly portion only. The language is divided into a great variety of dialects, which may be arranged in the following groups: (1) The South Lithuanian, spoken in the north of the Russian province Suwalki and in the Prussian districts S. of Gumbinnen and Pillkallen; (2) the East Lithuanian, spoken to the E. and N. E. of the first group; (3) the dialect of Szaulen, spoken to the W. of the second group; (4) the Zamaitic, or Samogitic, the folk-speech of the Russian province Telsz and of the neighboring districts; (5) the Prussian North Lithuanian, spoken in the neighborhood of Memel; (6) a dialect limited to a narrow territory between the last mentioned and the next following group; (7) the dialect of Ragnit, spoken between the cities of Ragnit and Insterburg, and stretching obliquely across Prussian Lithuania; (8) S. of this and W. of the South Lithuanian, a dialect bearing no particular designation.

The South Lithuanian is clearly distinguished from all the other dialects by the retention of long *ê* and *â* at the end of words (the latter in the form of *ô*), whereas the others use instead *ĕ*, respectively *ă*. As its boundaries correspond approximately with those of the Jatwings or Sudaus, a tribe, according to the chroniclers, closely related to the Lithuanians, and is said to have been extirpated by the German orders, it is probable that it does not represent any proper Lithuanian idiom, but rather the Sudau tongue.

The Lithuanian preserves a remarkably primitive character particularly in its possession, like the Sanskrit, Russian, and to a certain degree the Greek, of a free accent not limited to any particular position in the word, and furthermore in the fact that this accent appears in two varieties, corresponding to the Greek circumflex and acute, and of like origin with them. Other primitive characteristics which it preserves are, for example, the dual, the future, and the inflectional endings of declension. The Lithuanian was not employed for literary records, with the sole exception of a volume in silk, from the year 1512, containing an interwoven fragment of a song, until the Reformation, and only, in fact, since the middle of the sixteenth century. The earliest Lithuanian book is a translation of Luther's Smaller Catechism, to which is added a primer and a number of hymns (Königsberg, 1547). Next followed a baptismal formulary (1559), and the Bible translation of Johannes Bretke (1579–90), which was, however, never printed. From this time on the continuity of Lithuanian literature has never been broken, though it has never flourished, consisting almost exclusively of translations of religious works or of compilations, and claiming but a limited degree of interest. None of its products can lay claim to artistic significance or importance for the history of literature, unless it be the numerous legends and songs of the Lithuanian folk. Several of the songs have been utilized by German poets; cf. Dortchen's song in Goethe's *Fischerin, Ich hab's gesagt schon meiner Mutter*; Chamisso's *Sohn der Wittwe*. The value of these songs has, however, greatly depreciated in the progress of time, and that of the legends was probably never very great. There exist also since the year 1849 Lithuanian newspapers, and one of these appears—or appeared—in New York (the *Lietuwiszkasis Balsus*).

A grammatical presentation of the Lithuanian was made as early as the seventeenth century in the work of Daniel Klein, *Grammatica lituanica* (Königsberg, 1653). A scientific treatment of the subject was, however, first attempted in the year 1837 in Pott's *de Lithuano-Borussicæ in slavicis letticisque linguis principatu* (Halle, 1837). Since then August Schleicher and Friedrich Kurschat, the latter a native Lithuanian, have rendered pre-eminent service in advancing the knowledge of the language. See Lettic Language and Literature.

A. Bezzenberger.

Translated by Benj. Ide Wheeler.

Lititz: borough (founded by the Moravians 1756); Lancaster co., Pa. (for location of county, see map of Pennsylvania, ref. 6–H); on the Phila. and Reading Railroad; 8 miles N. of Lancaster. It derived its name from the barony of Lititz, Bohemia, an ancient refuge of the Bohemian Brethren. It is in an agricultural region, and is principally engaged in the manufacture of cigars. There are 5 churches, a monthly and 2 weekly newspapers, and several educational institutions, including Linden Hall Seminary, opened 1794, which has a library of over 4,000 volumes, and grounds and buildings valued at $60,000. The borough, which contains a noted spring, is a popular summer resort. Pop. (1900) 1,637.

John G. York, "Express."

Litmus, or (sometimes) **Lacmus** [from Dutch *lakmoes*; *lak*, lacker + *moes*, pulp; cf. Germ. *lackmus*]: a peculiar coloring-matter derived from certain lichens, chiefly *Roccella tinctoria*. There are three of these coloring substances derived from plants of this character, namely, litmus, orchil, and cudbear. These lichens grow upon rocks in the Alps and in other mountainous portions of the world. Litmus, which is the coloring-matter most frequently employed, is prepared for use in the arts almost exclusively in Holland. It is reddened by acids and restored to its original blue color by alkalies. It is therefore largely used for the purpose of determining the reaction of the various liquids.

Litolff, Henri Charles: composer and pianist; b. in London of a French father and English mother, Feb. 6, 1818; studied under Moscheles, and made his first appearance in public as a pianist in his twelfth year. He married at the age of seventeen and eloped to France; returned to England in 1846, and subsequently led a wandering life, giving concerts, finally settling in Brunswick, where he married Madame Meyer, the widow of a music publisher, his first wife having obtained a divorce. Here he began the issue of the cheap publications with which his name is associated. He was divorced from the second wife also, and married, in 1860, a daughter of the Count de la Rochefoucauld, and resided in Paris till his death, Aug. 6, 1891. His principal compositions are his operas *Robespierre*, *Héloise et Abélard* (1872); *Les Templiers* (1886); *King Lear*, his last work; many piano solo pieces, some overtures, symphony concertos, and some smaller pieces. As a pianist he was brilliant, and Berlioz spoke of him as a composer of the highest rank, possessing inspiration, scientific knowledge, and judgment.

D. E. Hervey.

Litre, or **Liter** [from Fr. *litre*, liter, from Mediæv. Lat. *li'tra*, a measure of capacity, earlier a "pound" (weight, or money), from Gr. λίτρα, a measure of length, also of weight, also a silver coin]: the French standard measure of capacity in the decimal system. The liter is a cubic decimeter, i. e. a cube each of the sides of which is 3·937 English inches; it contains 61·027 cubic inches. Four and a half liters are nearly equivalent to the imperial gallon.

Little Colorado River, or **Colorado Chiquito**: a tributary of the Colorado river of the West, rising in Western New Mexico and Eastern Arizona and flowing about 225 miles toward the W. and N. W. It is not everywhere a perennial stream, but is in places absorbed by the sands of its bed during the dry season. In middle course it traverses a broad, arid valley, but, approaching its mouth, it plunges into a deep gorge. Some of its sources have long been utilized by the Zuñi Indians for the irrigation of small farms, and white settlers had in 1889 enlarged the cultivated area to 5,500 acres.

G. K. Gilbert.

Littledale, Richard Frederick, LL. D., D. C. L.: clergyman and author; b. in Dublin, Sept. 14, 1833; studied at Trinity College in his native city; was ordained in 1856, and held various curacies in the Church of England, but retired in 1862 on account of ill-health and devoted himself exclusively to literature. D. in London, Jan. 11, 1890. He was a zealous Anglican ritualist, and very learned. He published a new edition of Anselm's *Cur deus homo* (London, 1863) and the *Liturgy of St. Mark and Offices from the Service Books of the Greek Church* (1863–68); completed and edited John Mason Neale's *Commentary on the Psalms from Primitive and Mediæval Writers*; and wrote, besides, a great number of polemical, historical, exegetic, and other publications, among which were *Catholic Ritual in the Church of England, Scriptural, Reasonable, Lawful* (1865); *Church Reform* (1870); *Plain Reasons against Joining the Church of Rome* (1880), of which 36,000 copies were sold.

Samuel Macauley Jackson.

Little Exuma: See Exuma, Great and Little.

Little Falls: city; capital of Morrison co., Minn. (for location of county, see map of Minnesota, ref. 7–D); on the Mississippi river, and the N. Pac. Railroad; 108 miles N. W. of St. Paul. It has good water-power, several manufactories, and a daily and three weekly newspapers. Pop. (1880) 508; (1890) 2,354; (1900) 5,774.

Little Falls: city (1895; incorporated as a village 1813); Herkimer co., N. Y. (for location, see map of New York, ref. 4–H); on the Mohawk river, the Erie Canal, and the N. Y. Cent. and Hudson River and the W. Shore railways; 22 miles E. of Utica. It is built against the sides of an abrupt declivity which rises about 500 feet above the river, and is in a dairy, cheese-making, and lumber region. The river here falls about 70 feet within half a mile, forming picturesque cascades and rapids, whence the village derives its name. There are 8 churches, 4 graded public-school buildings, gas and electric-light plants, 7 knitting-mills, large tannery, paper-mills, manufactories of cheese-factory and creamery apparatus, dairy preparations, knitting-machines, heating-furnaces, carriages, a public-school library, several public parks, and a daily and 2 weekly newspapers. Pop. (1880) 6,910; (1890) 8,783; (1900) 10,381.

Editor of "Journal and Courier."

Little Glacé Bay: coal-mining settlement of Cape Breton island and County (Nova Scotia), 15 miles E. of Sydney. Pop. about 400.

Little Humboldt River: the most important tributary of the Humboldt, Nevada; flows W. and then S. through Paradise valley in Humboldt County. It has some 35,000

acres of excellent bottom-land, and 90,000 of bench-lands of the best character. The small brooks abound in trout. The elevation is some 4,500 feet.

Little Inagua: See INAGUA.

Littlejohn, ABRAM NEWKIRK, D. D., LL. D.: bishop; b. in Montgomery co., N. Y., Dec. 13, 1824; graduated at Union College in 1845; received deacon's orders in the Protestant Episcopal Church in 1848; officiated at Amsterdam, N. Y., Meriden, Conn., and Springfield, Mass.; took priest's orders in 1850; rector of St. Paul's, New Haven, 1851–60, and since then of Holy Trinity church, Brooklyn, N. Y. He was for ten years lecturer on Pastoral Theology in the Divinity School at Middletown, Conn. In 1868 he was consecrated Bishop of Long Island, and in 1874 undertook the charge of the American Episcopal Churches on the continent of Europe. He received the honorary degree of LL. D. from the University of Cambridge, England, on occasion of delivering a series of special sermons before the university. He is author of *Philosophy of Religion*, a series of lectures, *The Christian Ministry*, *Individualism*, and has written largely for *The Church Review*, and has published many sermons, charges, and addresses.

Revised by W. S. PERRY.

Little Kanaw'ha River: a river which rises in Upshur co., W. Va., and flows in a generally N. W. course, joining the Ohio at Parkersburg. It flows through the oil region, and has wide and fertile bottom-lands. The building of three dams has made it navigable 38 miles to Burning Springs. Great numbers of logs are floated to market upon its waters.

Little Rock: city (settled 1819); capital of Arkansas and of Pulaski County (for location, see map of Arkansas, ref. 3–C); on the Arkansas river, and the Little R. and Mem. and the St. L., Iron M. and S. railways; 125 miles S. W. of Memphis. It is built upon the first highland reached by ascending the river, which is here 400 yards wide, and navigable eight months of the year for large steamboats, smaller ones plying to Fort Smith, on the border of Indian Territory, 300 miles above. The rocky cliff on which the city stands, and from which it takes its name, is not more than 50 feet above the river, while the Big Rock, beginning 2 miles above, is a precipitous range rising abruptly some 500 feet. Little Rock is a commercial and manufacturing city, with more than fifty large wholesale houses. The census returns of 1890 showed that 93 manufacturing establishments (representing 31 industries) reported. These had a combined capital of $1,480,881; employed 1,070 persons; paid $587,415 for wages and $1,154,675 for materials; and had products valued at $2,454,831. Among the industrial establishments are 3 cottonseed-oil mills, 2 cotton compresses, a cotton-goods mill, a cotton-press factory, 4 foundries and machine-shops, 3 granite-quarries, 2 chair and 2 furniture factories, 3 railway machine-shops, 2 gin-factories, 4 plan-

State Capitol, Little Rock, Ark.

ing-mills, 2 ice-factories, and flour, stove, and candy works. There are gas and 5 electric-light plants, electric street-railways, granite, macadam, and vitrified street pavement, and good water and sewerage plants. The city contains 28 churches, 8 public schools, 2 colleges for colored youth, a military academy, a Roman Catholic Academy for boys, Little Rock University (Methodist Episcopal, opened 1882), Arkansas Female College (non-sectarian, opened 1874), Philander Smith College (Methodist Episcopal, opened 1877), Roman Catholic convent and academy, 5 libraries (State, 52,000 volumes; University, 2,000 volumes; Marquand, 4,500 volumes; Masonic, 3,000 volumes; and Supreme Court, 6,000 volumes), 2 national banks with combined capital of $500,000, 2 State banks with capital of $400,000, a commercial bank with capital of $100,000, a trust company, and 2 private banks, and 2 daily, 15 weekly, and 4 monthly periodicals. The public buildings include the State Capitol, Penitentiary, State School for the Blind, State Insane Asylum, Deaf Mute Institute, U. S. Government building, U. S. arsenal, Children's Home, Old Ladies' Home, and board of trade building. The assessed property valuation is over $12,000,000. Pop. (1880) 13,138; (1890) 25,874; (1900) 38,307.

EDITOR OF "GAZETTE."

Little Russia: Southwestern Russia N. of the Black Sea provinces. It extends in the middle Dnieper valley from Kharkof to Galicia in the empire of Austria. The people differ widely in character from the other Russians, and their language and literature are peculiar. The Little Russian language is common eastward to the Asiatic frontier, and is found westward in Bukovina and Hungary. See Isabel Morris's *A Summer in Kief*.

M. W. H.

Little Tibet: See BALTI.

Littleton, ADAM, D. D.: Oriental scholar; b. at Halesowen, Shropshire, England, Nov. 8, 1627; was educated at Christ Church, Oxford, taking high rank in the classics; became rector of Chelsea, chaplain to King Charles II., and prebendary of Westminster in 1674. D. at Chelsea, June 30, 1694. Dr. Littleton formed a library of rare books and manuscripts, so extensive that it brought him to bankruptcy. He wrote much on mystic numbers and other recondite subjects, and published many sermons; but his great work was the *Dictionary of the Latin, Greek, Hebrew, and English Languages* (1678; frequently reprinted). He was a descendant of Sir Thomas Littleton. See Wood's *Athenæ Oxonienses*, vol. ii., and the preface to Ainsworth's *Latin Dictionary*.

Littleton, EDWARD, Lord: See LYTTELTON.

Littleton, or **Lyttleton**, Sir THOMAS: jurist; b. at Frankley, Worcestershire, England, in 1402. He was the eldest son of Thomas Westcote, but was baptized in the name of his mother's family, she being sole heir of Thomas de Littleton, lord of the manor of Frankley. He was a member of the Inner Temple, and was in practice as a pleader in 1445, and in 1453 was called to the degree of sergeant-at-law. He held several public offices, among which were the shrievalty of Worcestershire and the recordership of Coventry. In 1455 he was made king's sergeant and acted as justice of assize in the northern circuit, and before the death of Henry VI. he was appointed steward of the Marshalsea court and justice of the county palatine of Lancaster. He appears to have been involved in the political troubles of the times, and on the accession of Edward IV. obtained a general pardon under the great seal, and was soon in favor with the new king, by whom he was made a justice of the court of common pleas (Apr. 27, 1466), and created a Knight of the Bath (Apr. 18, 1475). He died at Frankley, Aug. 23, 1481, and was buried in the nave of the Worcester Cathedral under a marble altar-tomb erected by himself, upon which was an effigy of himself in brass, which, however, was removed during the civil wars. Littleton's fame rests chiefly upon his treatise on tenures, which was a short work written in law (Norman) French. It was the first systematic exposition of the laws of England concerning real property, and, unlike the work of earlier writers, was based wholly upon English law, without drawing from the Roman or civil law. The work contained a clear and accurate account of the tenures and estates then known in England, and with Lord Coke's *Commentaries* long remained the principal authority on the English law of real property. It is almost wholly obsolete, and its chief value is historical. The first edition, in black letter, without title or date, is conjectured to have been published in 1481. It was first translated into English in 1538, and was published with Coke's authoritative commentaries in 1628, since which time there have been a large number of editions. An edition from the most ancient texts, with collations by T. E. Tomlins, was published in London in 1841, with the French and English in parallel columns.

F. STURGES ALLEN.

Little Turtle (*Me-che-cun-na-qua*): a Miami chief of great reputation for intelligence, shrewdness, and valor in warfare; is supposed to have received some education in Canada. He commanded in the battles which resulted in the defeat of Gen. Harmar on the Miami (Oct. 22, 1790) and of Gen. St. Clair at St. Mary's (Nov. 4, 1791); was pres-

ent, though not in command, at the battle of Fallen Timbers or Maumee Rapids, Aug. 20, 1794, in which the Indians were defeated by Gen. Wayne; was one of the signers of the treaty of Greenville, Aug., 1795, which ended the war and conveyed to the whites an extensive region in Ohio, and in 1797 visited President Washington at Philadelphia, where he also had an interview with Count Volney, the French philosopher, and received a pair of elegantly mounted pistols from Kosciusko. D. at Fort Wayne, Ind., July 14, 1812.

Littorale, lĕe-tō-raa'lā [*littorale* is from Ital. *litorale*, liter., coast country, deriv. of *littore*, shore. Cf. Germ. name *Küstenland*, liter., coast country]: a province of the Austrian empire, extending along the northern shore of the Adriatic from Venetia to Croatia; bounded N. and E. by Carinthia and Carniola. It consists of the counties of Görz and Gradisca, the margraviate of Istria, and the district of Trieste, and comprises an area of 3,085 sq. miles, with 695,384 inhabitants, mostly of Slavic descent.

Littré, lĕe-trā', Maximilien Paul Émile: philosopher; b. in Paris, France, Feb. 1, 1801. Though adopting medicine for his career, Littré combined with this philological labors in many languages—notably Sanskrit, Arabic, Modern Greek, and the principal Romance tongues. He had time also for political enthusiasms, and in 1830 he fought as a republican on the barricades in Paris. Soon after he was invited by Armand Carrel to write for the liberal journal *Le National*. He produced for this a series of articles on the physical sciences of such power that the critics saluted him as a new writer of importance. His larger reputation, however, dates from the publication of the first volume of his translation of Hippocrates in 1838 (not finished till 1861), containing a masterly introduction. This led immediately to his election to the Académie des Inscriptions et Belles-Lettres (Feb. 22, 1839). At the same time he was at work on other translations—one of Strauss's *Life of Jesus* (2 vols., 1839–40) and one of Pliny the Elder (not published till 1848). About 1840 an important change in his career was produced by the reading, at a friend's suggestion, of the so-called Positivist writings of Auguste Comte. Completely captivated by these, he was convinced that in Comte he had found his true master. He became one of the leaders of the Positivists, and continued firm in his faith to the end of his life, in spite of the fact that he was obliged to reject the later visionary doctrines of his teacher. He accepted the *philosophie positive*, but could never adopt the *politique positive*. His writings in this field, however, show Positivism at its best. These are *Analyse raisonnée du cours de philosophie positive* (1845); *Applications de la philosophie positive au gouvernement des sociétés* (1849): *Conservation, révolution, et positivisme* (1852); *Paroles de philosophie positive* (1859); *Auguste Comte et la philosophie positive* (1863); *La science au point de vue philosophique* (1873); *Littérature et histoire* (1875); *Fragments de philosophie positive et de sociologie contemporaine* (1876). In 1867 he founded with other Positivists the review *La Philosophie Positive*. His preoccupation with the new philosophy, however, did not interfere with the prosecution of his philological studies. In 1844, on the death of Fauriel, he was appointed to the latter's place on the commission of the Academy charged with the continuation of the great *Histoire littéraire de la France*; and volumes xxi. to xxix. of this work owe much to his wonderful erudition. In 1862 he gathered into two volumes various scattered articles on the French language—*Histoire de la langue française*. On Feb. 6, 1863, he presented to the Académie des Inscriptions et Belles-Lettres the first part of his remarkable *Dictionnaire de la langue française* (4 vols., 1863–72; supplementary volume, 1877), upon which he labored for years with great diligence, but at the expense of his health. In 1880 appeared *Études et glanures pour faire suite à l'histoire de la langue française*. In spite of the severity of these labors he had not ceased to interest himself in medicine. He wrote much for the *Dictionnaire de médecine, de chirurgie, etc.* (14th ed. 1877), and also many articles and monographs—e. g. *Médecine et médecins* (1871). Though he had withdrawn from political activity after 1848, the war of 1870–71 moved him deeply, and in 1871 he accepted an election by the city of Paris to the Assembly. In 1875 he was made life senator. An expression of his views at this time was his pamphlet *De l'établissement de la troisième république* (1880). In 1874 he was elected a member of the Académie Française, to succeed Villemain. D. June 2, 1881. Few men in the nineteenth century have had the modesty, the earnestness, and the many-sided erudition of Littré; and still fewer have succeeded in preserving to extreme old age, in spite of the most exhausting labors, an interest as fresh and unwearied as his in all that has to do with the intellectual life. See Sainte-Beuve, *Notice sur Littré, sa vie et ses travaux* (Paris, 1863), and the *Notice sur Littré* in the *Histoire littéraire de la France* (vol. xxix.).

A. R. Marsh.

Littrow, lit'trof, Joseph Johann, von: astronomer: b. Mar. 13, 1781, at Bischof-Teinitz, in Bohemia; studied at the University of Prague; became Professor of Astronomy at Cracow in 1807; removed in 1810 to Kazan, in 1816 to Buda, and in 1819 to Vienna, where he died Nov. 30, 1840. Under his direction the observatory of Vienna was much improved, and his lectures drew great audiences. His most prominent writings are *Die Wunder des Himmels* (1834), often republished; *Theoretische und praktische Astronomie* (3 vols., 1822–26); and *Atlas des gestirnten Himmels.*—His son, Karl Ludwig (b. at Kazan, Russia, July 18, 1811; d. in Venice, Nov. 16, 1877), was his assistant in the Vienna Observatory from 1831; succeeded his father as director in 1842, and was employed in 1847 in connecting Austria and Russia by triangulation.

Liturgics: in the specific sense, in which the term is employed in this article, the history of the origin and development of liturgies, and a description of the books treating of or containing liturgies. The words λειτουργία, λειτουργός are used all through the Septuagint version of the Old Testament to denote divine service and the priest. The same use of the word is continued in the New Testament, as in St. Luke i. 23, where we read of the "ministration" (λειτουργία) of the priest Zacharias, and by St. Paul it is probably used with reference to the sacerdotal functions of the Christian priesthood in Rom. xv. 16, where we find the three great sacrificial words all employed in the same verse—λειτουργὸν, ἱερουργοῦντα, and προσφορά. At all events, Clemens Romanus uses the word as referring to the acts of Christian worship, and by the fourth century this use was fully established. (Cf. Council of Ancyra, 314.) The general meaning of the word to denote all public services of the Christian ministry, which has been adopted in this article, was soon restricted, so that by "the Liturgy" was usually meant what we call the mass, and to the present day the celebration of the Holy Eucharist is called in the Greek Church the "Divine Liturgy." By liturgics, then, in this article we mean all the set forms of words used in the public worship of God and in the administration of the sacraments. See Dom Prosper Guéranger, *Institutions Liturgiques*, a book of great research, but written in a bitter, prejudiced, and partisan spirit.

Antiquity of Liturgies.—St. Paul is by some learned writers supposed to have quoted in several places the already existing liturgy, especially in 1 Cor. ii. 9. (See Neale's *Essays on Liturgiology.*) And there can be no doubt that the Lord's Prayer was used, and certain other formulas which are referred to by St. Luke in the Acts of the Apostles (Acts ii. 42) as "the apostles' prayers." How early these forms were committed to writing has been much disputed among the learned, and it would be rash to attempt to rule this question. Pierre Le Brun presents most strongly the denial of their having been written during the first three centuries, and Probst (*Liturgie der drei ersten Christlichen Jahrhunderten*) argues against this opinion. While it does not seem possible to prove that before the fourth century the liturgical books were written out in full, owing no doubt to the influence of the *disciplina arcani*, it seems to be true that much earlier than this there was a definite and fixed order in the celebration of divine worship and in the administration of the sacraments. The famous passage in St. Justin Martyr seems to point to the existence of such a form in his day, showing how even then the service for the Holy Eucharist began with the epistle and the gospel. St. Augustine and St. Chrysostom bear witness to the same thing. A sermon then followed, and the *Missa catechumenorum* was done. St. Ambrose tells us that those not yet in the number of the faithful were dismissed at this point of the service. There now began the mass of the faithful (*missa fidelium*) with the washing of the bishop's hands, referred to by St. Cyril of Jerusalem in his *Catechetical Lectures*, and the offertory was made, St. Justin expressly explaining that the cup was mixed. St. Cyprian tells us that verses of the Psalter were sung in Carthage as *Offertoria*. The *Sursum Corda* is spoken of by both St. Cyprian and St. Augustine, and St. Cyril and St. Chrysos-

tom refer to the *Sanctus* as following the preface. Now that we have come to the canon, there is almost entire silence, as we so often read in the Fathers, "the initiated know what I mean." The words with which the dread mysteries are consummated were too sacred to be committed to the ordinary reader's care. We know the words of institution were used, and that the faithful answered "Amen at the Eucharist" (1 Cor. xiv. 16). Just before the communion of the people the veil was drawn aside, so St. Cyril Alexandrinus tells us, and they received the sacrament under the form of bread into their hands, and then from the chalice the deacon gave them the precious blood. During the communion-time was sung "Oh, taste, and see how gracious the Lord is," as we learn from St. Cyril. The whole service ended with a blessing by the bishop—"Grace and peace be with you." (St. Chrysostom, *Hom. iii. ad Coloss.*) The foregoing would seem to be a fair outline of the communion office of the Church during the early centuries, and it will be noticed that it exactly agrees with that service as used by the Greek, Latin, and Anglican Churches to-day. Of the so-called primitive liturgies none in its present form is probably earlier than the seventh century, for although one bears the name of St. Mark, another of St. James, and so on, no real critical work has been done upon them, and even of the MSS. we have the most meager information. The Leonine fragment and the Gelasian and Gregorian sacramentaries may justly be considered as early as any liturgical remains we possess, for while the Apostolical Constitutions are in part certainly of an earlier date, the eighth book, which contains these liturgical forms, is in a very uncertain condition; we have no reason for supposing its text to be unadulterated, and it is admitted that it is much later than the other books.

There are, roughly speaking, three bodies of Christians which look upon their ministry as a priesthood, with sacerdotal powers and a substantial oblation to offer, viz., I., the Eastern Churches, II., the Latin Churches, and III., the Anglican Churches, and the liturgical books of each of these will be treated separately.

I. The Eastern Liturgical Books.—These books of "The Holy Orthodox Eastern Church," of which alone we treat, are in Greek and in Slavic, i. e. Old Russian (which differs from Modern Russian rather more than Old English does from Modern English). The services of all the Eastern Churches are (or once were) in the language of the people. Following is a list of the liturgical books of the Eastern Church:

1. The *Type* (τυπικόν). A series of rubrical directions. 2. The *Menæa*, i. e. the propers for festivals and saints' days. 3. The *Triodion* and the *Pentecostarion*, i. e. the canons of odes for Lent and Eastertide. 4. The *Paracleticon*, i. e. the tropes for the ferias. 5. The *Octoechus* contains the stichera and tropes for a ferial week. 6. The *Menology* is what we call the martyrology. 7. The *Euchologion* contains the forms for the administration of the sacraments and for the giving of various blessings. Besides these there are the *Horologion* and the *Divine Liturgy*, both of which must be spoken of more at length. 8. The *Horologion*.—This corresponds to the Breviary of the Latin Church and to the "Daily Morning and Evening Prayer" of the Anglican Church. An edition of the Great Horology was issued under the authority of the Patriarch of Constantinople at Venice in 1856, and since then there are other editions. Those who desire more information upon this subject are referred to *Synopsis of Prayers of the Orthodox Eastern Church*, translated and edited by Katharine, Lady Lechmere, with an introduction by J. Gennadius (London, 1891), and to *Euchology: a Manual of Prayers of the Holy Orthodox Church*, G. V. Shann (Kidderminster). See also the remarks of Dr. Neale in his *Introduction to the History of the Holy Eastern Church*. 9. The *Divine Liturgy*.—This is the order for the celebration of the Holy Eucharist. Two forms are in actual use, that of St. John Chrysostom and that of St. Basil; to these must be added the "Liturgy of the Presanctified," i. e. a form of service used in Lent (except on Saturdays and Sundays) in which there is no consecration of the holy gifts, but the communion is made from the reserved sacrament. For the sake of accuracy it should be added that the liturgy bearing the name of St. James is used in Jerusalem on St. James's Day, Oct. 23.

Literature.—Hammond, *Liturgies, Eastern and Western*; Duchesne, *Origines du Culte Chrétien*; Neale, *Introduction to the History of the Holy Eastern Church*; Daniel, *Codex Liturgicus*; Goar, *Euchologion*; Renaudotius, *Liturgiarum Orientalium Collectio*; Neale and Littledale, *The Primitive Liturgies*.

II. The Latin Liturgical Books.—The liturgical books now in use in the Roman Catholic Church will be enumerated, and afterward some account of their history given.

(1) The *Breviary* contains the choir offices for both night and day, and the Psalter is divided so as to be recited once each week. The present *Breviarium Romanum* dates from 1631, and was set forth by Urban VIII. It is usually in four volumes, one for each season of the year; when all in one volume it is called a *Totum*. When the day hours are printed separately, the volume is called *Horæ Diurnæ*. (2) The *Missal* contains the ordinary and canon of the mass and the propers (i. e. the introit, collect, epistle, sequence or gradual, gospel, offertory, secret, communio, and post-communio) for the Sundays and week days of the year. The present *Missale Romanum* dates from 1634, and was imposed by Urban VIII. (3) The *Rituale* contains the forms for those sacraments which a priest can administer, and various benedictions. The present *Rituale Romanum* was set forth in 1614 by Pius V. This book was in olden times called a manual, *sacerdotale*, *agenda*, etc. Many dioceses still use their own forms and not the Roman *Rituale*. (4) The *Pontificale* contains all those offices performed by a bishop. It was in its present form set forth in 1644, and imposed by Urban VIII. upon all bishops under his jurisdiction using the Latin rite. (5) The *Ceremoniale Episcoporum* gives directions for the ritual to be used by bishops on various occasions. The present *Ceremoniale* was set forth by Clement VIII. in 1600. (6) The *Martyrology* is a list of the saints and mysteries commemorated on each day of the year, with brief historical notices of their lives. All these books are of great antiquity, and the dates given above are those in which the last reformed edition (so to speak) was set forth. We only have space to speak of the history of two in detail.

The History of the Breviary.—The central idea of the choir offices is the recitation of the Psalter; around this all else gathers; and this is their characteristic in every part of the Church. As the service of mass is derived to some extent at least from the sacrificial worship of the temple, so the choir offices are certainly but the Christian continuation of the synagogue services. At first, no doubt, there was but little fixed in these offices, and we can trace the changes that gradually took place; but it is evident that hours of prayer were in use in the apostles' times, for we read expressly of the sixth hour and of the ninth hour as being such (Acts iii. 1, x. 9). The offices of the Greek Church are very long, and no doubt so, too, at first, were those of the West; but this was afterward changed. It is certain that, while in large part of great antiquity, the Breviary of to-day is not even in its skeleton older than the beginning of the fourteenth century. Until after the Council of Trent every diocese had its own breviary and missal, and some of them, which were at that time over 200 years old, have continued in use. This article would be incomplete if no notice were taken of the reformation of the *Breviarium Romanum* by Cardinal Quignon in the sixteenth century, which was allowed to be used for a number of years but afterward suppressed. Quignon's *Breviary* has been reprinted at Cambridge under the editorship of Dr. Wickham Legg.

Literature.—Gavantus, *Thesaurus Sac. Rituum*; Dom Guéranger, *Institutions Liturgiques*; Grancolas, *Commentaire du Bréviaire Romain*; Card. Bona, *Divina Psalmodia*; Batiffol, *Histoire du Bréviaire Romain*.

The History of the Roman Missal.—There would seem to be a consensus among the learned that the Christian Church in Rome at first was chiefly if not exclusively Greek. Granting that this may have been the case, it is nevertheless true that the Clementine liturgy as contained in the Apostolic Constitutions bears a close relation to the Roman ordinary and canon of the mass, and may be the somewhat incorrect description by a Greek of the then Latin service. At all events, one thing is certain, that the words "*Mysterium fidei*" found in the Roman canon as part of the form for the consecration of the chalice occur in no other place (so far as known) than in the account of the institution found in the Clementine liturgy, where we read "This is the mystery of the New Testament. Take of it, eat. This is my body, etc." To be sure, here it is used in connection with the consecration of the bread, and in the Roman canon in connection with the sacred chalice, but such a blunder is one that might easily be made by one not familiar with the service. There is no space here to enter upon the proof, which is abundant, of the extreme antiquity of the Gregorian canon,

and of the general arrangement of the parts of the ordinary of the mass; we can but say that all evidence points to the conclusion that here we have the order for the celebration of the Holy Communion of the greatest antiquity, in large part certainly as early as the fifth century, and probably of apostolic origin. We can trace the changes made during the centuries with considerable minuteness, especially from the comments of Walafrid Strabo and other early ritualists, and also from a collation of the various early MSS. extant. One serious change seems to have taken place. The invocation has disappeared (or been reduced to infinitesimal proportions). On this point and on the relation of the Ambrosian and Gallican missals to the Roman, and of each to the Mozarabic, we have no space to enter, but refer to the Abbé Duchesne's *Origines du Culte Chrétien*, warning the reader that thus far the abbé's theories are not universally accepted in regard to the effect of Charlemagne's action touching the service-books.

LITERATURE.—Muratori, *Liturgia Romana Vetus*; Swainson, *Liturgy*, in *Dict. Christ. Antiq.*; Probst, *Die ältesten römischen Sakramentarien.*

Besides the Roman liturgical books there are the Ambrosian, Mozarabic, and other cognate liturgies, and varieties of the Roman used by the various religious orders, and those used in the various dioceses; we can but refer to these in passing.

LITERATURE.—Mabillon, *De Liturgia Gallicana*; Gerbert, *Vetus Liturgia Alemannica*; *Missale mixtum-dictum Mozarabe* (Migne).

A table of reprints of the pre-Reformation liturgical books of the Church of England:

SARUM.	*Missale* (Burntisland, 1861).
	Breviarium (Cambridge, 1879–90).
	Portiforium: Ed., Leslie (1843–55).
	Pontificale: Maskell's *Monumenta Ritualia* (with foot-notes on Bangor, Exeter, and Winchester uses).
	Processionale: Ed., W. G. Henderson (Leeds).
	Registrum St. Osmundi: Ed., W. H. Rich Jones, Rolls Series (1883).
	De Officiis Ecclesiasticis Tractatus: In Rock's *Church of our Fathers*, vol. iv. (1853).
	Manuale; Surtees Society, vol. lxiii., appendix; also Maskell, *ut supra*.
	Defensorium Directorii ad usum Sarum: Maskell's *Mon. Rit.*, vol. ii., 3d ed.
YORK.	*Missale*: Surtees Soc., vols. lix. and lx.
	Breviarium: Surtees Soc., vols. lxxi. and lxxv.
	Manuale: Surtees Soc., vol. lxiii.
	Processionale: Surtees Soc., vol. lxiii.
	Pontifical of Egbert: Surtees Soc., vol. xxvii.
	Pontificale (Bainbridge): Surtees Soc., vol. lxi.
LONDON.	*Excerpta ex Registro Consuetudinum Eccl. S. Pauli, Lond.*: Rock's *Church of Our Fathers*, vol. iv. (1853).
LINCOLN.	*Statuta Eccl. Cath. Linc.* (London, 1873).
	Consuetudinarium de Div. Off. Eccl. Linc.: Ed., Wordswords and Reynolds (1885).
	Liber Niger (Cambridge, 1892).
EXETER.	*Ordinale*: Bishop Grandisson. Ed., Reynolds (1880).
	Legenda Sanctorum (*ibid.*, 1880).
	Liber Pontificalis of Edm. Lacy: Ed., Ralph Barnes (Exeter, 1847).
HEREFORD.	*Missale*: Ed., Henderson (1874).
DURHAM.	*Rituale Eccl. Dunelm*; Surtees Soc., vol. x.
LICHFIELD.	*Statutes* of Bishop Pateshall, in Dugdale's *Monasticon*.
WELLS.	*Ordinale et Statuta*: Ed., Reynolds (1881).
MONASTIC.	*Missale ad usum Eccl. West. Monasteriensis*: Ed., Legg, Bradshaw Soc.
	Excerpta ex Ordinario totius anni ad usum alicujus monasterii Ord. Cisterciensis, etc.: Rock, *Church of our Fathers*, vol. iv. (1853).
	Mirroure of our Ladye: Early English Text Soc. (1873).
	The Martiloge in Englysshe (Sarum use): Bradshaw Soc.
BOOKS FOR THE LAITY.	*Lay Folks' Mass Book*: Ed., Simmons, Early Eng. Text Soc. (1879).
	The Prymer (A. D. 1400?): Ed., Littlehales (1891).
	The Prymer (A. D. 1405?): Maskell, *Mon. Rit.*, vol. i.
	A Godly Prymer (1535); *A Manual of Prayers, or the Prymer in English* (1539): *King Henry's Prymer* (1549): Ed., Burton (Oxford, 1848).

III. ANGLICAN LITURGIES.—Under this term is here included the liturgical books now used by those churches which are in visible communion with the see of Canterbury. All these churches have but one service-book, of a complex nature, being at the same time breviary, missal, ritual, and pontifical; it is called *The Book of Common Prayer and Administration of the Sacraments and Other Rites and Ceremonies of the Church.* This book contains first the choir offices compressed into two portions called "Daily Morning and Evening Prayer" and the Psalter divided, so that it is recited once each month. There is also the Litany to be said at certain times. The propers for the seasons and holy days follow, and the "Order for the Administration of the Lord's Supper or Holy Communion," corresponding to the ordinary and canon of the mass. The forms for the administration of baptism, confirmation, and the "Communion of the Sick," for the "Solemnization of Holy Matrimony," and for the "Visitation of the Sick," and the burial office come next, and at the end of the book are the forms for the ordination of the bishops, priests, and deacons. Besides these, there are some special services of less note, and varying in different parts of the world.

History of the Prayer-book.—The Church of England had always been provided with prayer-books in the vernacular for her people, but there does not appear to have been any public service in the English tongue until 1544, when the Litany was first translated into English and publicly used. In 1548 there was issued the "Order for Communion," being the preparation of the communicants, which in mass immediately precedes the administration of the sacrament. This now was to be said for the first time (so far as known) in English; and it was provided further that the chalice should be restored to the people, of which they had been deprived for some centuries; for the rest the mass continued to be celebrated as before.

The English Prayer-book.—In 1549 there was set forth the first English Prayer-book, in the preface of which it was declared that although before that time "there hath been great diversity in saying and singing in churches within this realm, some following Salisbury use, some Hereford use, some the use of Bangor, some of York, and some of Lincoln; now from henceforth, all the whole realm shall have but one use." This book, which is all in English, is taken chiefly from the service books of the different dioceses and from those of Rome, which were largely used by religious people and others. Of its history we unfortunately know very little, and perhaps nothing more than that Archbishop Cranmer was chiefly responsible for it, and that while he himself was at that time largely under the influence of the continental Reformers and chiefly of those of the Lutheran school, yet that he was obliged to make the book such as could be used with a good conscience by those who still held the old faith. On the whole subject, see Jacob's *Lutheran Movement in England* and Dom Gasquet's *Edward VI. and the Book of Common Prayer.* Two years later (1552) those urging radical change had gained ground, and it was determined that a new book should come out, more consonant with their doctrinal and ritual tenets. Accordingly, the second prayer-book in the reign of King Edward VI. was issued, and it is said that a third, still more Protestant and radical, was even then in contemplation. The king, however, died almost before the book was out of the printers' hands, and as Queen Mary came to the throne and restored the pre-Reformation office books immediately, it is probable that outside of the university towns and the city of London the book of 1552 was little used or known. When Queen Elizabeth renewed the breach with Rome, it was decided to take the book of 1552 and to incorporate into it certain parts of the book of 1549, especially the words "The body of our Lord Jesus Christ which was given for thee preserve thy body and soul unto everlasting life," used at the delivery of the Holy Sacrament, and the rubric ordering the vestments of the clergy and the fittings of the Church to be as they were in "the second year of the reign of King Edward VI.," i. e. the year before the first English Prayer-book came into use. This is substantially the Liturgy of the Anglican Churches to-day. It indeed underwent some slight changes in the beginning of King James's reign at the Hampton Court conference, and again after the great rebellion at the Savoy conference in 1661, but these alterations were very

minute. Speaking accurately, the Book of Common Prayer can not be said to be a distinct liturgy from that of Rome, but rather an adaptation, in which much of the Western service has been kept unchanged, but in which, on the other hand, strange and unaccountable changes in position and order of the parts have been made: e. g. while in each the *Gloria in excelsis* is found in the form for the celebration of the divine mysteries, in the Latin order it is at the beginning, in the English at the end of the service. One thing, however, is worthy of notice, that the sacraments have been continuously administered and divine worship continuously celebrated in the Anglican Church since 1559 in an unchanged form, and such an antiquity is worthy of the highest liturgical regard, even had the forms been at that time newly framed instead of being, as they are, modifications of forms already long in use.

Literature.—Keeling, *Liturgiæ Britannicæ*; Cardwell, *Conferences on the Book of Common Prayer*; Schudamore, *Notitia Eucharistica*; Parker, *Introduction to the Revisions of the Book of Common Prayer*; Blunt, *Annotated Book of Common Prayer*; Lathbury, *History of the Book of Common Prayer*.

The Irish Prayer-book.—This is the Book of Common Prayer of "The Church of Ireland" i. e. of what had been the Established Church. The Irish Prayer-book before the disestablishment differed from the English only in containing a few extra services and prayers, but after disestablishment had set it free from parliamentary control, the strong Protestant spirit asserted itself in the numerous radical alterations adopted by the Synod in 1870, despite the strenuous opposition of the famous Archbishop Trench, of Dublin, and of a few others.

The Scottish Prayer-book.—This is the Book of Common Prayer of the Nonjuring Episcopal Church in Scotland, commonly called the Scottish Episcopal Church. After episcopacy was abolished in Scotland by the authority of the Dutch princes and the Presbyterian religion had been established, despite the penal laws against them, the Scotch bishops and clergy (supported by many in England who had likewise refused to take the oath of allegiance to the newly chosen monarchs) continued in private to celebrate the sacraments and to keep up the succession. These clergymen, called Nonjurors, made some changes in the Prayer-book of the Church of England, the most important being in the prayer of consecration of the communion service. Further changes are under consideration. All these heretofore have been in the direction of a return to pre-Reformation use.

Literature.—Bishop Dowden, *The Annotated Scottish Communion Office*; Lathbury, *History of the Nonjurors*.

The American Prayer-book.—This is the Book of Common Prayer "according to the use of the Protestant Episcopal Church in the United States of America." Until the Revolution the Church of England in the American colonies had been part of the jurisdiction of the Bishop of London. After the independence of the country was secured, it seemed necessary for the prosperity of the Church of England here that it should be free from any foreign ecclesiastical jurisdiction. After some delay and difficulties this was accomplished by the hierarchy of the Church in England giving both Episcopal orders and also jurisdiction in this country to three American priests. Before, however, this was done, an attempt was made in 1785 to revise the Prayer-book in what is known as the "Proposed Book," but this (as Bishop White says) was seen to be a failure before it issued from the press. It was a very radical effort to simplify and popularize the Prayer-book. After the episcopate had been obtained, and with it the right to revise the Prayer-book, the work was entered into by the General Convention of 1789, and the result is the American Prayer-book as we know it to-day, which with but trifling changes and a few additions has been for over a century the public office book of the Episcopal Church in the U. S. The chief points in which it varies from the English book are the restoration of the rest of the Canon of Consecration (through the influence of Bishop Seabury), the omission of the Athanasian Creed, and of the indicative form of absolution from the Office of the Visitation of the Sick, and the addition of A Form for the Visitation of Prisoners (which was taken from the Irish Prayer-book), of a service of "Thanksgiving for the Fruits of the Earth," and of a number of separate prayers and collects. Several apparently anti-Catholic expressions and directions were omitted from the English book, notably the so-called "Black Rubric" and the rubrics prohibiting private masses. The Forms for Ordination were added in 1792, the Form for the Consecration of a Church in 1799, the Book of Articles of Religion in 1801, and last of all an Office of Institution in 1808. In 1880 a resolution was adopted appointing a committee to consider whether "the changed conditions of the national life do not demand certain alterations" in the Prayer-book. The committee, however, at the beginning practically decided to do nothing in the direction suggested by determining that "no alteration should be made touching . . . doctrine," and that "in all its suggestions and acts" the committee was to "be guided by those principles of liturgical construction and ritual use which have guided the compilation and amendments of the Book of Common Prayer, and have made it what it is." This work was only completed in the General Convention of 1892, and the changes made are of the most trifling nature, being principally the restoration of the *Magnificat* and of *Nunc dimittis* to evening prayer, the making of the recitation of the Nicene Creed obligatory in all churches, and the introduction of translations into English of three sets of propers from the unreformed service books.

Literature.—Fred. Gibson, *Introduction* to the American edition of Blunt's *Annotated Book of Common Prayer*; McGarvey and Gibson, *Liturgiæ Americanæ* (in the press, 1893).

H. R. Percival.

German and Lutheran Development of Liturgies.

The Reformers denied that the Mass is an expiatory sacrifice, and therefore that it can be offered by one man for another, or by the living for the dead. All believers are priests. Christ bade all drink of the cup. The Word of God is a means of grace; therefore it should be read and explained in the vernacular, and in the Holy Supper the words of institution should be recited in the vernacular in the hearing of the people. Christ is the only Mediator. Therefore, retaining the festivals of Christ and the order of the Church year, they gave up nearly all saints' days. Rites instituted by men are not obligatory, and do not merit grace. They are of value in training the young and illiterate in the Word of God.

Luther and Melanchthon taught that the Word is of prime importance, even in the sacraments, being "a means by which forgiveness of sins is distributed and given." (*Luther*, xxix., 134.) Under the idea of the Word, or the Gospel, they included not only the *lectiones* and the *sermons*, but the Word of God in Baptism and the Holy Supper, and in the parts of the service (as the *Alleluia*, *Absolution*, *Pax*). "God deals with us in two ways, outwardly and inwardly. Outwardly through the spoken word of the Gospel, and through tangible signs, as baptism and the sacrament. Inwardly through the Holy Ghost and faith and other gifts, but all this in such measure and order, namely, that the outer parts must precede, and the inner come afterward and by means of the outer; for He will give to no one the Spirit or faith without the external word or sign which He has ordained for that purpose." *Die ursprüngliche Gottesdienst-Ordnung in den deutschen Kirchen luth. Bekenntnisses* (Kliefoth, 2d. ed. 1858–61); Jacoby, *Die Liturgik der Reformatoren* (1871–77); Luther's works *passim*.

Zwingli denied that the sacraments bring or dispense grace. The Holy Communion was in his view "a common commemorative celebration of the New Testament by the atoning death of Christ, and an act of faith and confession which serves to quicken the congregational consciousness." (*Stähelin*, in Herzog's *Real-Encylopädie für protestantische Theologie und Kirche*.) He relegated the Holy Supper to great days, and made the sermon the center and normative principle of the chief Sunday service; while the Lutherans, rejecting the appointment of certain days on which the whole congregation was bound to commune, left the Holy Supper as the culmination of every chief service, though they forbade consecration where there were not communicants. To the proclamation of the Word of God they joined the appropriation of its gracious gift in the Holy Communion. See Schaff, *Church History*, vi., vii.; Horn, *The Christian Year* (1876); W. Loehe, *Haus- Schul- u. Kirchenbuch* (1877).

Lutheran Liturgies of the Sixteenth Century.—(Richter, *Die ev. Kirchenordnungen des 16 Jahrhunderts*, 1845; Daniel, *Codex liturgicus* II.; *Common Service*, preface, 1888.) In 1523 Luther published his *Formula Missæ*, a recension of the Mass. He would not banish the Latin tongue from worship. Changes should be gradual. Old service should be the basis of the new. The order was: *Introit*, *Kyrie*, *Gloria in Excelsis*, *Collect*, *Epistle*, *Graduale and*

Hallelujah, *Gospel*, *Nicene Creed*, sermon (or before *Introit*), *Preface*, *Words of Institution*, *Elevation* with *Sanctus*, *Lord's Prayer*, *Pax*, *Distribution* with *Agnus Dei*, *Communio*, *Prayers*, *Benedicamus*, *Benediction*. Altar, candles, vestments were retained. 1526, the *Deutsche Messe* followed, and was enjoined upon churches in Saxony. In it the Lord's Prayer, involved in a paraphrastic exhortation, preceded the *Words of Institution*, and the bread was given before consecration of the cup. This found little favor in later orders, but an *Exhortation* was introduced, and the *Lord's Prayer* before the *Words* became predominant Lutheran usage.

All the states published orders reforming the service and aiming at uniformity within their jurisdictions. 1. Those of Northern and Middle Germany followed Luther's orders. To this group belongs the first Prayer-book of Edward VI., except in introduction of the *Epiklesis*. (Jacobs, *The Lutheran Movement in England*, 1890; Gasquet and Bishop, *Edward VI. and the Book of Common Prayer*, 1890.) 2. Those of Southwestern Germany were influenced by the Swiss. (Herzog, *Real-Encyclopädie*, 2, x., 722; xvii., 595; Grüneisen, *Die ev. Gottesdienstordnung i. d. oberdeutschen Länden*, 1856.) 3. Brandenburg, 1540; Pfalz-Neuburg, 1543; Austria, 1571, while aiming at pure doctrine, retained as much as possible of the old rite.

Reformed.—Zwingli, more conservative than Calvin in this regard, shortened and revised the old service; Calvin essayed a new service on the basis of the Scriptures. The worship of German Reformed states is "Lutheranizing." 1. Zurich, 1525, 1535, 1675; Berne, 1528, 1581; Basel, 1529; Schaffhausen, 1592. 2. Forms of Prayer attached to Genevan Catechism, 1541–45; Neuchâtel, 1713; Liturgy of French Protestant Church, Charleston. 3. Palatinate, 1563; Hessen, 1539, 1566, 1657, 1748; Berg, 1769. See Ebrard, *Reformirtes Kirchenbuch* (2d ed. 1890); *Liturgie*, 1843; Daniel, vol. iii.; Harnack, *Real-Encyclopädie*, 2, vii., 723.

Later History of Lutheran Service.—The elevation (1539) and mass vestments (Nuremberg, 1801) were given up. The debates of the *Interim* period (1548–55) made the Roman Catholic antithesis distinct. Trent confirmed it. The *Thirty Years' war* destroyed all good order. Pietism undervalued externals. Rationalism had no heart in worship. *The New Prussian Liturgy* (1816, 1822) marked a revival of liturgical interest. Its author, Frederick William III., awakened by Napoleonic wars, said that "all the new liturgies have forsaken the historical foundation. We must go back to Father Luther. . . . I have the old liturgy with the old Bible. The Christian Church has had it from the beginning; Luther and his coadjutors reformed it." It is Lutheran in outline, but omits the Lord's Prayer in the Holy Supper, and inserts the *formula of distribution*: "*Jesus says, Take, eat*," etc., intended to serve both Lutherans and Reformed. It aroused debate (against it, Schleiermacher; Marheineke, Eylert, Ammon, Augusti defended it). New liturgies followed in Baden, 1831; Prussia, 1832; Saxony, 1842; Nassau, Würtemberg, 1843; Brandenburg, 1853; Bavaria, 1857; Saxony, 1878. Private compositions: Bunsen's Capitoline liturgy, 1828; Pasig, 1851; Löhe, 1844, 1884; Petri (Hanoverian). 1852; Frühbusz (Pomeranian), 1854; Hommel, 1851; *Allgemeines Gebetbuch* (Leipzig, 1884); of United Church, Stier, 1852: of Reformed Church, Hugues, 1846.

In United States.—Mühlenberg introduced a liturgy of pronounced Lutheran type in 1748. This was modified in 1786. The first English Lutheran liturgy was meager. At the Pennsylvania Synod of 1860, and in the *Church Book*, 1868, a return to the Lutheran type was made. So *Book of Worship*, 1864, Missouri Synod's German liturgy, is modeled on Saxon. The English-speaking bodies in 1878 united in the preparation of a Common Service Book for the use of Evangelical Lutheran congregations, published at Columbia, S. C., and Philadelphia, 1888. This aroused general debate, but finally has been adopted by all the Lutheran general bodies in the U. S. which use the English tongue, and up to 1893 had run through thirteen editions. It presents the "full Lutheran service with all its provisions," "according to the common consent of the pure Lutheran liturgies of the sixteenth century," and is in substantial agreement with the revised services of the Scandinavian churches (*Den Svenska Psalmboken*, Stockholm, 1873; *Kirkesalmebog*, Christiania, 1893). It has been published also in German (*Kirchenbuch*, Philadelphia, 1877; *Gemeinsame Gottesdienstordnung*, Philadelphia, 1893), and has been translated into Japanese for the use of Lutheran missions there (Saga, 1894). See *Lutheran Church Review* (Philadelphia) and *Lutheran Quarterly* (Gettysburg, 1878–92); Richards and Painter, *Christian Worship* (1892); Horn, *Outlines of Liturgies* (1890); *Feasibility of a Service for all English-speaking Lutherans*; *The Lutheran Sources of the Common Service* (1891); Schuette, *Before the Altar* (1894).

E. T. Horn.

Liudprand, or **Liutprand**: one of the principal chroniclers of the tenth century; b. about 922, belonged to a noble and distinguished Lombard family, and was educated at the court of Pavia as page to King Hugo of Italy. Under Hugo's successor, Berengarius, he was made chancellor and sent on a diplomatic mission to Constantinople in 949. Afterward he fell into disgrace, entered the service of the Emperor Otho I., and was by him made Bishop of Cremona in 961 and employed in important negotiations with the pope and the Byzantine court. D. in 972. Three works by him have come down to us, and have great value as historical sources: *Antapodosis*, in six books, a narrative of the events from 886 to 950, evidently written in order to avenge himself upon Berengarius and his queen, Willa; *De Rebus Gestis Ottonis Magni imperatoris* (960–64); and *Relatio de Legatione Constantinopolitana* (968). They are all found in Pertz, *Monumenta Germaniæ Historica*. See Köpke, *De Vita et Scriptis Liudprandi* (Berlin, 1842).

Livadia, lĕĕ-vaa'dee-ăă (in Gr. Λεβάδεια): town of Greece; in the nome of Attica and Bœotia; picturesquely situated on the Hercyna; was the principal town of Greece under the Ottomans. Near by are the cave of Trophonius, anciently famous for its oracle, and a curious castle of the thirteenth century in ruins. Pop. (1890) 6,465. E. A. G.

Liver [O. Eng. *lifer*: Icel. *lifr*: O. H. Germ. *lebara* > Mod. Germ. *leber*; Gr. ἧπαρ: Lat. *je'cur*: Fr. *foie*]: a large gland in the visceral cavity of all vertebrates. In man it weighs about 5 lb., and is situated on the right side, immediately below the diaphragm, but extends beyond the middle line to the left side. It reaches, superiorly, the sixth rib, while its anterior border inferiorly approaches the lower margin of the thorax. The form is flattened, broad and thick toward the right extremity, and thinner and narrower toward the left. The superior surface is convex, while the inferior surface is irregularly concave. Upon the posterior border the liver is thick and rounded, with a thin and sharp anterior border. In the abdomen the position is oblique; in the erect posture the convex surface is directed upward and forward, with the concave downward and backward. The diaphragm, covering the superior convex surface, separates the liver from the under surface of the right lung and from the heart. The inferior concave surface is in relation with the stomach anteriorly, a portion of the duodenum, transverse colon, and right kidney, and by its left extremity with the upper end of the spleen. The diaphragm intervenes between the vertebral column and posterior border of the liver, while the anterior border is free, and in relation with the anterior abdominal wall. The liver possesses five ligaments, by means of which it is retained in place, called the broad, the coronary, the two lateral, and the round ligament. By five fissures, named longitudinal, fissure for the ductus venosus, transverse fissure, fissure for gall-bladder, and fissure for the vena cava, the liver is divided into five lobes; these lobes are designated right and left lobe, lobus quadratus, lobus Spigelii, and lobus caudatus. The liver is covered by the peritoneum externally; the folds of this membrane as it passes from the surface of the organ form four of the ligaments above enumerated. The round ligament is the result of the obliteration of the umbilical vein of the fœtus. The proper coat of the liver is a dense but thin fibrous membrane, very adherent to the substance of the organ, and in intimate relation with the peritoneum, Attached to the liver, in the shallow fossa upon the under surface of the right lobe, lying parallel with the longitudinal fissure, is a membranous sac, the gall-bladder. The gall-bladder is divided into a body, fundus, and neck. The body is the middle portion; the fundus the expanded extremity which approaches the notch in the free border of the liver; the neck the portion which, narrowing, enters the right extremity of the transverse fissure and forms the *cystic duct*. The cystic duct is about 1½ inches in length, and has the diameter of a crow's quill. At the transverse fissure the duct unites with the excretory duct of the liver, *the hepatic duct*, forming by this junction the *ductus communis choledocus*. The ductus communis choledocus, with a length of 3 inches, passes downward and opens into the duodenum, passing obliquely between its coats. For the minute anatomy of the liver and gall-bladder, see Histology.

The Functions of the Liver.—The liver as a gland stands alone in the economy, on account of the complexity of function which it possesses. The physiology of glands in general points to but one function for each; in the case of the liver, however, may be enumerated (1) the secretion of bile, and (2) the glycogenic or sugar-producing property. Under the head of bile is included both a secretion of importance to digestion—in fact, necessary for life—as well as important excretion.

How is the Bile Secreted?—The old theory that the small glands in the lining membrane of the gall duct secrete the bile is incorrect, as these same glands are met with in all mucous membranes, and simply produce mucus. There is no anatomical or physiological evidence that the bile is secreted anywhere but in the lobules or acini by means of the hepatic cells. At this point the small bile-capillaries take up the material and carry it to the duodenum through the ductus communis choledocus, and a portion to the gall-bladder for future use. A question of interest arises as to whether the bile is formed from venous or arterial blood. The hepatic artery has been tied, and bile was secreted still. From the experiments of Oré it is shown that when the portal vein is obliterated bile continues to be formed from the blood of the hepatic artery. Hence we conclude that bile may be formed from either venous or arterial blood, but the portal blood is doubtless the more important, the hepatic circulation being designed more especially for the nutrition of the liver.

Quantity of Bile.—From experiments on animals, with a fistula in the gall-bladder and the ductus communis choledocus tied, it has been estimated that the quantity of bile secreted in twenty-four hours in a healthy man varies from 20 to 50 oz.

Flow of the Bile.—During the period in which the digestive functions are inactive the gall-bladder is constantly receiving bile from the liver. As soon, however, as stomach digestion is completed, and the food passes into the duodenum by means of the distended condition of the surrounding organs, a sufficient amount of pressure is exerted upon the walls of the gall-bladder to force out the bile, through the ductus communis choledocus, into the small intestine. The flow of bile continues during the period of intestinal digestion, after which no more passes into the duodenum; the gall-bladder still receives this fluid from the liver, and in this manner it is stored up for future use. The bile, then, is constantly formed by and discharged from the liver. This peculiarity belongs to the liver, for it is a well-established fact that *secreting* glands are only active at certain times, their functions not being constantly required. The quantity secreted, however, increases during the digestive processes.

Properties of the Bile.—See BILE. We have already referred to the functions of the liver, and have seen that it secretes bile and forms sugar. Let us first consider the functions of the bile. In the first place, it is a secretion formed from the blood by the liver, and discharged into the alimentary canal for purposes of digestion. Here, after modifying the digestive process, a part is absorbed into the system, and a part (cholesterin) passes out of the economy. That the bile is necessary to life is seen in the fact that when this fluid is allowed to escape through a fistula an animal will die of inanition in from twenty-seven to thirty-eight days. Physiologists are not yet certain of the exact action of the bile as a digestive fluid; some considering that it is for the purpose of causing the movements of the intestine (peristaltic action), others that it supplies alkalinity to the absorbing vessels of the villi, which hastens the introduction of fat into the blood; while, on the other hand, it has been claimed that the bile forms an emulsion with fats to a great extent, and in this manner aids the secretion from the pancreas, so as to completely digest fatty materials. We can only state that the bile performs some part in the digestive process, and it is probable that each theory represents part of the truth. The biliary salts, with certain other constituents of the bile, are absorbed in the intestine, as they can not be found in the fæces, and are not seen to accumulate in the blood when the liver is diseased or extirpated.

The Bile as an Excretion.—Although it is well known that cholesterin is found in small quantity in the crystalline lens and spleen, by far the larger amount is met with in the brain and nervous system. Experiments have shown that the blood acquires cholesterin in passing through the brain and nerves of the extremities, and therefore there can be no doubt that the blood takes up this substance from the nervous system generally; the cholesterin representing the worn-out nerve-tissue, as urea does that of muscle.

The Glycogenic or Sugar-forming Function of the Liver.—In 1848 Bernard, the illustrious French physiologist, showed that the blood coming from the liver contained sugar of the variety found in the urine of persons suffering from *diabetes mellitus.* When an animal is fed exclusively upon animal food, which contains no sugar, and the blood going to the liver is examined carefully, no sugar is to be found in it; but when the blood coming from the liver is analyzed, sugar is always present, even though the time were chosen when the digestive function was quiescent; in fact, in starving animals the blood of the hepatic veins always contain sugar. These experiments point to the fact that the blood acquires sugar in its passage through the liver. Bernard further examined the blood from various parts of the body, made extracts of all the tissues, and found sugar only in the tissue and blood of the liver. As the blood passes from the hepatic veins it becomes mingled with that of the vena cava, and in its passage through the lungs the sugar either entirely or in great part disappears. We can then conclude that the liver, unlike any other gland in the body, is a secreting as well as an excreting organ, and, like the ductless glands, it forms a substance (sugar) which is delivered directly into the blood. For diseases of the liver, see CALCULUS, HEPATITIS, and JAUNDICE.

Revised by WILLIAM PEPPER.

Livermore, ABIEL ABBOT, D. D.: religious writer; b. at Wilton, N. H., Oct. 30, 1811; educated at Exeter; graduated at Harvard College 1833, and at the Divinity School 1836; settled in Keene, N. H., 1836, in Cincinnati 1850; in 1857 removed to Yonkers and became editor of *The Christian Inquirer*, a Unitarian paper in New York; became 1863 president of the Theological School at Meadville, Pa., and continued in this office until 1889. D. at Wilton, N. H., Nov. 28, 1892. Mr. Livermore was a contributor to magazines, and the author of several works: *A Commentary on the New Testament* (6 vols., Boston, 1842–82); *Lectures to Young Men* (Keene, N. H., 1846); *The Marriage Offering*, a prize essay on the Mexican war (Boston, 1850); *Discourses* (1854). He was also one of the compilers of the book of hymns known as the *Cheshire Collection* (1845).

Livermore, MARY ASHTON: reformer; b. in Boston, Mass., Dec. 19, 1821; daughter of Timothy Rice and wife of Daniel P. Livermore, a Universalist minister; has written largely for periodicals, labored with much ability in behalf of the Sanitary Commission during the civil war, and has taken a prominent position as a writer and public speaker upon woman suffrage and various social and religious questions. In 1870 she was editor of *The Woman's Journal* at Boston, Mass. She is the author of *Pen Pictures* (Chicago, 1865); *Thirty Years too Late*, a temperance story (Boston, 1878); and *My Story of the War: a Woman's Narrative of Four Years' Personal Experience as Nurse in the Union Army* (Hartford, 1888).

Liverpool: city and port of Lancashire, England; situated in 53° 24′ lat. N., and 3° 0′ 1″ lon. W., on the eastern side of the estuary of the Mersey; 202 miles N. W. of London and 32½ miles W. of Manchester (see map of England, ref. 7–F). The etymology of the name of the city is uncertain. A plausible but doubtful derivation is that from the Welsh Llyvrpool, "the expanse of the port," or "the pool of the confluence." Liverpool is a parliamentary and municipal borough, also for certain purposes a county in itself and the seat of a bishopric created in 1880, when the town was erected by letters patent into a city. It covers an area of 5,210 acres, and sends nine members to the House of Commons, one for each of its nine divisions.

Streets.—Liverpool forms a kind of semicircle, with the Mersey for its base. The chief streets run mainly N. and S. Many are broad and handsome, while the houses in many others of them are commodious and well built. Church Street and Bold Street are full of handsome shops. Stanley Road, connecting Liverpool with its northern boundary, the municipal borough of Bootle, and Scotland Road are great thoroughfares. Some of the city parks have attracted to residence in their vicinity many of the wealthy inhabitants, but with a wide sea-range, speedily accessible by steamer and railway, numbers of business men have residences more or less distant from the city. Many business men are domiciled at Birkenhead, which, with nearly 100,000 inhabitants, is exactly opposite Liverpool, and separated from it by the estuary of the Mersey.

The Mersey and the Docks.—At Liverpool the Mersey is 3 miles from the open sea; at its narrowest parts, between the landing-stage and Birkenhead, it is three-quarters of a mile in width, but farther N. it widens considerably, and is navigable by vessels of the largest draught. A railway tunnel connects Liverpool and Birkenhead, the space between the bed of the river and the crown of the tunnel being at no point less than 25 feet. It was opened for traffic in 1886 by the Prince of Wales. The construction of the tunnel cost £1,250,000. Among the wonders of the world are the docks of Liverpool, some fifty in number, with their appurtenances, and it was in Liverpool that the system of floating docks originated. The great landing-stage, 2,063 feet in length and 80 feet in width, which rises and falls with the tide, is connected with the shore by seven hinged bridges. Between it and the shore is a floating bridge, 550 feet in length and 35 in width, for vehicles as well as pedestrians, available at all states of the tide. One-half of it is used for seagoing vessels and the tenders of the great "liners," the other for the Mersey ferries, of which there are eight. The docks extend along the Liverpool shore of the Mersey for more than 6 miles. The water area is 381 acres, with 25½ miles of quay space. The docks at Birkenhead, controlled by the corporation of Liverpool, extend for a mile along the shore and inland 2 miles, occupying a water area of 164½ acres and 9½ miles of quay space, in all 545½ acres of water area and 35 miles of quay. There are also twenty-three graving docks in which vessels are repaired. The fine Liverpool floating dock, the Salthouse Dock, still in existence, though partly rebuilt and enlarged, was opened in 1753. The largest Liverpool dock, the Alexandra, at the north end, was formally opened by the Prince and Princess of Wales in 1881. It has a water area of 44¼ acres and quay space of 2¼ miles, and is used chiefly by the largest class of steamships trading to the U. S. and the East Indies. The Albert Dock, opened by the Prince Consort in 1846, is surrounded with ranges of fire-proof warehouses, five floors each with vaults below the quays, the total superficial area of these five floors with quays and vaults being 25 acres. At the south end of these systems is the Herculaneum Dock, opened in 1866, and reopened after enlargement in 1881. The petroleum magazine here is said to be the largest in the world, and capable of holding 60,000 barrels. The total area of the dock estate in Liverpool is 1,104 acres, of which 732 are occupied by graving-docks, dock-quays, sheds, warehouses, etc. A double line of railway, about 6 miles in length, runs from N. to S. on the eastern margins of the dock-quays, with branches to the various railway stations. Over this ground railway runs the overhead electric railway, opened by the Marquis of Salisbury in 1893, with thirteen stations along the route. Between the docks and the city there is a continuous broad road with streets leading to the main city thoroughfares, and along the greater portion of the river-wall there is a marine parade which can be used as a public promenade.

Public Buildings.—The town-hall, reconstructed after a fire in 1795 at a cost, with the furniture, of £110,000, is Classical in style, and contains a spacious council chamber and a saloon for civic hospitality. The municipal offices (1866), a quadrangular edifice also in the Classic style, cost about £160,000. At the north end is a tower 210 feet high. The Exchange buildings (1864), in the French Renaissance style, have an inside colonnade surrounding a quadrangle, locally known as The Flags, in which the markets for cotton and general produce are held. The custom-house, post-offices, and dock offices occupy a pile of buildings in the Ionic style, with a fine dome. The Government buildings form a block in the Italian style, containing the offices of the Inland Revenue, the county and probate courts, etc. St. George's Hall is the finest edifice of the kind in the provinces. It was finished in 1854 at a cost of £400 000. The general style of the building is Corinthian. Its principal façade is more than 400 feet in length. Its great hall, 169 feet by 74, contains a fine organ and seats 2,500 persons. There is another hall which will seat 1,000. The rest of the building contains the assize and other law courts, with a law library. In the area in front are equestrian statues of the Queen and the Prince Consort, and between them a statue of Lord Beaconsfield.

Public and Other Institutions.—The Free Public Library and Museum (1857–64) occupy a stone building of the Corinthian order. The institutions themselves are maintained by local rates. The Picton reading-room, erected by the corporation, is to the Free Library what the reading-room of the British Museum is to its library. The reference library contains more than 102,000 volumes. The Picton reading-room connects the library and museums with the Walker Art Gallery (1874–77). The Royal Institution (1814–17) contains a natural history museum and a valuable collection of pictures. The Athenæum has a library of 40,000 volumes. The observatory, on Bidston Hill, is maintained by the Mersey docks and harbor board. The Philharmonic Hall, belonging to the Liverpool Philharmonic Society, will hold nearly 3,000 persons. The largest of the theaters, the Alexandra theater and opera-house (1866), is in the Italian style. The Wellington Rooms (1815) have been called the Almacks of Liverpool, and are managed by a committee. Belonging to the corporation are the Botanic Gardens, 11 acres, and there are seven parks covering several hundred acres, and the Mount, a public promenade of 4 acres. There are in Liverpool more than 130 hospitals and philanthropic institutions. Among them are the Sailors' Home (1852), with about 7,000 boarders; the Royal Infirmary, founded in 1745, and open to all; the Liverpool Infirmary for children (1851–70); the Northern Hospital (1833–34); the Royal Southern Hospital; and the Liverpool Stanley Hospital (1867).

Churches and Chapels.—There are 100 Anglican churches in Liverpool. The Church of St. Peter, in Church Street (1704), is used as the cathedral church of the diocese. The Roman Catholics have 44 churches and the Presbyterians 28, the Methodists, of all branches, 74 chapels, the Congregationalists 28 chapels, the Baptists 27, the Unitarians 6, the Friends have 2 meeting-houses, there is a Greek church, and there are 4 synagogues. Of the several cemeteries the most striking in its picturesque irregularity is St. James's.

Educational.—Liverpool University College (1882), forming part of the Victoria University, Manchester, is on Mt. Pleasant, and its buildings occupy 4 acres. It combines instruction in all the branches of a liberal education with the teaching of science, theoretical and practical, and with technical and industrial training. An important medical school is connected with it. Liverpool College (1840–43) is in connection with the Church of England. Among other educational institutions are Liverpool College for Girls, the Government School of Art (1837–83), Liverpool Nautical College (1892), and St. Edward's Roman Catholic College for young men (1842). The school board has established 25 board schools, but these are outnumbered by the 87 national schools (Church of England), and the Roman Catholic schools, of which there are 43. There are some 22 industrial and reformatory schools, with a few ragged schools. Sixteen newspapers (6 daily) and periodicals are published.

Government.—Liverpool is governed by a corporation consisting of a mayor (on whom in 1893 the dignity of lord mayor was conferred by letters patent) with forty-eight councilors, elected by the burgesses in sixteen wards, and sixteen aldermen elected by the council. It is a wealthy and progressive corporation.

Commerce and Shipping.—The commerce and shipping of Liverpool are larger than those of any other port in the United Kingdom. Its imports are less in value than those of London, but its exports are larger, and its exports and imports are more equally balanced. Its commerce with the U. S. is greater than with any other country. The total tonnage of all the vessels (exclusive of the coasting trade) which entered and cleared at Liverpool in 1892 was 11,119,976 tons and of these 5,346,263 tons represented vessels bound for or coming from the U. S. Besides its general commerce with the U. S., Liverpool sends to them large numbers of emigrants, for which it is the chief port of embarkation. The imports of foreign and colonial produce into the United Kingdom in 1892 were of the value of £423,793,882, of which Liverpool received £109,347,354. They included 14,863,493 cwt. of raw cotton, 20,376,294 cwt. of wheat, 8,917,203 cwt. of Indian corn, 271,686 live cattle and sheep, 3,220,831 cwt. of bacon and ham, 5,999,985 cwt. of unrefined sugar, 29,609,588 lb. of unmanufactured tobacco, 30,416,283 cwt. of leather. The amount of the custom duties paid at Liverpool in 1892 on the few articles on which they are leviable in the United Kingdom was £2,958,408, nearly a third of the sum received by the London custom-house. The value of the produce and manufactures of the United Kingdom exported from it in 1892 was £226,075,173. Of this produce to the value of £90,167,362 was exported from Liverpool. The value of the foreign and colonial merchandise exported from the United Kingdom in the same year was £64,563,113; the value of that exported by Liverpool alone was nearly a fifth, £13,147,483. The exports included cotton piece-goods valued

at £35,693,388; linen piece-goods valued at £2,148,946; woolen tissues and worsted stuffs valued at £7,165,941; iron, raw and manufactured, valued at £7,554,636; chemical products valued at £2,175,762; and salt valued at £432,671. Four thousand two hundred and seventy-two vessels (exclusive of the coasting trade) entered the port in 1892. They were mostly British vessels, and chiefly belonging to Liverpool, which is registered as possessing 2,333 vessels, of 2,095,491 tons collectively, and of these 987 are steam vessels of 1,087,388 tons collectively. Besides its foreign commerce, Liverpool has a large coasting trade. Of vessels engaged in this in 1892 there entered Liverpool 12,782, of 2,656,239 tons collectively, and there cleared from it 13,143, of 3,210,308 tons collectively.

General Industry.—There is some ship-building in Liverpool. The various processes connected with ship-building and ship-fitting employed 3,875 persons. There are also establishments for the construction of marine engines and of machinery generally. In 1893 they employed 4,473 persons. Although other industries are carried on, such as sugar-refining, tobacco-manufacturing, and watch and chronometer making, those connected with commerce, the docks, and navigation are the most important. Liverpool has fourteen banks.

Population.—The population in 1801 was 77,653. In 1891, through increase of area, the borough had a population of 629,548; in 1900, 685,276. The population of Greater Liverpool, as it may be called, which was 670,304 in 1881, had increased in 1891 to 708,742. In 1891 the total foreign population of the urban sanitary district, which is smaller than Greater Liverpool, was 7,402. In 1892 the death-rate was 25·9, being 5·7 higher than that of London.

History.—The earliest notices of Liverpool date from the English conquest of Ireland. King John founded it as a town, and made use of it for sending re-enforcements to Ireland. Its history for centuries was unimportant. It was not until 1709 that its population, having grown to a few thousand, the accommodation afforded by its little harbor was increased through the erection of a wet dock. Later in the century it embarked in the slave-trade, of which it became the headquarters, and it prospered greatly by nefarious traffic, exporting Negroes to the West Indies in exchange for their sugar and other products. When the slave-trade was suppressed a more legitimate channel for the energies of the merchants was opened by the development of the Lancashire cotton-manufacture and of cotton-growing in the U. S., Liverpool importing from the U. S. the cotton needed for that industry. The canal system, originated by the Duke of Bridgewater, gave Liverpool water communication with the chief marts of Northwestern England. The Liverpool and Manchester Railway, opened in 1830, added to its prosperity, and the growth of railways since then has placed it in communication with all parts of the United Kingdom.

See the authorities mentioned under LANCASHIRE; also Sir J. Allanson Picton's *Memorials of Liverpool* (1873); *Harbours and Docks*, by L. F. Vernon Harcourt (1885); Kelly's *Directory of Liverpool and Birkenhead* (1884); *County Council and Municipal Directory for 1884*; parliamentary papers, etc. F. ESPINASSE.

Liverpool: seaport of Nova Scotia; capital of Queen's County; has considerable trade in fish and lumber (see map of Quebec, etc., ref. 3–B). The town is well built and attractive. It has a good harbor, into which flows the river Mersey. It has one weekly newspaper, a bank, and a lighthouse on Coffin's island; lat. 44° 3′ N., lon. 64° 36′ W. Pop. (1891) 2,465.

Liverpool: village; Onondaga co., N. Y. (for location of county, see map of New York, ref. 4–F); on the Onondaga Lake, the Oswego Canal, and the Rome, Water. and Ogdens. Railroad; 4½ miles N. of Syracuse. It has several mills, willow-basket factories, cigar-factories, silver-metal factories, and solar salt-works. There are five churches and a weekly newspaper. Pop. (1880) 1,350; (1890) 1,284; (1900) 1,133.
EDITOR OF "TELEGRAPH."

Liverpool, CHARLES JENKINSON, First Earl of: statesman; b. in Oxfordshire, England, May 16, 1727; educated at Oxford; entered Parliament, and became Under Secretary of State in 1761. Having secured the favor of the king, he rose rapidly in the official service. He was Secretary of State for the War Department in Lord North's administration from 1778 to 1782, in which capacity he had much to do with determining the course of military operations in the U. S. during the closing years of the war of independence in North America. On retiring from this office he joined the party of the younger Pitt, by whom he was appointed in 1784 President of the Board of Trade. He held that post during the whole seventeen years of Pitt's first administration. He was created Baron Hawkesbury in 1786, and Earl of Liverpool June 1, 1796. D. in London, Dec. 17, 1808. He published a *Collection of all the Treaties of Peace between Great Britain and other Powers from 1648 to 1783* (3 vols., 1785).

Liverpool, ROBERT BANKES JENKINSON, Second Earl of: statesman; b. in London, June 7, 1770; educated at Oxford; entered Parliament in 1791, and took rank as a ready debater. He was appointed Secretary of State for Foreign Affairs in the Addington cabinet, and negotiated the Treaty of Amiens in 1801. He became Home Secretary under Pitt and on the latter's death in 1806 declined the premiership, but accepted it on the assassination of Mr. Perceval in 1812, and remained at the head of the administration until an attack of paralysis occasioned his resignation in Apr., 1827. These fifteen years were marked by a retrograde policy on the part of the ministry and by discontent on the part of the people. Though he was respected by his opponents for sincerity, Lord Liverpool's statesmanship was not of a high order, and his policy was completely reversed by his successor. D. Dec. 4, 1828. F. M. COLBY.

Liverworts: popular name of certain green plants related to the Mosses. They form one of the classes of MOSSWORTS (*q. v.*).

Livery of Seizin: See FEOFFMENT.

Liv'ia Drusil'la: the wife of the Emperor Augustus and the daughter of L. Livius Drusus Claudianus, who died by his own hand after the defeat at Philippi. Livia was married at an early age to Tiberius Claudius Nero, by whom she had two sons, Tiberius (afterward emperor) and Drusus. While still pregnant with the latter she was married to Octavian (Augustus), who had been captivated by her beauty and her talent, and who to bring about this union had divorced his own wife Scribonia, and compelled Tiberius Nero to divorce Livia. The union with Augustus seems to have been a happy one, but ancient historians make it appear that her ambition to secure the succession for her own sons caused her to commit many crimes in order to remove the members of the family of Augustus, to whom the succession would naturally have fallen. Thus the death of the young Marcellus, nephew and adopted son of Augustus (to whose memory a remarkable passage of the sixth book of the *Æneid* is devoted), and of Lucius and Gaius Cæsar, sons of Agrippa, was charged to her machinations, nor was she free from the suspicion of having hastened the end of Augustus himself. Meantime her surviving son, Tiberius, had been adopted by Augustus, who designated Livia and Tiberius as his principal heirs. On her son's succession to the imperial dignity Livia continued for a long time to exercise great influence, so much so that at first it seems to have been felt that Tiberius was subservient to her will; but in fact Tiberius, while considerate of his mother, always maintained an attitude of independence toward her in all affairs of state, and thus by degrees a spirit of alienation grew up between them which increased so much with years that Tiberius refused to visit her on her death-bed, or even to execute the directions of her will. She died at an advanced age (perhaps eighty-six) in the year 29 A. D. G. L. HENDRICKSON.

Livingston: city; capital of Park co., Mont. (for location of county, see map of Montana, ref. 6–G); on the Yellowstone river, and the N. Pac. Railroad; 100 miles E. of Helena, the State capital. It is connected with the National Park by a branch railway; contains 5 churches, 3 public schools, electric lights, water-works, 3 hotels, board of trade, and 3 weekly newspapers; and has railway-car shops, and large farming, stock-raising, and coal and gold mining interests. Pop. (1880) not in census; (1890) 2,850; (1900) 2,778. EDITOR OF "HERALD."

Livingston, EDWARD: jurist and politician; b. at Clermont, Columbia co., N. Y., May 26, 1764; was a son of Judge Robert R. Livingston (1718–75); graduated at Princeton in 1781, and began the practice of law in New York. Having the advantages of family influence and natural ability, he rapidly gained distinction in his profession, and became prominent in local and national politics; was twice mayor of New York; judge of a municipal court, and from 1795–1801 a prominent Jeffersonian member of Congress. Owing to pecuniary troubles he removed in 1804 to New

Orleans, where he attained a brilliant reputation as a lawyer, and acquired sufficient wealth to discharge all claims against him. Mr. Livingston spent many years in preparing civil and criminal codes for Louisiana, which were his chief literary labors, and won for him a wide fame in Europe and in Spanish America. He was a member of Congress 1822–29; U. S. Senator 1829–31; Secretary of State 1831–33; minister to France 1833–35. He afterward resided at Rhinebeck, N. Y., where he died May 23, 1836. His works on jurisprudence were published in New York in 1873. See his *Life*, by C. H. Hunt (1864); and *Recollections of Livingston*, by M. Davezac. Revised by F. Sturges Allen.

Livingston, Philip: a signer of the Declaration of Independence; b. at Albany, N. Y., Jan. 15, 1716; graduated at Yale in 1737; became a prosperous merchant and official of New York city; was Speaker of the House of the Colonial Legislature in 1768, a member of the Continental Congress 1774–78, and president of the provincial Congress 1775. Member of the New York General Assembly in 1776, and of the first State Senate 1777. He was one of the founders of the New York Chamber of Commerce and of the Society Library, and materially aided Yale and Columbia Colleges. D. at York, Pa., June 12, 1778.

Livingston, Robert R., LL. D., known as Chancellor Livingston: statesman; b. in New York, Nov. 27, 1747; a son of Judge Robert R. Livingston and a brother of Edward Livingston, jurist; graduated at King's (now Columbia) College in 1765; became a successful lawyer; was recorder of New York 1773–75; a member of the Continental Congress 1775–77 and 1779–81; was on the committee which reported the Declaration of Independence; was Secretary of Foreign Affairs 1781–83; chancellor of New York 1777–1801; was a prominent member of the New York convention of 1788 which adopted the Constitution of the U. S.; was instrumental, while U. S. minister to France (1801–04), in effecting the purchase of Louisiana; was the assistant of Fulton in perfecting steam-navigation; was one of the introducers of merino sheep into the U. S., and held various public positions with great efficiency. D. at Clermont, N. Y., Feb. 26, 1813.

Livingston, William, LL. D.: statesman; a brother of Philip; b. at Albany, N. Y., in 1723; graduated at Yale in 1741; became a prominent lawyer and journalist; removed in 1773 to Elizabethtown, N. J., and was elected in 1774 and 1775 to the Continental Congress. He became brigadier-general of militia in 1775, and in the following year was elected Governor of New Jersey, an office which he held until his death. During the war, when the British occupied the State, he fulfilled his duties with courage and ability. He was a member of the convention which in 1787 drew up the Federal Constitution. His writings, consisting of newspaper articles and pamphlets, prove him to have possessed considerable literary talent. See his *Life and Letters*, by Theodore Sedgwick, Jr. (New York, 1833). D. at Elizabethtown, N. J., July 25, 1790.

Livingstone, David, M. D., LL. D.: missionary and explorer; b. at Blantyre, near Glasgow, Scotland, Mar. 19, 1813. His parents were very poor, and could give him no aid to acquire a scholarly education. His religious enthusiasm, however, in connection with a passion for traveling in foreign countries, created early the idea of a missionary life in his mind; and first by attending an evening school while employed during the day in the cotton-mills, and later on by working hard during the summer and studying during the winter, he contrived to prepare himself thoroughly for his task. In 1838 he offered his services as a missionary to the London Missionary Society, and in 1840 was ordained and proceeded to Kuruman in South Africa. He was engaged in the service of the London Society for sixteen years, and meanwhile married the daughter of the Rev. Robert Moffat, the distinguished missionary. In 1849 he made his first journey of exploration, and discovered and surveyed Lake Ngami. He started (1853) on the great journey that made him famous. His salary was only £300 a year when the heathen Makololo chief, Sekeletu, gave him men, ivory, and trading commissions that enabled him (1853–56) to travel from the Zambesi to Loanda on the west coast and then to retrace his steps across the continent to the mouth of the Zambesi. He returned to England and wrote his *Missionary Travels and Researches in South Africa*, which made his name well known. In 1858 he returned to Africa, and, supported by the Government and accompanied by several scientific associates, he started on an exploring journey up the Zambesi and Shiré rivers, the greatest results of which were the discovery of Lakes Nyassa and Shirwa, and the salubrious Blantyre Highlands. His wife, who was with him, died at Shupanga (1864). He then spent nearly two years (1864–65) at home publishing *A Narrative of an Expedition to the Zambesi*. Livingstone returned to Africa (1866) to discover the ultimate sources of the Nile. Little was heard from him during the seven remaining years of his life, but they were years of great discoveries, and, in part, of great privations and suffering. He was destitute of means to send tidings to his friends, and the most direful rumors of his fate were spread abroad. *The New York Herald's* Livingstone search-party, commanded by Henry M. Stanley, found the explorer (1871) at Lake Tanganyika. He could not be induced to return home, but worked on till he died, having no resources part of the time except what the natives gave him. In these seven years he discovered and partly mapped the large eastern system of Congo sources, beginning with the Chambezi river near Lake Nyassa. Following these rivers for hundreds of miles, discovering Lakes Bangweolo and Moero, through which they run, and deterred at Nyangwe from following the Congo to the sea only by lack of means, he believed to his death that the large part of the upper Congo water-system he had traced belonged to the Nile. His map of Lake Bangweolo, derived chiefly from natives and long used in all maps of Africa, was very erroneous. Had he lived a few weeks after his return to Bangweolo he, and not Giraud, would have supplied a more correct map; but he died (May 1, 1873) on its southern shore. His heart was buried where he died, and his embalmed body was carried by his servants to the coast, whence it was taken to England and buried with imposing ceremony in Westminster Abbey. He was, as a rule, remarkably accurate in his geographical delineations, considering his imperfect instruments. His keen powers of careful observation gave his books enduring value. He never injured a native. To him is wholly due the first great impetus to African exploration and the first outburst of indignation against the Arab slave-trade. See *Livingstone's Last Journals* (1874); Blaikie's *Livingstone's Personal Life* (1880); and Stanley's *How I Found Livingstone* (1873). Revised by C. C. Adams.

Li'vius Androni'cus: author; lived in the third century before our era; was born at Tarentum, a slave of Greek descent. He received his liberty from M. Livius Salinator, and began to represent tragedies and comedies (which he composed after Greek models) in Rome about 240 B. C. He also translated the *Odyssey* into Latin, and did much to make the Romans acquainted with Greek literature. In the time of Horace his compositions were still used in the schools, but only a few insignificant fragments have come down to our time, edited by Düntzer (Berlin, 1835); O. Guenther, *Odyssiæ reliquiæ* (Stettin, 1864); Baehrens, *Frag. Poet. Rom.*, pp. 37–43 (Leipzig, 1886); and by Ribbeck, *Trag. Lat. Rell.* (Leipzig, 1871). Revised by M. Warren.

Livo'nia (Germ. *Liefland*): government of Russia; bordering on the Gulf of Livonia, and comprising, together with the island of Oesel, an area of 18,158 sq. miles. The surface is low, flat, and often marshy, dotted with numerous lakes, and covered with forests. Toward the S. E., however, it rises and forms a plateau about 500 feet high and intersected with numerous valleys. The soil is not very productive. Swamps and peat-bogs occupy a large portion of the ground, and vast sand-wastes stretch along the Baltic coast. Rye, barley, oats, buckwheat, flax, and hemp are raised, and many cattle reared. In the towns the inhabitants are mostly of German descent, mixed with Russians, Poles, and Jews; in the country they are of Finnish origin. Pop. (1890) 1,256,200. Capital, Riga. The country was a Swedish possession from the Peace of Oliva (1660), when it was conquered from Poland, to the Peace of Nystadt (1721), when it was ceded to Russia.

Livre, leevr' [Fr. pound < Lat. *lib'ra*, balance, pound]: the former French standard unit of weight; was to the pound avoirdupois as 17·267 to 16. Also, a former French coin, superseded in 1795 by the franc, which is to the *livre tournois* (the old standard) as 81 to 80, the Parisian livre being to these figures nearly as 100. Still other livres were in use.

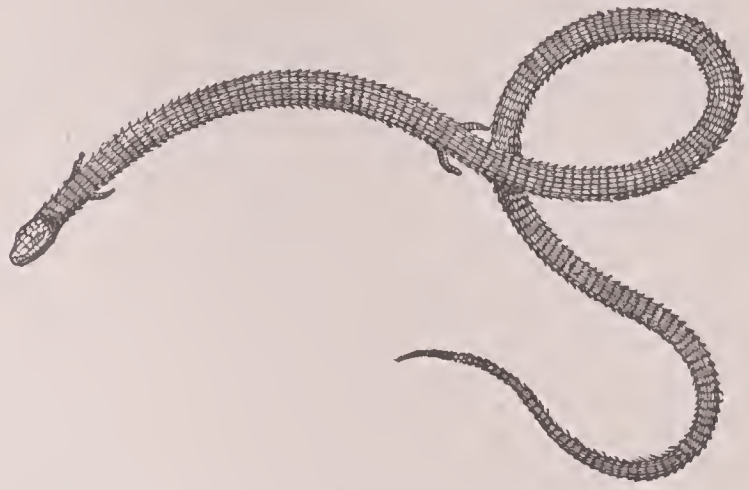
Liv'y (in Lat. Titus Livius): historian; b. at Patavium, in Northern Italy, in 59 B. C.; lived chiefly in Rome, where he enjoyed the favor of Augustus and maintained intimate intercourse with the young Claudius, but returned in his old age to his native city, and died there in 17 A. D. He was

married, had at least one son and one daughter, and enjoyed great celebrity among his contemporaries, but nothing further is known of his personal life. According to Seneca, he wrote several dialogues and essays on philosophy, which have been lost, but the work by which he won a lasting fame was his history of Rome from the foundation of the city to the death of Drusus 9 B. C. It consisted originally of 142 books, and the short introductions with which the first, twenty-first, and thirty-first open seem to indicate that it was divided into groups of ten books or *decades*, each decade comprising an independent epoch; but of these 142 books only thirty-five have come down to us—namely, the entire first decade, i.–x., embracing the period from the foundation of Rome to the year 293 B. C.; the entire third decade, xxi.–xxx., embracing the period from 219 B. C. to 201 B. C.; the entire fourth decade, and one-half of the fifth, xxxi.–xlv., embracing the period from 201 B. C. to 167 B. C. Of the rest only a few and inconsiderable fragments are still extant; all the so-called *epitomes*, however, short extracts of or indexes to each book, have been preserved except those to Books 136 and 137. The first printed edition (Rome, 1469) contained only twenty-nine books—namely, i.–x., xxi.–xxxii., xxxiv.–xl. The remaining six books were discovered in fragments in 1518, 1531, and 1616, and for more than two centuries the whole learned world was put into general commotion every now and then by a rumor that the entire work had been discovered, until in the seventeenth century all libraries had been ransacked in vain, and all hope of the recovery of the lost treasure was given up. The best modern editions are by Drakenborch (Leyden, 1738–46, and Stuttgart, 1820–28); Madvig and Ussing (Copenhagen, 1861, *seq.*; revised 1886, *seq.*); Weissenborn (Berlin, 1861, *seq.*); A. Zingerle (Prague, 1883, *seq.*); and A. Luehs (Berlin, 1888, *seq.*). There are English translations by Philemon Holland (1600); Baker (1797); John Hayes (1744); and in Bohn's Classical Library (1850). Considered as a work of science, modern scholars have not given the highest praise to Livy's history; the studies on which the representation rests are generally not exhaustive, and often not accurate. The chronology is sometimes confused, and the geographical and military descriptions are often inconsistent or misleading; nor is Livy strong in tracing the growth of the constitution and the evolution of the state. However, on account of the scarcity and in many cases the total lack of other historical documents, the work has an inestimable value, while in the matter of style it challenges our highest admiration. The narrative is fluent and picturesque, and full of variety, often dramatic and brilliant. No writer has shown a greater mastery of the period. The diction is tinged with a poetic coloring showing clearly the influence of Vergil. The author is dominated by a strong feeling of the greatness of the Roman people, and his ardent patriotism and warm sympathies captivate the reader. The result of the investigation of Livy's sources in the different decades can not be considered here. See Schanz, *Römische Lit. Geschichte 2ter Theil*, p. 184 ff. (Munich, 1892); Taine, *Essai sur Tite-Live* (Paris, 1888); Capes, *Livy* (London, 1879); Kühnast, *Die Hauptpunkte der Liv. Syntax* (Berlin, 1872); Riemann, *Études sur la langue et la grammaire de Tite-Live* (Paris, 1884).

Revised by M. WARREN.

Lixivia'tion and Lixiv'ium [from Lat. *lixi'vium*, lye, liter., neut. of *lixi'vius*, made into lye, deriv. of *lix*, ashes, lye]: Lixiviation is the method of extracting ingredients soluble in water from porous substances, like ashes or earth, by placing the latter in some receptacle, through which the water may be made to percolate. The vessel for lixiviation usually has a perforated bottom, upon which straw or coarse gravel is first spread, and then the material to be lixiviated is filled in. All the potash made in the U. S. is thus obtained from wood-ashes, and much of the saltpeter of commerce similarly from nitrous earth. Much economy is often arrived at by a construction which enables the first water poured on the mass to remain in it for some time until it has finished its solvent action, and then drawing off at the bottom. Sometimes then, on pouring through fresh water, it will be found soon to run nearly pure. Concentrated lyes are thus obtained without boiling down. The second water is not allowed to mix with the first, but kept to pour through a fresh mass of material.

Lizard [M. Eng. *lesarde*, from O. Fr. *lesarde* > Fr. *lézard* < Lat. *lacer'ta*, lizard (> Span. *lagarto*, whence Eng. *alligator*)]: a general name for any member of the order *Lacertilia*, often extended to include not only the crocodiles and many extinct saurians, but even, in popular parlance, tailed batrachians, such as newts and salamanders. A lizard is a tailed reptile, usually with an elongate body, having a scaly or granular skin, toothed jaws whose rami are firmly united



The anguine or snake lizard of South Africa.

in front, and, as a rule, eyelids and four limbs, although in exceptional cases, e. g. the blind worm, glass snake, and scheltopusic, the limbs may be rudimentary or absent. The serpent-like lizards may readily be distinguished from snakes by their fixed teeth and the united halves of the lower jaw. The tail may be very short, scarcely longer than the head, as in the Australian *Trachydosaurus*, or several feet long, as in the great *Hydrosaurus*. The iguanas have a dewlap and a fringe of high scales down the back, and the curious lace lizard, CHLAMYDOSAURUS (*q. v.*), has a wide frill about the neck. Owing to a peculiar arrangement of the muscles the tails of many lizards readily break off. When this happens the lost portion of the tail is reproduced, but although externally perfect the missing vertebræ are found to be replaced by a continuous strip of granular cartilage. Nearly 2,000 species of lizards are known, ranging in size from the great teguexin, 6 feet long, to species of 2 or 3 inches in length. Nearly all lizards are oviparous, depositing their eggs, which are covered with a shell or tough calcareous membrane, in the sand, to be hatched by the heat of the sun. A few species, however, are ovoviviparous, the eggs being retained in the oviduct until hatched, and the young brought forth alive. Lizards are most numerous in tropical

Nimble lizard (*Lacerta agilis*).

and warm countries; none are found in very cold regions, and in the temperate zone they pass the winter in a torpid state. As a rule, they prefer sandy or rocky localities, and are carnivorous, feeding on small mammals, insects, eggs, etc. Some species are arboreal and herbivorous, and the great *Amblyrhynchus* of the Galapagos islands enters the

sea and feeds on seaweed. With the exception of the HELODERMA (*q. v.*), none are poisonous. F. A. LUCAS.

Ljunggren, yoong'gren, GUSTAF HÅKAN JORDAN, Ph. D.: critic; b. in Sweden in 1825; studied at Lund; graduated 1844; was in 1847 appointed Assistant Professor of Æsthetics, and in 1859 Professor of Æsthetics and the History of Literature and Art. In 1865 he was elected a member of the Swedish Academy. Ljunggren's fame as a critic and writer upon the subject of literary history rests not only upon his thorough learning and studies, but also on his fascinating way of presenting his subject. Chief among his writings upon literary history are *Svenska dramat intill slutet af 17de århundradet* (The History of the Swedish Drama until the End of the Seventeenth Century, 1864); *Svenska vitterhetens häfder efter Gustaf III.'s död* (The Annals of Swedish Literature after the Death of Gustaf III., 3 vols., 1873–86), besides several smaller writings—*Bellman och Fredmans Epistler* (1867); 3 volumes *Smärre Skrifter* (Smaller Writings, 1872–81). Ljunggren has also written on topics of a purely æsthetic nature: *Framställning af de förnämsta esthetiska systemer* (The Chief Æsthetic Systems, 2 vols.; 2d ed. 1869–83), which is used as a handbook in the Swedish universities; *Studier öfver Holberg* (1864). Finally may be mentioned some sketches from Italy, *Från en resa* (1871). P. GROTH.

Llama: See LAMA.

Llandudno, lan-did'nō: a much-frequented watering-place in Carnarvonshire, North Wales; picturesquely situated on a sheltered bay of the Irish Sea, at the mouth of the Conway (see map of England, ref. 8–E). Two lofty promontories, Great Orme's Head and Little Orme's Head, protect the bay against the sea. The permanent population in 1891 was 7,333.

Llanel'ly: town of South Wales; 16 miles S. E. of Caermarthen (see map of England, ref. 12–D); on a creek of the Caermarthen Bay, at the mouth of the river Lougher, and has manufactures of copper, tin, and iron wares, pottery and chemicals, extensive docks, and a considerable trade in coal. Pop. (1891) 23,937.

Llano Estacado, lyaa'nō-es-tăă-kaa'dō [Span., palisaded plain. See LLANOS]: a large plateau in Northwestern Texas. On nearly all sides it stands above the surrounding country, from which it is separated by a cliff facing outward, and this cliff or palisade gave rise to its name, which has been misleadingly translated "staked plain," and supposed to refer to the stake-like boles of a yucca-plant which grows there. Its general form is quadrangular, with a length N. and S. of 400 miles, and a width of 75 to 150 miles, but its outline is irregular, including many salients and re-entrants. It is very smooth and apparently level, but there is an eastward slope averaging 15 feet to the mile. Its surface is constituted of a feebly coherent, sandy formation of Neocene age, resting unconformably on Triassic shales and other rocks. The sandstone absorbs all the rainfall, so that there are ordinarily no surface-streams; but the impervious rocks beneath retain the water in the lower part of the sand, whence it can be obtained by wells. There are no trees, but the nutritious gama-grass abounds, supporting an important grazing industry. The climate is so dry that in the absence of water for irrigation agriculture can not be pursued. G. K. GILBERT.

Llanos, lyaa'nōs [Span., liter., plains, plur. of *lla'no* < Lat. *pla'nus*, plane, level, whence Eng. *plain*]: in various parts of Spanish America, tracts of open land of very different character. In a special and geographical sense, the name has come to be used for a vast tract in Venezuela and Colombia, properly the llanos of the Orinoco or of Venezuela. Broadly speaking, they occupy the space between the river Orinoco, the coast mountains of Venezuela and the Eastern Cordillera of Colombia, extending eastward to the Orinoco delta, westward, by the Apure basin, nearly to Bogotá, and southwestward, around the bend of the Orinoco, to the Vichada branch of that river; beyond the Vichada the plain is broken by woods until it merges into the great Amazonian forest. The entire area has been estimated at more than 150,000 sq. miles, much the larger part being in Venezuela. All this region is characterized by immense stretches of perfectly flat grass land, and no part of it is more than a few hundred feet above sea-level; but it is a great mistake to suppose that the llanos are perfectly uniform in character throughout; in fact, they vary greatly. The natives always make a distinction between the *llanos bajos*, which are broad river-bottoms, subject to periodical overflows from the rivers themselves, and the *llanos altos*, which are above the reach of such floods, though portions may be inundated by the rains. Again, the llanos altos not only present inequalities (*bancos*), but are varied in many places by flat-topped hills, 500 or 600 feet high, evidently the remains of an old table-land. Along the southern edges of the Venezuelan mountains these *mesas* often form a continuous terrace; and in one place, at least, they pass entirely across the llanos, from the Orinoco, opposite the mouth of the Caura, to a break in the coast range near Barcelona. The llanos bajos are green throughout the year, and present, especially near the Apure, the largest extents of perfectly open, clean, and level grass-lands, often so great that the horizon is open in all directions; they are dotted with shallow lakes, some of which dry up in the winter months; during the rains they are overflowed in all directions; cattle wade after the floating grass or retire to the few spots left dry; and travelers pass for miles through water up to their saddle-girths; nevertheless, these are the best and most productive pastures. The llanos altos are green and beautiful during the rains (June to October), but dry and arid during the other months, the winds raising clouds of dust; cattle pastured on many parts of them must be driven to the river-bottoms at this season. The lakes of the llanos altos are little more than pools, but during the rains water frequently collects over large surfaces. Eastward, some portions under the lee of the Cumaná Mountains are so dry at all times that travelers over them are obliged to carry water, as in a desert. Trees, especially palms, grow scattered over many parts of the llanos, or are gathered into small clumps (*matas*) and lines along the streams. The mesas often have forest on their edges, but the tops are generally covered with bushy *rastrajo*, similar to the campo growth of Brazil. A multitude of streams, rising on the flanks of the mountains or of the mesas, flow over the llanos, and most of them are navigable at a short distance from their sources; thus they furnish a network of communication with the Orinoco. The climate in most parts is hot and damp, but generally healthful in the dry season; during the rains intermittent fevers and dysentery are prevalent, especially in the llanos bajos. Animals abound, jaguars, deer, wild hogs (both the native species and those from European stock), and a multitude of birds being most prominent; the jaguars frequently destroy cattle. Of the numerous Indian tribes which formerly occupied the llanos, only a few are left in a wild state, principally in the southwest. At present the plains are thinly inhabited, principally by a hardy race of mixed Indian, Negro, and white blood, the *llaneros*; they are trained to ride from infancy, and are wonderfully skillful herdsmen; quite unlettered, they are nevertheless intelligent, brave, and generous, and have done efficient service in the numerous wars of Venezuela. Though many parts of the llanos are fertile, they are used at present exclusively for grazing; immense herds of cattle run on them in a nearly wild state, being only driven together annually for branding, and to separate those intended for the market. Horses are also raised, but they have suffered greatly from a disease now common in swampy lands throughout South America. The houses of the *llaneros*, and even those of the best cattle estates, are little better than huts, and there are few towns. See Codazzi, *Geografía de Venezuela* (1841); Michelena y Rójas, *Exploración oficial* (1867); Carl Sachs, *Aus den Llanos* (1878); Humboldt, *Voyage dans les régions équinoxiales* and *Tableaux de la Nature*; Édouard André, *L'Amérique équatoriale* (1878); Ramon Paez, *Wild Scenes in South America* (1862). HERBERT H. SMITH.

Llanos de Chiquitos, or **Llanos de los Chiquitos**: See SANTA CRUZ, Bolivia (Department).

Llanos de Manso (so called from Andres Manso, who in the sixteenth century received authority to colonize this region): a plain in the extreme southeastern part of Bolivia, department of Chuquisaca. It forms a portion of the GRAN CHACO (*q. v.*). H. H. S.

Llanquihue, lyăăn-kee'wā: a southern province of Chili, S. of Valdivia; approximately between 40° 10′ and 42° 10′ S. lat.; but by some authorities the limits are extended to 47°. Area, by the former limits, 7,823 sq. miles. The Andes form the eastern boundary, and in general the surface is much broken; but in the northern part, which extends to the Pacific, there are considerable plains. The surface is covered with woods, largely of pine, interspersed with tracts of open land and with many beautiful lakes: of these, Lake

Llanquihue is the largest body of fresh water in Chili (area about 225 sq. miles), and is navigated by steamboats; it is 170 feet above the sea, and its great depth and clearness give the water a blue tint resembling that of the ocean. Above this lake rise the Osorno volcano (7,250 feet), and the Calbuco cone (5,550 feet), which was in eruption in Oct., 1893. The southern part of the province is a narrow strip facing the gulfs and channels which separate the Chiloé and Chonos archipelagos from the mainland; it is cut up by narrow fiords between rugged mountains, and the scenery is extremely grand and varied. The climate is temperate, but very rainy; average temperature at Puerto Montt (Gulf of Ancud), 53° F. Wood-cutting, the cultivation of wheat, barley, etc., and grazing are the principal industries. Llanquihue was separated as a territory in 1853, when it was a desert. In 1885 the population was already 62,809, and rapidly increasing; a large proportion of the people are German immigrants. Capital, Puerto Montt (pop. 1885, 2,787), at the head of the Gulf of Ancud; it is now connected by rail with Valdivia. Osorno, in the northern part, had 3,097 inhabitants in 1885. HERBERT H. SMITH.

Llewelyn (loo-el'in) **ap Griffith**: Prince of Wales; succeeded his uncle David in 1246; revolted from his allegiance to the English crown, and ravaged the frontier. He was joined by de Montfort in 1263, and defeated Mortimer in 1264; made peace with Henry III. 1267; was summoned to do homage by Edward I., but refused to appear, and demanded the release of his bride, Eleanor de Montfort, who had been captured by English vessels in the Channel 1275; war began, and Llewelyn was forced to surrender his territories 1277, but Eleanor was released and married to him. He became reconciled to his brother David, and renewed the war with the English 1282, but was surprised and killed by Mortimer Dec. 11, 1282. Revised by F. M. COLBY.

Llorente, lyō-rān'tā, JUAN ANTONIO: historian; b. at Rincon del Soto, near Calahorra, Spain, Mar. 30, 1756; studied theology at Tarragona and Madrid; was ordained priest (1779); became doctor in canon law, advocate in the royal councils, vicar-general of the bishopric of Calahorra (1782), chancellor of the University of Toledo, member of the principal academies, commissary (1785), and secretary-general of the Inquisition (1789). He made two unsuccessful attempts to correct the inveterate abuses of the Inquisition, the latter of which occasioned his relegation to a monastery for a short time, and the exile of his friend and protector, the minister of justice, Jovellanos. In 1806, however, he was employed by the favorite Godoy to write a work in opposition to the traditional privileges claimed by the Basque provinces—*Noticias históricas sobre las tres provincias Bascongadas* (5 vols., 1806–07). This work is an unjust attack upon the Basques and Fueros, in which, according to Ranke, he perverted the facts of history. Llorente adhered to the French intervention; was made a councilor of state by King Joseph, and director-general of national estates (1808), in which capacity he was charged with the suppression of the convents and the administration of the confiscated property. On the extinction of the Inquisition its papers were placed in his hands, with a commission to prepare its history. He fulfilled this task in his *Anales de la Inquisición de España* (2 vols., 1812–13). Charged with embezzlement of immense sums, he was removed from his offices, but was appointed to others; was exiled on the return of Ferdinand VII. in 1814; resided for a time in England, and afterward in Paris, where in 1817–18 was published a French version by A. Pellier of his celebrated *Historia Crítica de la Inquisición de España, etc.*, 4 vols., of which the original was printed in Madrid in 10 volumes in 1822 (German trans. by H. F. Eisenbach, 1824; abbreviated English version, 1826). At the same time he was at work on his *Mémoires pour servir à l'histoire de la Révolution d'Espagne*, published under the pseudonym *M. Nellerto* (3 vols., Paris, 1814–19). In 1818 he printed a brief autobiography, *Noticia biográfica . . . de J. A. Llorente, etc.* In 1821 appeared at San Sebastian his *Apología católica del proyecto de Constitución religiosa, etc.* In 1822 he edited the works of B. de las Casas, printed his *Observaciones críticas sobre el romance de Gil Blas de Santillana*, and issued a French version of his *Retrato político de los Papas desde S. Pedro hasta Pio VII.* (the Spanish was printed the next year in Madrid). The last of these works aroused great indignation among the French clergy, and obliged him to leave Paris and return to Madrid, where he was well received. D. Feb. 5, 1823. Llorente was a writer of considerable talent, and his works were once very popular with the anti-Catholic element in Europe; but they can not be trusted for the accurate statement of facts, and consequently have fallen into comparative discredit. See Hefele, *Life of Cardinal Ximenes* (London, 1860, c. xvii.).

Revised by A. R. MARSH.

Lloyd, CHARLES HARFORD: organist and composer; b. in Thornbury, Gloucestershire, England, Oct. 16, 1849; was educated at Oxford, graduating Mus. B. 1871, B. A. 1872, M. A. 1875. He became organist of Gloucester Cathedral in 1876, and conducted the Three Choirs festivals of 1877 and 1880. In 1882 he was appointed organist of Christ Church Cathedral, Oxford, and conductor of the Choral Society there. His compositions include many canticles and anthems for the Church, glees, madrigals, and part songs, choruses and incidental music to *Alcestis*, and the following cantatas: *Hero and Leander* (1884); *Song of Balder* (1885); *Andromeda* (1886); *The Longbeard's Saga*, men's voices (1887); *A Song of Judgment*, and *The Gleaner's Harvest*, women's voices. He has also written a few instrumental pieces. D. E. HERVEY.

Lloyd, WILLIAM, D. D.: bishop; b. at Tilehurst, Berkshire, England, Aug. 18, 1627; was educated at Oriel and Jesus Colleges, Oxford; became a fellow 1646; took priest's orders 1656; was prebendary of Ripon, Salisbury, and St. Paul's; chaplain to Charles II.; vicar of St. Mary's, Reading, and archdeacon of Merioneth; became Bishop of St. Asaph 1680, of Lichfield and Coventry 1692, of Worcester 1699, and died at Hartlebury Castle in Worcestershire Aug. 30, 1717. Lloyd took an active part in the troubles occasioned by the so-called Popish plot of 1678, and was one of the celebrated seven bishops who protested against the Declaration of Indulgence to Romanists and Dissenters by James II., for refusing to publish which they were committed to the Tower, tried, and acquitted (1688). He was almoner to William III. and to Queen Anne. He was noted as a rabid anti-papal leader and ardent student of prophecy: wrote *Considerations touching the True Way to Suppress Popery* (London, 1677); *An Historical Account of Church Government as it was in Great Britain and Ireland, when they First Received the Christian Religion* (1684); a *Dissertation on Daniel's Seventy Weeks* (1690); a *System of Chronology* (1690); a *Harmony of the Gospels*, and other theological works, and furnished valuable materials to *Bishop Burnet's History of His Own Time.*

Revised by S. M. JACKSON.

Lloyd's: the name by which the first floor of the Royal Exchange in London is known, being the center where the business of maritime insurance is transacted, and where the earliest shipping intelligence from all parts of the world is posted for the information of subscribers, whether merchants, shippers, or underwriters. The board of underwriters have rooms here, and receive reports from their agents in every port throughout the world visited by the ships they insure. The system is so arranged that the individual underwriters risk no more than £100 to £150 on any single vessel. Their concerns are administered by a committee of twelve members. There is a vast "merchants' room," provided with newspapers from all parts of the world, and a "captains' room," where ship-auctions are held and convivial gatherings frequently meet. The establishment derives its name from a coffee-house kept by Edward Lloyd in the seventeenth century. In 1692 the coffee-house was removed to Lombard Street, and became the headquarters of the board of underwriters. In 1774 the institution removed to rooms in the Royal Exchange. It was incorporated by act of Parliament in 1871. The name is now applied generically to similar institutions elsewhere, the most celebrated of which are the Austrian Lloyd at Trieste (established 1823 by Baron Bruck) and the North German Lloyd at Bremen. *Lloyd's List* was printed as a weekly from 1716 to 1800, since which time it has appeared daily, with the fullest shipping intelligence. Besides this various works are published by the corporation for the benefit of the mercantile community, including *Lloyd's Weekly Shipping Index*, *Lloyd's Confidential Index*, and the *Mercantile Navy List.* The Austrian Lloyd has a journal, established in 1834. See F. Martin's *History of Lloyd's* (1875).

Loach [from Fr. *loche*]: a name given to fishes of the family *Cobitidæ*, which is related to the carp family (*Cyprinidæ*). There are no representatives of the group in America. In England there are two species—*Cobitis tænia* and *Nemachilus barbatulus.* The *Nemachilus barbatulus*

or common loach, a European fish of the family *Cobitidæ*, is sometimes used as food. It lives at the bottom of clear

The loach.

streams. The lake loach (*Misgurnus fossilis*) of Central Europe buries itself in mud, and has a bad flavor.

Loadstone [*lode*, *load* (< O. Eng. *lād*, way, journey, carrying, related to the verb *lead*) + *stone*]: the natural magnet, a mineral consisting essentially of magnetic iron ore, which is a compound of the peroxide and protoxide of iron. It strongly attracts the magnetic needle, but does not itself always possess polarity.

Loam [O. Eng. *lām* : Germ. *lehm* (from Low Germ., for High Germ. form *leim*), clay]: a mixture of sand and clay, with an addition of about 5 per cent. lime and some animal and vegetable matter. A loamy soil is intermediate in character between sandy and clayey soils, and is that best adapted to general agriculture. It is lighter and warmer than a clay soil, and stronger and more retentive than a sandy one.

Loan [O. Eng. *lān*, deriv. of *lēon*, lend : Germ. *leihen*, lend : Goth. *leihwan*, leave < Teuton. *lihwan* < Indo-Euro. *liq-* > Gr. λείπειν, λιπεῖν : Lat. *lin'quere*, leave]: in law, either (*a*) a delivery of a chattel, as, for example, money or stock, by one person to another for the use of the latter, for which an equivalent, usually in kind, is to be returned at a future day; or (*b*) the species of bailment technically called *commodatum*, which consists in the delivery of an article to another for his gratuitous temporary use, on condition that the identical article delivered shall be returned to the lender.

I. If the loan be of the first kind the lender may bring an action in a court of law for the recovery of damages equal to its value, or of the sum agreed to be given in return, if default be made in rendering the equivalent at the time appointed according to the terms of the agreement; but the thing itself agreed to be given in return can not be obtained by action in a court of equity, except in certain cases where the recovery of money damages only would work injustice, or where the amount of damages can not be ascertained. (See Specific Performance.) Interest will usually be recoverable upon the value of the article loaned from the time of default. Loans of this kind are sometimes made with intent to evade the laws against usury; but, as usury statutes generally apply to loans of wares, merchandise, or other commodities, as well as of money, if the intent of the parties to a loan and the effect of the transaction are to violate the usury laws, the same penalties will be incurred as in the case of a loan of money. A loan of stock to be replaced by the same number of shares, however, will not be usurious, though the value of the stock may be subject to great fluctuations; and the same rule would apply in other analogous cases. (See Usury.) The most common loans of this class are loans of money to be repaid in money. The contract for repayment is usually evidenced by a promissory note, bill of exchange, bond, due bill, or other written obligation, although, of course, this is not necessary. In order to establish the relation of debtor and creditor in case of a loan of money, it is not necessary to prove that the defendant requested the loan, but the law presumes that when money is loaned to and received by another without any express agreement for its repayment, a lawful debt is created which may be recovered by an action. See Deposit, Interest, and Statutes of Limitations.

II. In case of a loan of the second kind, the property loaned may be used by the bailee only for the purpose for which it was loaned, and he will be responsible even for the slightest negligence if it be thereby lost or injured or impaired in value, the necessary degree of care in each case varying with the nature of the property loaned and the circumstances of the loan. If injury or loss be occasioned by inevitable accident, sudden disaster, theft, burglary, or other cause which could not be anticipated or provided against, the bailee will incur no liability, but the loss will fall upon the bailor. The gratuitous loan creates a trust relation of a personal nature, and the article loaned may be used only by the bailee in the absence of any special agreement to the contrary, or of an express or implied license by the owner that some person may use it. Thus it has been held that the loan of a horse to a person for him to ride did not justify him in allowing his servants to ride. The property loaned is to be returned to the owner at the expiration of the time agreed upon, or, if no such stipulation be made, at the expiration of a reasonable time; and if the bailor then refuses to deliver it on a proper demand being made, he is guilty of conversion, and may be sued in an action of trover for the value of the goods or in an action of replevin for the recovery of the goods themselves. (See Conversion, Trover, and Replevin.) He can not detain the property as a pledge for any demand he may have against the bailor. See Addison, Story, and Parsons *On Contracts*, and Story and Schouler *On Bailments*. F. Sturges Allen.

The Roman Law of Loans.—The Roman law distinguishes two forms of the loan, viz., the loan for use (*commodatum*) and the loan for consumption (*mutuum*). (1) *Commodatum* does not transfer ownership; it is understood that the very thing lent is to be restored to the lender. This form of loan is therefore limited to such things as can be used without being used up. Real property can be thus loaned, as well as movables. (2) *Mutuum* transfers ownership; it is understood that not the specific things lent, but an equivalent quantity, shall be restored. This form of loan is therefore limited to things that take their value (*functionem recipiunt*) from quantity; that belong to a class (*genus*) in which all the single objects are of equal value, so that the lender has no interest except in receiving the same "measure, weight, or number" that he has lent. Among such things the Romans classed money, wheat, wine, oil, etc. Mediæval jurists described these things as "fungibles"; modern jurists call them "representative" or "generic" things.

Both of these loans are in principle friendly, and therefore gratuitous. *Mutuum* does not carry with it any responsibility for interest, even in case of default. If interest is to be paid, it must be expressly stipulated. *Commodatum* does not even tolerate payment for the use of the thing loaned. If such payment is promised, the contract is no longer loan, but hiring (*locatio-conductio*).

Nearly related to *commodatum* is *precarium*. It differs from *commodatum* principally in that the thing loaned *precario* can be demanded by the lender at any time, even before the purpose is accomplished for which it was borrowed. See License.

Closely related to *mutuum* is the so-called "irregular deposit." The regular deposit is a transfer for safe-keeping. It is not a transfer of ownership; the specific things deposited are to be returned. It is in no sense a loan, for the things deposited may neither be used nor consumed. If now money (or other generic things) be deposited, and if the parties agree that the depositee may use the deposit and shall be responsible only for an equivalent amount, the contract is apparently *mutuum*; but the Roman jurists decided that in such cases the amount could be recovered *as deposit*. The principal reason for this decision was that in the action of deposit the referee (*judex*) could condemn the defendant in whatever sum was due *ex fide bona*, including interest informally promised and interest on default (*ex mora*). If, on the other hand, no interest was to be paid, the claim for money deposited was a privileged claim, i. e. the depositor was entitled to be satisfied before other creditors in case of the insolvency of the debtor. This rule was especially important when, as was often the case, money was deposited with a banker (*argentarius*).

In all cases of loan a real contract (*obligatio re contracta*) comes into existence with the delivery of the property lent. In the case of *mutuum* and the irregular deposit, the liability of the borrower is absolute; in the case of *commodatum*, he is liable for any loss or damage occasioned by his willful wrong (*dolus*) or negligence (*culpa*); in the case of *precarium*, he is responsible only for willful wrong. In certain cases counterclaims might arise against the lender. These were enforced by an *actio contraria*.

Loans to a person under paternal authority (*filius familias*) were not recoverable, even when the borrower was of full age, unless the father approved or ratified the contract. Such loans were of course praetically "post-obits."

Loan in the European Codes.—Modern European legislations have retained, for the most part, the distinctions and rules of the Roman law. The loan for use (*commodat*, *prêt à usage*, *Gebrauchsleihe*) is distinguished from the loan for

consumption (*prêt de consommation, Darlehen*). *Precarium*, however, is ordinarily treated as a special form of loan for use, differing from the ordinary loan for use only in being revocable at the lender's pleasure. *Mutuum* and the irregular deposit have practically been fused into a single legal institution. As regards interest informally promised and interest in default, the rules governing the loan for consumption are those of the irregular deposit; but the priority attached to the latter claim is not recognized in modern laws of bankruptcy. In many codes, therefore, the irregular deposit is either ignored or expressly declared to be an ordinary loan for consumption. Some writers, however, still maintain that the irregular deposit (especially the bank deposit) is a different thing from the ordinary loan of money. They assert that the deposit is characterized by a different intention; that the element of safe-keeping enters into it; and that there is therefore an advantage to the depositor that does not exist in the ordinary loan.

LITERATURE.—Durif, *Le Prêt à Intérêt* (Paris, 1877); Huschke, *Lehre vom Darlehen* (Stuttgart, 1822); Höhne, *Theorie des Leihvertrags* (Berlin, 1886); Niemeyer, *Depositum Irregulare* (Halle, 1889); von Schey, *Das Darlehen* (Vienna, 1890). MUNROE SMITH.

Loan and Building Associations: See BUILDING AND LOAN ASSOCIATIONS.

Loanda, or **Luanda**: See ST. PAUL DE LOANDA.

Loan'go Coast: the southwest part of the French Congo coast-line extending from 5° S. lat. about 100 miles N. W. It was the sea-front of the former province of Loango of the native empire of Congo lying chiefly S. of the Congo river. It was acquired by France (1883) through S. de Brazza's treaties with the chief of Loango and other native rulers. The Kwilu is the only considerable river, but far from the sea is not available as a trade-route. The most important place is Loango, which is visited by French, British, and German steamers, and does a fair business in rubber, palm oil, and ivory. It is little more than a collection of European trading-factories, though when it was under native control it had a population of about 15,000. Its importance is due to a sharp bend in the coast, sheltering the roadstead from the prevailing winds. C. C. ADAMS.

Lobau, lō'bow: an island in the river Danube; 6 miles below Vienna. It was taken by Napoleon I. May 19, 1809, occupied by the French army after the battle of Aspern, May 22; was the place whence the invading forces were concentrated in June, and where the celebrated passage of the Danube was made July 4 and following days, 1809. This island gave the title of count to Gen. Mouton, one of the French heroes of the campaign.

Lobau, lō'bō', GEORGES MOUTON, Count de: marshal of France; b. Feb. 21, 1770, at Phalsbourg, France; enlisted as a volunteer in the army in 1792; became aide-de-camp to Meusnier in 1793 and to Joubert in 1798. He took part with Masséna in the defense of Genoa, and was severely wounded in a sortie. Returning to France after the capitulation, he was made a member and later an officer of the Legion of Honor by Napoleon, who appointed him general of brigade and his aide-de-camp in 1805. Thenceforth he took part in all the important campaigns of the empire, distinguishing himself at Jena, at Friedland, and under Bessières in Spain, where he commanded a division. His title, Count of Lobau, was won in the campaign against Austria for the services which he rendered during the occupation of the island of Lobau, and for the storming of Essling, in the battle of Aspern. He was rough and blunt, but courageous and skillful. After the Russian campaign he was at the head of the organization of a new French army, and in the battle of Waterloo he commanded the Sixth Army-corps on the right wing. After the Restoration he was banished from France, and not allowed to return until 1818. In 1828 he was elected a member of the Chamber of Deputies, and he took a prominent part in the revolution of 1830, assumed the command of the national guard instead of La Fayette, was made a peer and marshal in 1831, and put down with great success the uprisings of 1832 and 1834. D. in Paris, Nov. 21, 1838. F. M. COLBY.

Lobby [viâ O. Fr. or Late Latin from Germ.; cf. O. H. G. *louba* > Mod. Germ. *laube*, bower, arbor]: the body of persons who, not being members of a legislature, are engaged in influencing legislators to vote for or against particular measures that come before them. This meaning is doubtless due to the fact that persons who wish to consult legislators are often to be met in the vestibules or lobbies of legislative chambers. Although the word is more often used in an evil sense, it is of course true that much of the influence exerted by lobbyists is entirely legitimate.

The *causes of the existence of the lobby* in connection with nearly all legislative bodies become evident on brief consideration. (1) The legislator needs the advice and assistance of specialists to enable him to form an intelligent judgment on very many of the questions that come before him for action. (2) The system of legislation in vogue in the U. S., under which all bills are referred to small committees for consideration before they are brought for final action before the full Legislature, furnishes a favorable opportunity for lobbying in the vicious sense of the word. (3) Under the U. S. system of legislation, bills that are purely local or private in their nature usually follow the same course as public bills, instead of being treated semi-judicially as in England. (See LAWMAKING, METHODS OF.) Consequently, it is often possible for an individual or for a corporation that has great interests at stake to push a measure quietly through before its real nature has been discovered. (4) For the same reason, a dishonest legislator may bring in a bill that if passed would seriously injure some corporation, and force the latter to pay him to drop the measure. A different system of treatment of private bills would enable such a corporation to expose the real nature of the injurious bill and the motive of the legislator more efficiently than is possible under the present system.

The *methods of the lobby* while, of course, almost numberless, will still vary more or less with the position and character of the lobbyist. At times members of the Legislature themselves will undertake, for pay, to carry measures through. They may employ, in addition to the methods used by others, that of "log-rolling," i. e. they may agree to vote for or against certain bills favored by other members in exchange for a vote given as they wish. Only members, too, can make to advantage a "strike," i. e. the introduction of an injurious measure for the purpose of being paid to drop it. Ex-members often make dangerous lobbyists from their complete acquaintance with legislative methods and men. The most dangerous, because most successful, lobbyists, however, are those ex-members or others who make it their regular business for pay to aid or hinder the passage of any measure whatever at the will of their patrons. Such men in the course of years come to know all the details of legislative business; they are personally acquainted with all the legislators, knowing their history, character, habits of life, and how best to secure their favor. As soon as a new member is elected, his record and life and personal character are studied, and the lobbyist soon learns what are the most effective means of influencing his vote. These means will, of course, vary with the individual; and they range all the way from bare-faced bribery, threats of exposing some past mistake or crime, or of preventing a re-election, to the most subtle and indirect methods of influencing the mind. Articles are written for the papers, letters and telegrams are secured from constituents, social attentions are lavished upon the legislator, loans of money are made him, entertainments are provided for him, anything is done that will probably affect his vote for or against, as may be desired.

The *remedies* for the evils of the lobby are difficult to find, because these evils consist in the abuse of privileges which must be granted in order to secure the most effective legislation, as the privilege of ready access to legislators to recommend new laws or give needed information. The experience of legislative bodies, however, seems to have established the following propositions: (1) It is clear that the separation of private measures from public, so far as is possible, and the treatment of the former in a semi-judicial manner, with full notice to all parties interested to appear to defend or oppose the measures, with due safeguards against hasty or secret legislation, would remove a large part of the evil. (2) The evil sometimes works its own cure in part. In New York, after the exposure of the Tweed corruptions, members were very fearful of being suspected of corruption, and to this day the report that a bill has money behind it is enough to cause many timid members to vote against it with little regard for its merits. (3) Of course, every measure or change in public sentiment that tends to raise the character of the legislators intellectually or morally lessens the evil influence of the lobby. (4) In many States of the U. S., in order to lessen the evil, the constitutions have restricted in many ways the power of the

Legislature, by forbidding special acts, charters, etc., and severe laws have been passed against bribery in any form. In California and Georgia lobbying is punishable as a felony, and a legislator if found guilty of taking a bribe is punishable as a felon, disfranchised, and forever disqualified from holding any office of public trust. (5) The Massachusetts Legislature has passed a law by which every promoter of any law in the interest of others is registered and known as the regularly employed attorney or lobbyist. Failure to register on the part of such an attorney is severely punished. The publicity thus obtained has seemed to give respectability to the work, and to have encouraged corporations and persons interested to secure the services of persons who would employ honest means only. See CRÉDIT MOBILIER and LAW-MAKING, METHODS OF.

AUTHORITIES.—Spofford, article *Lobby* in Lalor's *Cyclopædia of Political Science*; Bryce, *American Commonwealth* (vol. i., p. 673; vol. ii., p. 124, 129); H. C. Tanner, *The Lobby and Public Men, passim*; and *Report of United States Railway Commission* (p. 84), *First Report of Interstate Commerce Commission* (p. 7). As illustrating methods of work of the lobby may be cited various novels, e. g. Hamlin Garland's *A Member of the Third House* and Frances Hodgson Burnett's *Through One Administration*.

JEREMIAH W. JENKS.

Lobeck, CHRISTIAN AUGUST: Greek scholar: b. in Naumburg, Germany, June 5, 1781; was privat docent at Wittenberg 1802; conrector 1808; rector of the Lyceum 1809; professor extraordinary 1810; professor ordinary and librarian at Königsberg from 1814 till his death, Aug. 25, 1860. He is especially noted for his contributions to Greek grammar and mythology. His principal writings are *Paralipomena grammaticæ* (2 vols., 1837); *Pathologiæ sermonis Græci prolegomena* (1843); *Aglaophamus* (2 vols., 1829), in which his treatment of the Orphic sect is particularly valuable, its origin, doctrines, and history being traced out with great learning and acumen. We owe to Lobeck an excellent commentary to the Ajax of *Sophocles*. See *Biogr. Jahrb. xxxii.* (1882) p. 233 f.; Bursian, *Geschichte der class. Philologie in Deutschland*, pp. 572–575, 711–713. ALFRED GUDEMAN.

Lobeira, lō-bay'ĕe-răă, VASCO, de: Portuguese soldier and the reputed author of the famous romance AMADIS OF GAUL (*q. v.*). Little is known of his life. The chronicler Fernam Lopes informs us (*Chronica del Rey D. João I.*, p. ii., cap. 39, p. 97) that after the battle of Aljubarrota (1386), in which he fought, he was knighted by John I. The same writer (*Chronica de D. Fernando*, cap. 177) speaks of him as being already a knight in Elvas in the reign of Ferdinand IV. The contradiction has never been explained in a satisfactory manner. The currently accepted year of his death, 1403, rests upon no sure evidence whatever. No Portuguese version of the *Amadis* romance is in existence, and many scholars have doubted whether there ever was one. The latest, and in many ways the most plausible, theory on the subject, however—that of Carolina Michaëlis de Vasconcellos (in Gröber's *Grundriss der romanischen Philologie*, II. Bd., Abt. 2, p. 216 *seq.*, 1894)—supposes that the real author of the story was the great-grandfather of Vasco de Lobeira, João Pires Lobeira, who was a Galician troubadour living before and during the reign of the famous monarch, D. Dinis (1279–1325). In favor of this view is the fact that we have from this Lobeira a poem dealing with an episode later appearing in the *Amadis*. The confusion of the names is easily accounted for. The transference of the story to Spain is also explicable on plausible grounds. In various ways both João de Lobeira and the *Amadis* are connected with the Infante D. Affonso de Portugal, brother of D. Dinis (b. 1263; d. 1312); but this D. Affonso was married to the Spanish princess Violante Manuel, sister of D. Juan Manuel, one of the most distinguished statesmen and writers of his time. Through the latter and his friends it would be easy for the romance to become known at the Spanish court.

A. R. MARSH.

Lobel', MATTHEW (Lat. form LOBELIUS): botanist; b. at Lille, Flanders, in 1538; studied medicine at Montpellier; settled in England before 1570; made extensive botanical collections in England; devoted himself especially to vegetable physiology and the correction of errors made by Dioscorides; published *Stirpium Adversaria Nova* (London, 1570), containing nearly 1,300 species, with 272 small figures; *Plantarum seu Stirpium Historia* (Antwerp, 1576); *Icones Stirpium* (Antwerp, 1581); and a treatise on *Balsams* (London, 1598). D. at Highgate, London, Mar. 2, 1616.

Lobe'lia [named by Plumier in honor of Matthew Lobel, botanist to King James I.]: a genus of plants of the natural order *Lobeliaceæ*, of which the most important species is the *Lobelia inflata*, or Indian tobacco, as it is commonly called. This is a very common indigenous annual or biennial herb, growing wild in waste spots throughout Canada and the U. S. It has a fibrous root, and a solitary straight hairy stem rising about a foot high. The flowers are small and of a light-blue color; the leaves oval, serrated, and hairy. The entire herb, dried, is used in medicine under the name *lobelia*. Its properties depend on an alkaloid, *lobeline*, which is a thick, oily, transparent, volatile fluid, with a pungent taste resembling tobacco. Lobelia is a powerful nauseating emetic, producing in full dose an effect like that of tobacco—long-continued, distressing nausea and vomiting, with purging, copious sweating, and great muscular relaxation. In overdose it is a potent acro-narcotic poison. Lobelia is too severe an emetic to be used to produce vomiting, and its medicinal employment is in non-emetic doses as a relaxing agent in asthma and allied spasmodic diseases. If given at all as an emetic it should be used in one full dose rather than in several small ones, since under those circumstances vomiting takes place before enough is absorbed to cause serious symptoms.

Revised by H. A. HARE.

Lobelia cardinalis: scientific name of a species of lobelia, popularly called the cardinal flower, from the intense red color of the blossoms. It is the most showy of the species indigenous to North America, and is prized in cultivation. The low and bright-blue flowered lobelia, largely used as a bedding-plant, is *L. erimus*, from the Cape of Good Hope.

Loblolly Bay: See GORDONIA.

Lob Nor (LOB LAKE): a body of water in Eastern or Chinese Turkestan, just W. of 90° E. lon. from Greenwich. The fertile oasis it occupies is bordered on the S. by the Altin-tag range and surrounded on all other sides by the Gobi Desert. Known for centuries through old travelers and Chinese writers and map-makers, the first European to visit it in modern times was Prejevalsky (1876), who found that it is a reedy lake of no great depth, bordered by flat shores, the haunt of immense numbers of water-fowl, and inhabited by a few hundred human beings whose habits, tenements, and mode of life resemble those of the primitive lake-dwellers. It has no outlet, but its waters are quite sweet at its western end, where it receives the Tarim river. Gradual desiccation, assisted by the withdrawal of much water for irrigation purposes, presages the complete disappearance of the lake, which is now (Bonvalot, 1891) little more than a marsh.

C. C. ADAMS.

Lo'bo, FRANCISCO RODRIGUES: Portuguese poet. Almost nothing is known of his life; the date of his birth is nowhere preserved, and that of his death (by drowning in the Tagus) can only be fixed as somewhat after 1623. He was a native of Leiria, and seems to have been in the *entourage* of the Duque de Caminha. He is said to have studied at Coimbra, and then to have passed his life in comparative retirement at Leiria, occasionally paying a visit to Lisbon. By Portuguese critics he is acknowledged as one of the best of their writers. Coming at the beginning of the seventeenth century, a period of literary decay in Portugal, he still preserved the strength and beauties of the preceding century. He felt the influence of contemporary Spanish poetry, notably that of Góngora, and he was familiar with the work of the Italians; but he also loved the traditional and popular verse of his native land, and his greatest successes were obtained in his *Serranilhas*, in imitation of the naïve charm of this art. We have from him *Romances: Primeira e segunda parte* (with two exceptions written in Spanish; Coimbra, 1596); *A Primavera* (Lisbon, 1601); *As Eclogas* (Lisbon, 1605); *O Pastor peregrino: segunda parte da Primavera* (Lisbon, 1608); *O Desenganado: terceira parte da Primavera* (Lisbon, 1614). Also an attempted epic, *O Condestabre de Portugal* (1610), and an imitation in mingled verse and prose of Castiglione's *Cortegiano*, entitled *Côrte na Aldéa, e noutes de inverno* (Lisbon, 1610). The latter was long regarded as Lobo's masterpiece. The *Obras politicas, moraes e metricas de Francisco Rodrigues Lobo* were printed in Lisbon in 1723 (later, less complete edition, Lisbon, 1774).

A. R. MARSH.

Lobo, JERONIMO: missionary; b. at Lisbon about 1593; entered the order of the Jesuits in 1609, and went in 1622

as a missionary to Goa, whence he proceeded to Abyssinia in 1624. Here he worked with great success, but was at last expelled in 1634, and returned to Portugal to persuade the Christian powers to make a crusade against Abyssinia. Having failed in this, he went once more to Goa in 1640, whence he returned in 1656, and died at Lisbon, Jan. 29, 1678. Lobo wrote a narrative of his travels, which made a great sensation, and was translated into many foreign tongues—into French in 1673 and more fully by the Abbé Legrand in 1728, and into English by Dr. Johnson (1735).

Revised by F. M. Colby.

Lobo'sa [Mod. Lat., fr. Gr. λοβός, a lobe]: a sub-class of Protozoa belonging to the Rhizopoda, and characterized by the power of protruding lobe-like processes of protoplasm (pseudopodia). There is no cell-wall to these single-celled organisms, but in the protoplasm one can distinguish a clear outer layer gradually passing into the more granular central portion. A nucleus is always present, and there is frequently a clear space (contractile vacuole) which rhythmically expands and contracts, and is supposed to be for the excretion of nitrogenous waste. A few species, like the *Amœba*, are naked, but the majority form protecting cases, either as in *Arcella* by a hardened secretion of the body or, as in *Difflugia*, by cementing together grains of sand, etc. *Amœba* is possibly the best known member of the Protozoa. All of the Lobosa are microscopic, and most of the species occur in fresh water, only a few being found in the sea. The American species have been beautifully monographed in Leidy's *Fresh-water Rhizopods*, published by the U. S. Geological Survey.

J. S. Kingsley.

Lo'bos Islands [Span. *lobo*, seal], or **Seal Islands**: three small islands off the coast of Lambayeque, Peru, between 6° and 7° S. lat. The Lobo de Tierra is 12 miles from the mainland; the other two are about 35 miles out. They are rocky, but of no great height, and have a small population. They are important for their extensive deposits of guano, being among the few of the Peruvian guano islands which are not exhausted.

H. H. S.

Lobster [O. Eng. *loppestre*, perhaps corrupted from Lat. *locus'ta*, locust, shell-fish, lobster; cf. O. Eng. *lopust*, locust]: one of the largest and most valuable of all *Crustacea*, and second only to the oyster as an article of food among the marine invertebrates of the North Atlantic coast. It is classified with the *Macroura*, a sub-order of the *Decapoda*, which embraces lobsters, crayfishes, and shrimps. The European lobster, *Homarus vulgaris*, has its chief habitat on the southwestern coast of Norway, but is found throughout the British islands, on the coast of Iceland, and in the Mediterranean. It does not go into the Baltic. The langouste, or spiny lobster, *Palinurus vulgaris*, abounds in the Mediterranean, but is rare in the Atlantic. The Norwegian lobster, *Nephrops norvegicus*, is common in Norway, but less abundant on the coast of Sweden. It occurs sparingly in the British islands and in the Mediterranean Sea. The North American lobster, *H. americanus*, which is more important economically than all the preceding, is found in the coastal waters of the Atlantic Ocean from Labrador to Delaware, and in depths extending from the shore-line out to 100 fathoms.

The extreme northern limits of the North American lobster are the Straits of Belle Isle. Nova Scotia, Prince Edward Island, Newfoundland, New Brunswick, and Maine constitute the great lobster-producing territory of the Atlantic coast. A few lobsters have been detected as far S. as Johnstown, Va., and in 1884 the U. S. Fish Commission steamship Albatross obtained a good-sized specimen off Cape Hatteras, N. C., from a depth of about 30 fathoms. The lobster is a sedentary animal, its only migrations being to and from deep water. The spring movement toward shore occurs in April or May, when the temperature of the water has reached about 55° F., and the fall migration in October or November.

In Maine the summer fishing begins in May and lasts until November. During this time lobsters are caught in 3 to 10 fathoms of water. The winter fishing is conducted in 35 to 40 fathoms.

The lobster never swims at the surface of the water, but crawls or walks on the tips of its thoracic legs. By means of the flexible part of the body or "tail," it is able to dart backward with great rapidity, sometimes going 25 feet in less than a second. Its food consists of shell-fish, especially clams, fish, and all kinds of dead animals.

The sexes appear to be about equally divided. The female reaches maturity when from 8 to 12 inches long. Adult females produce eggs once in two years. The spawning period is mostly confined to June, July, and August, but it is a remarkable fact that a certain number (probably not large) lay eggs in the fall, winter, and spring months. The extruded eggs are attached by a viscous cement, which hardens in the water, to the swimming legs and to the under side of the tail. In this position they are carried about by the female, and are aërated by the fanning motion of her swimmerets for a period of from ten to eleven months, when the young are hatched and immediately dispersed. The latter rise to the surface, and begin life as free-swimming larvæ. At Wood's Hole, Mass., the majority of eggs always hatch in June; farther N. the hatching period is a little later, and a few may be hatched in the fall. The hatching of a single brood lasts about a week. Shortly after the hatching of her young the mother lobster molts, but does not produce eggs again until the following summer. The eggs are usually of a dark-green color, spherical, and measure about $\frac{1}{16}$ of an inch in diameter. Their number varies with the size of the animal producing them—from 3,000 to over 80,000. The law of production of ova may be expressed as follows: *The numbers of eggs produced by female lobsters at each reproductive period vary in a geometrical series, while the lengths of the lobsters producing these eggs vary in an arithmetical series.*

According to this law we have the following:

Series of lengths:	8 :	10 :	12 :	14 :	16
Number of eggs:	5,000 :	10,000 :	20,000 :	40,000 :	80,000

The adult lobster often falls a prey to fish of many kinds, such as the pollock, striped bass, and tautog, the sharks, rays, and skates. The cod and striped bass are perhaps its most formidable enemies, excepting always man, especially when it is young or in a soft condition. The pernicious destruction of spawn lobsters by fishermen and canners has been instrumental in hastening the decline of the fishery.

The lobster, like other arthropods, is surrounded by an external skeleton, which is a dead, inelastic product, and must therefore be cast off periodically in order to admit of growth. The frequency of this exuviation or molting depends upon the age and nutrition of the animal, and is the register of its growth. During the first four months of its life the lobster molts from eight to ten times, the adult female probably not oftener than once in two years, and the giants weighing upward of 20 lb. at much longer intervals. Hard-shell lobsters have the finest flesh, stand transportation best, and are therefore most valuable for the market. A large proportion of all lobsters taken in fall, winter, and spring are of this kind. The greatest number of soft-shell or new-shell lobsters appear from July to October. When the critical time has arrived the lobster turns over on its side, distends the membrane between the tail and the shell of the back until this finally bursts, and the whole body is then slowly drawn through the opening thus formed. The carapace is lifted up, the appendages are freed gradually from their old covering, and the tail comes out last. The old shell is thus discarded whole, the internal parts of the skeleton, including the lining of the stomach and intestine, being simply withdrawn from the folds in the external skin in which they are formed. This process occupies five or six minutes. Immediately after the molt the lobster is limp as wet paper, and perfectly helpless. The process of hardening of the new shell is very gradual, and it requires about two months to produce a shell as hard as the one cast off. Rubber shell, buckle shell, paper shell, and shadow are some of the names in use to designate lobsters with new soft shells. A store of lime is secreted during the molting period by the walls of the stomach in the form of two nodules, each about the size of a filbert. After molting these gastroliths are retained in the stomach, where they are absorbed. Young lobsters sometimes fill their stomachs with calcareous particles, such as fragments of mollusk-shells, immediately after molting, in order to obtain a large supply of lime for the hardening of the new shell. An adult lobster increases in length after molting from $\frac{3}{4}$ of an inch to $1\frac{1}{2}$ inches.

When the young lobster hatches from the egg it is about one-third of an inch long. It probably keeps near the surface, where it feeds on microscopic organisms. In two weeks it has molted four times. When three to four weeks old it molts again, and soon after goes to the bottom. It now has the general external appearance and many of the habits of the adult. The largest lobsters caught are invariably males, and attain a weight of probably not over 30 lb. One of the

largest with an authenticated record, in the museum of Adelbert College, Cleveland, O., weighed when alive between 27 and 28 lb. There is no constant relation between the length and weight of a lobster, on account of the variation in the size of the claws. A 10½-inch lobster will weigh about 1¾ lb.

The extruded eggs of the lobster when in an advanced stage of development may be successfully hatched by artificial means, and the young lobsters liberated. As no successful method of rearing the young lobster until it has passed its free-swimming stages and goes to the bottom has yet been devised, little good can be accomplished by this method on account of the enormous death-rate of the young. Not over two in every 10,000 eggs hatched survive and reach the adult state under present conditions.

Attempts to transport lobsters across the continent alive and plant them in the Pacific Ocean have been made by the U. S. Fish Commission: 590 lobsters, many of them egg-bearing females, have been safely planted on the Pacific coast. No evidence has yet appeared to show that the lobster has multiplied and thriven in this new environment.

Lobster-fishery.—As early as 1810, according to Rathbun, some fishing was done at the Elizabeth islands and in Connecticut, but the fishery in North America appears to have been first started on Cape Cod. While the lobster formed an important food-supply to the inhabitants of the New England coast in colonial times, the fishery did not become a distinct industry until about 1840, when it had extended to the coast of Maine. Here and in the Maritime Provinces this important industry has reached its greatest proportions. It is unfortunately in a decline, due to overfishing. The growth of the fishery was correlated with that of the canning industry, which is said to have been introduced from Scotland into the U. S. shortly after 1840. While in 1850 there were only 3 canneries in the U. S., in 1880 there were 23 in the State of Maine. In 1892 there were 212 canneries in Prince Edward Island alone, 186 in the province of New Brunswick, 46 in Quebec, and 182 in Nova Scotia.

Legislation for the protection of the lobster, however vacillating and unfounded on scientific knowledge, has probably helped to stay the decline of the fishery. In Maine (laws of 1893) it is unlawful to destroy female lobsters with extruded eggs, or lobsters less than 10½ inches long, from July 1 to May 1 following. In May and June the legal limit is set at 9 inches (measured from rostrum to end of tail-fin). Canning is allowed only between Apr. 20 and July 1 following, and no lobsters must be preserved under 9 inches in length. Somewhat similar laws are in force in the other States and in the British provinces.

Lobsters are caught in pots or traps made of laths with a funnel-shaped opening at either end. The pots are weighted with stones, and set either in single warps or in trawls of eight to forty pots each. The traps are baited with refuse fish, and the lobster, when once inside the pot, seldom escapes unless small enough to crawl between the slats. It has been estimated that half a million lobster traps have been used in the Maritime Provinces in a single year.

The pots are tended from small boats, and the catch is kept in floating "cars," moored in some protected spot near the shore. Welled fishing-smacks gather the lobsters from the fishermen and carry them to the canneries and to the large distributing centers, such as Portland, Boston, and New York. The lobsters are shipped alive in barrels, with ice in summer, to all parts of the U. S. Large quantities are immediately boiled for home consumption. The impounding of lobsters in large inclosures of salt water, where they can be kept during the winter, and taken up when needed for market, is now successfully practiced on a large scale. When lobsters are prepared for food the stomach, or "lady," and intestine must be removed. No other parts of the lobster are poisonous under ordinary circumstances. The "coral," or ovaries, and "tomally," or liver, are highly esteemed by epicures.

The average annual yield of the Norway lobster-fishery from 1879–84 is said to have been 1,175,000 lobsters, valued at $107,468, the greater portion being shipped to Great Britain. About 3,000,000 lobsters are said to be taken in Great Britain in a year, while on the shores of Prince Edward Island alone 26,000,000 lobsters were captured in 1885. The total number of lobsters caught in New England in 1887 was 1,960,939; total value, $120,307. The New England lobster-fishery in 1889 yielded 30,449,603 lb., valued at $833,736. The percentage of lobsters caught in the different New England States for the same year was: Maine, 68·86; New Hampshire, ·77; Massachusetts, 17·81; Rhode Island, 2·59; Connecticut, 9·97. More people were said to be engaged in Maine in the capture of lobsters than of any other single product, and the value of the output in 1889 was more than one-fourth of that of the entire yield of the fisheries of the State, being $574,165. *Bulletin United States Fish Commission*, vol. x., p. 108.

The total yield and value of the lobster-fishery of Canada in 1892 was: Cans of preserved lobsters, 12,524,498; value, $1,758,425; tons of lobsters shipped alive or fresh, 6,028; value, $238,300; total value, $1,996,725. Statistics for 1880 for the U. S. (New England, New York, New Jersey, Delaware): Lobster-traps, 147,018; pounds of fresh lobsters caught, 10,934,754; pounds of lobsters canned (in Maine), 9,455,284; value fresh lobsters, $408,005; value canned lobsters, $238,253; total value, $746,258.

In the lobster-fishery we have the anomaly of a declining industry, with a yearly increasing yield, but with a gradual diminution in size of the lobsters caught, and an undue increase in the number of traps and fishermen. As a result, the grounds have in many places been depleted. In Prince Edward Island, in 1879, from three to three and a half lobsters were required to fill a pound can, while in 1888 it required seven. It is said that the business is not profitable when five to six lobsters are required for this purpose. For an account of the lobster and the lobster-fishery, see *The Fisheries and Fishery Industries of the United States*, sect. 1 and 5 (Washington, 1884–87). FRANCIS H. HERRICK.

Lobworm: See LUGWORM.

Local Action (in the voltaic cell): chemical action which does not generate current in the external circuit, and consequently is a source of loss. See BATTERY.

Localization: the act of localizing, or of assigning a definite location or place to something. Specifically (*a*) in medicine, the determination of the site or organ in which physical and morbid processes originate, or the process by which a general physiological or pathological condition becomes concentrated in one particular locality. When pathological it is known as *morbid localization*. (*b*) In physiology and psychology, the principle according to which different regions of the brain and nervous system are concerned with different and exclusive functions, more particularly known as **Cerebral Localization**. Most important consequences flow from this principle in the sphere of brain physiology and anatomy, and also of psychology.

Facts of Localization or Nervous Specialization.—In the two halves or hemispheres of the brain we find a twofold or duplicate organ, analogous to the doubleness of the eyes while performing together a single function. In regard to the function of the brain as a whole, we may say that in the main it is performed equally well by either hemisphere alone. If one hemisphere be entirely removed or destroyed, there is no perceptible impairment of the mind, at least in its greater typical activities. The hemispheres are moreover capable of separate activities at the same time; the movements of organs on the right side of the body, which are governed by the "motor area" in the left hemisphere, may be different from simultaneous movements on the left side, governed by the "motor area" in the right hemisphere. Again, there are certain functions which are presided over by one of the hemispheres exclusively, the other having no part in them: the motor speech-center is in the left hemisphere in right-handed persons, and reversed in left-handed persons; and it is probable that there is a corresponding functional development for the delicate movements of one hand only, as in writing, etc. Accordingly, instead of considering the brain as two duplicate organs, either of which might be educated to perform all the cerebral offices, we have to consider it as a double organ whose functions are partly separate and partly conjoint. That is, the facts point to the conclusion that (*a*) there is a class of functions over which the hemispheres have conjoint dominion: functions which they may perform together and which either may perform alone, and functions which they must perform together and can not perform alone; and (*b*) there are functions which are peculiar to each alone: which one must perform alone, and in which the other has no share.

The great divisions of function may be stated in general terms under three heads in accordance with the facts now presented:

1. Purely reflex functions are presided over by the spinal cord and lower centers.

2. The automatic functions proceed out from the central and tegmental systems of centers beneath the cerebral hemispheres.

3. Sensation and voluntary movement have their seat in man in the cortex of the hemispheres.

If 1 and 2 be considered together as giving only one degree of complexity, and 3 be added as giving another degree, we may show their relation by Fig. 1.

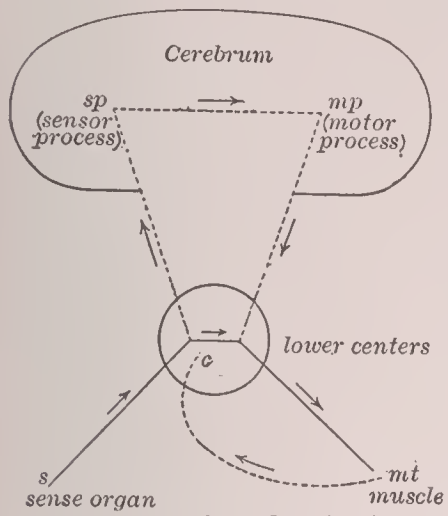


Fig. 1.—*s c mt* = reflex circuit ; *s c sp c mt* = voluntary circuit.

The degree to which the cortex serves the purposes of mind, above the bare reception of present stimuli and mechanical reaction upon them, is seen in the behavior of animals deprived of the cortex. Frogs and pigeons have been fully tested in view of this question. It is found, in brief, that the life and reactions of the creature are unimpaired so far as the *immediate* environment is concerned: it lives, breathes, flies, sees, eats, carries out all reactions of response to direct stimulation; but it fails to respond to remote stimuli: the reactions are for the most part uninfluenced either by the past or the future. The creature lacks spontaneity. Memory has disappeared; so have generalization and purpose. The creature has *sensations*, but not *perceptions*, as far as a line can be drawn between these states. It fails utterly to *recognize*, and it fails to *attend*. It is plain, then, that such a hemisphereless creature lacks largely the co-ordinating, retaining, relating, or, as it is often called, the "apperceiving," function. The terms *psychic*-blindness, *psychic*-deafness, etc., are given to this condition, in which there is no *physical* blindness, etc., but in which sensations have lost their mental *meaning*. As for particular reactions, however, the greatest difference is found in different animals. In dogs and birds many functions are performed by the lower centers which are presided over by the hemispheres exclusively in monkeys and in man. This illustrates the fact that reactions at one time reasonable and intelligent may become nervous and mechanical: and this consideration, based upon extended experimental proof, leads us to recognize the great elasticity of the system as regards specialization. When these maimed animals are kept alive, their condition improves, and they begin to get something of their intelligence back again.

Localization in Special Areas of the Cerebral Cortex.—The question as to whether there are local areas in the cortex or gray matter of the hemispheres which are especially active in the exercise of the sense and motor activities is of great importance for general psychology. Experiments have

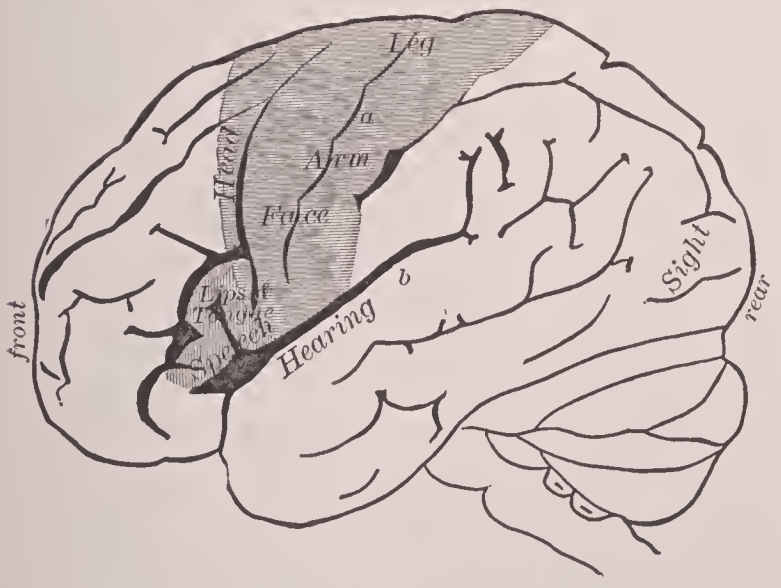


Fig. 2.—Outer surface of left hemisphere of the brain (modified from Exner): *a*, fissure of Rolando ; *b*, fissure of Sylvius.

been very conflicting in their results, but it is now generally admitted that there are a limited number of well-ascertained areas. The motor functions are grouped around the fissure of Rolando (see *a*, Fig. 2), extending roughly from the vertex of the skull downward and forward in a line which passes slightly in front of the orifice of the ear. The centers for the leg, arm, and face are in the order named, proceeding downward. The special muscular groups involved in the finer movements of these organs are distributed on both sides of the Rolandic fissure. Movements of speech have their center for right-handed persons in the third frontal gyre of the left hemisphere. The sensory area comprehends the region lying back of and beneath the motor zone; the fissure of Sylvius (see *b*, Fig. 2) being a rough horizontal boundary between the motor and sensory areas. Of the special senses, sight is located in the occipital lobe, including the so-called angular gyre at the upper end of the Sylvian fissure. The centers for hearing, taste, and smell lie, less exactly, in the temporo-sphenoidal lobe, the horizontal area below the fissure of Sylvius.

In man the destruction of the frontal lobes seems to bring about a higher kind of "psychic blindness": a loss of voluntary attention, co-ordination, and thought. According to a widely current hypothesis these lobes are the final center of convergence for the connections between the sensory and motor centers of the brain. The loss of connection between this seat and any other area cuts the latter with its store of memories off from its full *rôle* in the mental life. For example, speech may be impaired by the loss of any one of three functions located in different areas, i. e. word-seeing, word-hearing, and word-uttering.

One of the most difficult and important questions yet remaining open is the determination of the particular regions which contribute directly to consciousness, i. e. which are sensory. Are we conscious of the motor centers at all, or is all our consciousness of movement, as well as other sensibility, mediated by elements which are only sensory? May sensory areas be also motor? That motor and sensory functions may at least be performed by the same areas is shown by Schäfer and Munk, who find (in opposition to Ferrier) definite movements of the eyes following electrical stimulation of the sight (sensory) center (occipital lobe) in dogs and monkeys. It is possible (Munk) that this center controls reflex eye-movements, and that the eye-movement center in the Rolandic region is the seat of voluntary movements. This view agrees with the suggestion of Bianchi that the ordinary stimulation of the motor areas does not pass directly out to the nerves, but passes first through the sensory centers: a position supported by all cases of sensory effects following the stimulation of motor areas. Beaunis holds that the motor elements have an immediate element of consciousness. Schäfer is led to the position that the visual area represents in some detail a projection of the retina upon the cortex.

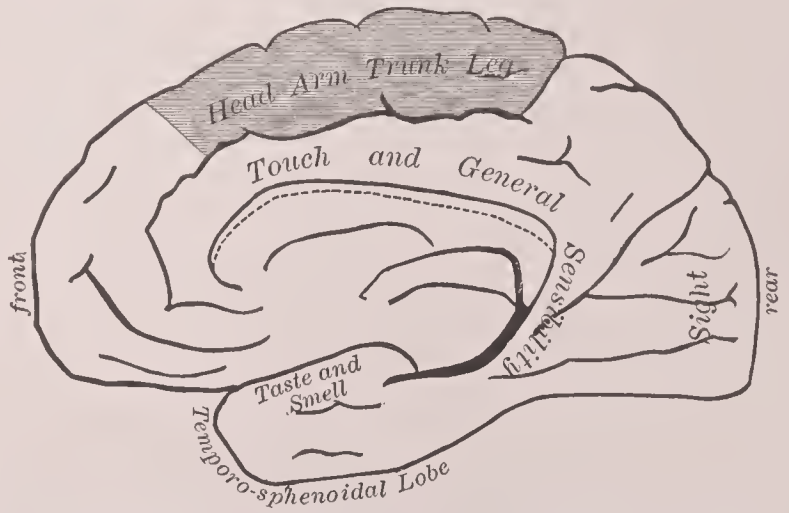


Fig. 3.—Inner (mesial) surface of the right hemisphere of the brain (modified from Schäfer and Horsley). In both figures the shaded area is the motor zone.

Principle of Indifference of Function.—The principle of indifference includes the class of facts which show that the nerve-courses are not the agents of different or specific forces, but parts of a common system and agents of a common life. As a matter of fact, we find that different courses can be made to perform each other's function. If a piece of sensor nerve be joined to a cut end of a motor nerve and grow in place, it will conduct the motor impulse continuously with the motor piece. The contrary is also true. The range of such experiments is very limited, since it is impos-

sible to exchange the end-connections of nerves either centrally or peripherally; but the facts at hand establish conclusively the principle of indifference as regards the sensor and motor nerve-tracts. In its application to the centers the same principle has a different name, since it takes a somewhat different form of manifestation, i. e. the principle of *substitution.*

Principle of Substitution.—The question further arises: Can the nerve-centers be made to take up each other's function? Researches in cerebral localization, chiefly upon animals, tend to show that such a substitution of function is possible, at least to a limited degree. The removal of a cortical center, which occasions loss of one of the special senses, say sight, or the loss of control over a certain muscular area, seems to be made good by the assumption of the deranged function by a contiguous or, at least, a connected center. At any rate, the animal recovers, if kept alive a sufficiently long period. The word "seems" is used advisedly, for it is still uncertain whether the loss of such a function is due to the destruction of the entire apparatus normally reacting to this function or to its partial loss, the remaining elements being temporarily inhibited by so-called "physiological shock," or, in the case of electrical stimulation, by diffusion of the current. The latter is known to be the case in many of the experiments on brain-tissue, especially when the surgical method is employed without the extremest care. This latter view is also supported by the remarkable fact that in the monkey and man these substitutions are exceedingly rare; a result we would expect on the shock theory, considering the higher degree of delicacy and differentiation attained by the system in these higher organisms. Yet in the case of rabbits and dogs such substitution, notably of the sight, is probably established on a firm basis.

Principle of Specific Connection.—The limits which the growth of the organism sets to the substitution of functions find their expression in what is called "specific connection" through the system. By this principle is meant, in general, two things: First, that nerve-courses are specific only according as they have certain well-defined connections at center or periphery. These connections keep the courses to an invariable function. The optic nerve has a specific connection with the retina and with the optic center in the brain; the auditory nerve with the ear and the center for hearing, and so on. In this case it is the end-organ or the center which is specific, not the nerve-tract; and, second, it means that nerve-centers are specific according as their connections necessitate their reacting to a specific stimulus. The optic center has specific connections with the retina through the optic nerve; the center for sounds with the ear, through the auditory nerve, and so on. Now there are as many of these specific connections as there are kinds of stimuli issuing in motor reactions. Consequently, the only specific things after all are the stimulus and the movement. For the bearing of all these facts and principles upon mental theory, see PHYSIOLOGICAL PSYCHOLOGY.

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J. MARK BALDWIN.

Localization, in Space: the mental act or function by which we perceive objects at certain definite localities. The physiological indications by which we do this are called *local signs.* By local signs are meant specific local differences in the arrangement or structure of the elements in the skin and retina. By reason of these differences localities are known to be in the positions they really occupy in space. I refer an excitation to my hand or foot; why do I give it such a reference? Why do I locate a pain in my right hand rather than in my left? Simple sensations, as tastes, sounds, are fused together; but such sensations from neighboring points of the skin and retina preserve their peculiar character and relation to one another, and we distinguish different localities because the sensations from them are really different. The first idea of our own body results from muscular sensations which arise from early movements, and these sensations are vague and confused; yet even here the feeling of extension is present, also vague and confused. Whence comes it? It can only come from initial differences of some kind which are perpetuated through transmission to the brain. These differences, probably in the skin or sensor nerves, and possibly a matter largely of association, afford a datum for the localization of sensations in different portions of the body.

The theory of local signs was first propounded by Lotze, who, however, varied it in its application to different orders of sensation. For sight he made the local sign consist in the fixed amount of muscular movement which any retinal point must undergo to be brought into the line of clearest vision. This is a different and definite quantity for every point in the retina. In the skin the local sign, for Lotze, was the combination of light accessory sensations which are provoked in immediate connection with the point of contact. There would be a varying amount of radiation of stimulus in the skin according to the varying structural consistency of the parts over which the skin is stretched, as bone, muscle, ligament. This hypothesis found development in the more natural position that the local sign was an implanted peculiarity in the structure of the skin itself. A further theory, very widely adopted, and suggested by Czermak, makes the local distinctions in the skin due to the ramifications of the spread-out nerve fibrils, each such nerve-end reacting for its own position and being thus a local sign. This position is most probable. It is supported by the fact that the sensibility of the skin to local differences varies greatly in different parts of the body and may be increased by the fixing of the attention, by exercise, and in the hypnotic state. These latter conditions tend to bring into play finer elements of the ramifying nerve, and thus to diminish the distance between the sensitive points. And the same facts tend to refute the theory that the units of tactual feeling are found in Weber's "circles of sensation."

Besides the general consideration that some such hypothesis as that of local signs is necessary to the case, there is direct evidence of the existence of these signs. The fact of varying local discrimination of the skin has been mentioned; it is also true of the retina. The relative discrimination of localities grows less delicate as we proceed from the center to the edge of the retina. The quality of massiveness or extensity of sensations of touch and sight depends upon the simultaneous independent excitation of units of sensation, and can be accounted for only on the assumption of some characteristic by which these units are kept distinct. If the skin of the forehead be bent down upon the nose and grow there, its irritation is felt still at the forehead. The same is seen in the retina in certain pathological affections, in which the retinal elements are displaced; the irritating points of light falling upon these elements are localized where they would be seen by the healthy eye.

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J. MARK BALDWIN.

Local-option Laws: in general, laws empowering a political division of a state to decide upon a certain measure; in a special sense, laws authorizing the people of each locality to decide for themselves the question of permitting the sale of liquor within its limits. In the U. S. objection has been made to local-option laws as unconstitutional, in that they delegate legislative power to the locality by making their adoption depend upon the popular vote; but this objection has not been sustained by the courts, which have generally held that these laws merely involve the delegation of a power to determine some fact or state of things upon which the law-making body makes or intends to make its own action depend. (See Cooley on *Constitutional Limitations.*) Local option in the matter of the liquor traffic has been advocated in the U. S. chiefly by those who wish to suppress this traffic altogether, but think it easier to fight it in the localities than in the State as a whole. To these are added those who, while not in sympathy with the PROHIBITION (*q. v.*) movement, consider it fair that each locality should bear the responsibility of the continuance or suppression of the traffic within its limits. Acts authorizing local option have been passed by many of the State Legislatures, and its advocates claim that it has been at-

tended with a high degree of success, maintaining that it is more practicable than prohibition by legislative act or constitutional amendment, and less liable to evasion where it has resulted in forbidding the sale of liquors. Where this system has prevailed a large proportion of the localities have prohibited the traffic. Local-option enactments in the various States differ greatly in detail, but as a general rule provide that at stated intervals a certain proportion of the voters of the locality may, upon petitioning the Legislature, secure a special election to decide the question of prohibition. In some States, however, the question is periodically submitted for decision without requiring a preliminary petition. In Great Britain the leader of the local-option movement is Sir Wilfrid Lawson, author of the Permissive Bill, who introduced a local-option resolution in Parliament in 1879, and has since tried in vain to secure to the electors of a locality the power to veto the issue of licenses. The term local option in Great Britain includes schemes for the reform of the licensing system, and for securing to localities a wider range of powers than is demanded by Lawson and the United Kingdom Alliance, as the right not merely to accept or reject, but to regulate completely the liquor traffic within their bounds. F. M. Colby.

Location: See the Appendix.

Lochleven, loch'lee'ven: a small lake in Fifeshire, Scotland; containing an island on which stood the castle noted as the place where Mary Queen of Scots was imprisoned from July, 1567, until her escape, May 2, 1568. The place is now of no military or strategical importance, but was in the sixteenth century a stronghold of the first rank.

Lock [O. Eng. *loc*, inclosure, door-fastening, deriv. of *lūcan*, lock, fasten]: an inclosed mechanism for fastening doors, drawers, lids, etc., by means of a movable bolt; usually operated by a portable instrument called a key, but sometimes by a turning knob or dial.

The ancients, although possessing great skill in many conspicuous arts, do not seem to have distinguished themselves as makers of locks, as clumsiness appears to have been the predominant characteristic of all their locksmithing, or rather lock carpentry, for the evidence accessible indicates that the earliest locks were made of wood, long before skill in the shaping of metals was applied to the construction of such articles. Without doubt, the first lock was made in Egypt, the birthplace and nursery of the arts and sciences. Wooden locks of a rude and primitive design—quite similar to those made 4,000 years ago—are still in use in Egypt and Syria. Thompson states that the steward of the convent on Mt. Carmel opened his magazine with a key as large as a club, reminding him of Isaiah (B. C. 758) xxii. 22, "The key of the house of David will I lay upon his shoulder." This suggests the statement of Callimachus (B. C. 260) who in his *Hymn to Ceres* speaks of the goddess taking the form of Nisippe, her priestess, carrying a "key fit to be borne upon the shoulder." Locks continued to be made large and clumsy for many centuries, for Eustathius, Bishop of Thessalonica (A. D. 1155), tells of keys that were curved like a sickle, and so large that they were often carried on the shoulder.

In the book of Judges, chap. iii. 23–25, we are told that "Ehud (B. C. 1330) locked the doors of the parlor," and that the servants of King Eglon "took a key and opened them." This is the earliest mention of a key in history. Homer's description of the opening of her wardrobe by Penelope is translated by Pope thus:

> A brazen key she held, the handle turned,
> With steel and polished ivory adorned.
> The bolt, obedient to the silken string,
> Forsakes the staple as she pulls the ring;
> The wards, respondent to the key, turn round,
> The bars fly back, the flying valves resound;
> Loud as a bull makes hill and valley ring,
> So roared the lock when it released the spring.

It is clear that this must have been a burglar-alarm lock; and the terribly sonorous character of the alarm is suggestive of possible improvements in the mechanism of modern alarm-locks.

The door-lock used in Egypt, which is the oldest known method for fastening doors, etc., is made of wood to-day precisely as when first invented forty centuries ago, and is a good example of the "persistence of a type" in mechanism. The bolt of the lock is rectangular in cross-section, open at one end, and hollow throughout the most of its length; on the upper surface of the hollow portion of the bolt are several vertical holes communicating with the hollow. The bolt slides in an inclosing box or case of wood secured to the inside of the door; when the bolt is pushed in locking (the key is not required for this operation), so that its solid end enters the mortise in the doorpost, a number of pins (having heads on their upper ends to prevent their falling too far), which occupy holes in the upper part of the bolt-case, drop into the holes in the upper surface of the bolt, and thus prevent its being drawn back without the use of its key—this consists of a flat bar of wood small enough to enter easily the hollow end of the bolt. On the upper surface of this key-bar are fixed a number of vertical pins, placed in the same relation to each other as the holes in the top of the bolt, and of the same height as the thickness of the wood through which they are bored. When this key is pushed as far as it will go into the hollow end of the bolt and then raised vertically, the pins in its upper surface will enter and fill the holes in the bolt, and so raise the pins which secured it in its locked position; then the key with the bolt attached is drawn back, thus unlocking the door. It will be noted from this description that there is no keyhole in the modern sense of the term, but as the lock is secured to the inside of the door, in order to lock it from the outside or use the key for unlocking, there is a round hole cut in the door through which the hand and arm can be thrust for that purpose. There are no springs in this lock, and if thieves had been as ingenious in Eastern as in Western nations it would have passed out of use many centuries ago.

The *tumbler lock* is, next to the Egyptian, the oldest type of lock, and there is evidence that the Chinese invented it very early in their history. It derives its name from a lever, latch, or slide, entering a notch in the bolt, which in consequence can not be moved until the *tumbler* is lifted by a key. There have been endless modifications of the tumbler lock, and it is very generally used, notwithstanding the fact that it can be picked by a skillful operator.

The *warded lock* was the next species of lock invented; it derives its name from certain obstructions of more or less irregular shape attached to the lock-case in the path of the key, which are intended to make it impossible to move the bolt unless the key has openings in its bit which will enable it to pass the wards. Locks of this kind were used by the ancient Romans long before the beginning of the Christian era, and are still very largely used when a cheap lock will answer the purpose. Their construction is very simple; the bolt has upon its top a flat spring, and in its lower edge are cut a pair of notches, one of which is acted upon by the key while passing the wards, and the other is provided with a projecting curve which when held in contact with the lower edge of one of the mortises in the case through which the bolt slides, by the pressure of the spring, serves to hold the bolt in its locked or unlocked position. The first action of the key is to lift the bolt slightly against the pressure of the spring, thus relieving it from the edge of the mortise, and as the key continues to turn the bolt is moved into the required position and the key released. This style of lock can be readily picked by the use of a stiff wire bent at the end in such a way as to avoid the intricacies of the wards.

The *letter* or *dial lock* was the fourth type of lock devised. Its invention has been attributed to M. Regnier (director of the Musée d'Artillerie at Paris) about 1650, but he was probably merely an improver or manufacturer of a style of lock invented by another, for in Beaumont and Fletcher's play, *The Noble Gentleman* (1615), we find

> A cap-case for your linen and your plate,
> With a strange lock that opens with A.M.E.N.

Thomas Carew, in 1620, writes:

> . . . As doth a lock that goes
> With letters; for, till every one be known,
> The lock's as fast as though you had found none.

Regnier's locks were for a time very popular, and were used for the fastening of diplomatic dispatch-boxes. They have been described as follows, viz.: "Broad steel rings four, five, or eight deep, upon each of which the alphabet was engraved, turned upon a cylinder of steel, and the lock only separated when the letters forming a particular word were in a straight line with each other. This word was selected from among a thousand, and the choice was the secret of the purchaser. Any one not knowing the words might turn the rings round for years without finding the right one." The concluding sentence of this description is erroneous, as these locks have been frequently opened in recent years without a previous knowledge of "the word," but the operation of unlocking inevitably disclosed it. Such locks are not now used to any considerable extent.

The four types of lock described are the foundation facts of lock construction, on which all subsequent improvements

in such mechanism rest; and it is difficult to conceive it possible to make a lock without employing one or more of the ideas involved in these four typical methods of construction. It is therefore to a combination of these primary lock mechanisms, with other details, whose sole object is to guard them from successful assault from criminal ingenuity, that we are to look for absolute security in lock construction, if indeed such a result is attainable. It generally happens that as soon as a lock seems to meet all requirements some burglar or enterprising business rival discovers some hitherto unimaginable method of picking.

It is supposed that locks were introduced into England by Phœnician traders, as locks similar to those originating in Egypt have been used from a remote antiquity in Cornwall. Locks were first manufactured in England in the reign of Alfred (A. D. 871–901). In the time of Richard I. (1189–99) there was an entry in a book of accounts belonging to the Manor of Savoy of the purchase of two "stocklokkes, price xx^{d}," and two "hang lokks, price xvj^{d}." During the reign of Queen Elizabeth the art of lock-making had evidently made considerable advance, for we are told that a certain Mark Sealiot made a lock "consisting of eleven pieces of iron, steel, and brass, all of which, with a pipe key of gold, weighed only two grains of gold." The Marquis of Worcester (1663), in his famous *Century of Inventions*, mentions several locks of Sealiot's design, and says of one of them: "If a stranger open it, it setteth an Alarm a-going, which the stranger cannot stop from running out; and besides, though none should be within hearing, yet it catched his hand, as a Trap does a Fox: and though far from maiming him, yet it leaveth such a mark behind it, as will discover him if suspected; the Escocheon or Lock plainly showing what monies he has taken out of the Box to a farthing, and how many times opened since the owner had been in it."

In the middle of the eighteenth century the main dependence for security in locks consisted of a combination of complicated wards, intricate keys, single tumblers, and a multitude of bolts shot simultaneously by the action of a single key from all sides and even the angles of the door or lid to which they were attached. Sometimes as many as twelve bolts were used.

Barron's lock was the first lock having multiple tumblers patented in England (1778), and its construction added very much to the difficulty of picking by the means known at that time. Bramah's lock (1784) and Chubb's (1818) were for many years regarded in Great Britain as absolutely secure from a successful attack of lock-picking tools and skill, but they were both repeatedly opened in 1851 by A. C. Hobbs (b. 1812; d. 1891), mechanician, and a native of the U. S., who was the exhibitor of the Day & Newell Parantoptic (inspection defying) lock at the Crystal Palace in London. On July 22, 1851, three months after his arrival in England, he opened a Chubb lock having three bolts and six tumblers which was affixed to the door of a strong room at 34 Great George Street, Westminster. This he accomplished with his instruments (never having seen the key) in twenty-five minutes, relocking the door in seven minutes, neither operation having occasioned the slightest injury to the door or lock. This success was followed by the triumph of opening the famous Bramah lock, with its eighteen slides, which had been hanging for many years in the window of Messrs. Bramah's shop as a challenge to a generation of locksmiths, and receiving from them, by order of the arbitrators, the 200 guineas reward offered for so doing. The actual time Hobbs was at work on the lock was nineteen hours, several of which were used in recovering the pieces of a broken tool from the interior of the lock. He afterward repeated the operation three times within an hour, and opened another lock having eight slides in four minutes. Hobbs established in England the manufacture of locks by machinery (all locks had previously been made there by hand-work) on the interchangeable plan.

The Parantoptic lock of Day & Newell (owing to his success in introducing it to the notice of purchasers this came to be called the Hobbs lock) had a functional combination of parts that had unsuccessfully been attempted in earlier locks, viz., the ability to adjust automatically its mechanism during the operation of locking to any arrangement of the removable pieces, or bitts forming the wing of its key, which of course must be used for unlocking; but this automatic adaptability enabled the lock to be operated with a key of new form whenever it was locked. This was an element of safety which none of its competitors for a time possessed, and, besides, the lock was so contrived as to defy the means of picking so successfully used by Hobbs on other locks. In consequence of the advantages named and the liberal advertising from the influence of Hobbs's connection with it, this lock was largely used for many years, but was finally opened by Linus Yale, Jr. (b. 1821; d. 1868), by a method which was not strictly mechanical, but rather a means of making the lock itself report to the operator graphically and in an unmistakable way the order in which the bitts were assembled in the key when it was used. This method consisted in smoking or otherwise discoloring the tumblers before the door was locked, then when the key was used its bitts would scrape off the substance covering the tumblers in proportion to the length of the several bitts; hence, by examining the tumblers by the aid of a small mirror introduced through the key-hole after the removal of the key, it was possible to measure the length of the abrasions on the tumblers, and from these measurements construct a key that would open the lock. This, while very ingenious and effective, can not be regarded as illustrating so high an order of skill as the purely mechanical methods which preceded and followed it. Linus Yale, Jr., was a highly ingenious and very fertile inventor of locks, and without doubt contributed more to the art of lock-making in its higher branches than any other individual. The well-known draw or post-office lock, having a thin flat key, is his invention, and is what is now popularly known as the Yale lock. One of the most ingenious locks of his design was called the magic lock. It had cylindrical bolts, was without springs, had a very small keyhole, and a key with a detachable bitt, which, when the key was inserted and turned, was automatically removed from the stem or handle and carried about 3 inches away from the keyhole and then made to act upon the tumblers, and thus enabled the continued movement of the handle to open the lock. This was followed by the invention by Yale of his treasury lock, which was a decided improvement upon the magic lock, inasmuch as it had two series of tumblers similar in idea to the Day & Newell lock, and thus the element of changeability was provided in the key in addition to detachability.

Chronologically we have now approached the year 1860. It had by that time become evident to experts in lock construction that no locks operated by a key were safe from being picked or opened by some ingenious artifice, and, further, that the increasing frequency of the use of gunpowder by professional burglars made it highly desirable that there should be no opening through the door into the lock. These considerations led to the invention of a large number of dial-locks, among which were the Sargent, with its roller bolt and tumblers changeable by a key, the Marvin magnetic lock, and several varieties invented by Linus Yale, Jr. Many of the poorer dial-locks readily yielded to the skill of operators, and finally the opening of the best of the Yale dial-locks by James Sargent, who used a micrometer for the purpose, which had also been invented by Mr. Yale, gave a rude shock to the feeling of confidence which had become very general in regard to the security of the best dial-locks, and for a time the belief seemed to be general that it was impossible for human ingenuity to devise a lock that could not be picked. This condition of affairs caused inventors to turn their attention to an old and neglected invention, the *time-lock*. The first suggestion for a lock that could only be unlocked at a certain time is contained in an English patent issued to William Rutherford in 1831. In this invention the lock mechanism was controlled by a clock secured to the inside of the door. This clock could be set to the hour at which it was desired to open the door, and at that hour and no other could the key or other means for moving the bolts be made to operate. In 1857 another time-lock was devised by Holbrook & Fish, of the U. S. Both of these locks anticipated the days of profitable appreciation by many years, but their inventors were far-seeing in their ingenuity, for their work embraced details which are now regarded as of the first importance.

About this period there were a number of abortive efforts to introduce time-locks to the favorable consideration of bankers and merchants, but it was not until the dial-lock had ceased to give confidence that the time-lock began to attract serious attention. The first successful lock of this kind was patented by James Sargent in 1875, and was soon followed by the Yale time-lock, in which the inventions of Little, Stockwell, and others were included, and at a later date by the time-locks of Pillard, Homes, Hall, and other ingenious inventors. No time-lock has ever been picked, as

the time allowed for operating with instruments upon the lock after its mechanism has been released and before it is again secured by the clock attached is too short for the employment of any instrument with success. Notwithstanding the security of the time-lock against picking there was still a vulnerable point in it as usually constructed at the time of its general adoption—the lock was not automatic; that is, it required to be unlocked by some form of dial mechanism operated from the outside of the door; this, of course, required that a spindle should pass through the door to communicate the movements of the dial to the mechanism of the lock. This gave a point of application for tools to destroy the lock and an opening through which some highly explosive liquid could be introduced. These objections have been overcome by the invention of the automatic time-lock, or, as it is sometimes called, the bolt-motor. This consisted of a case (similar to a lock-case) secured to the interior of the door. This case contains two very powerful springs which are set by a key (operated from the inside, as there is no opening of any kind through the door) before the door is closed; one of these springs is connected with a trigger which releases it as soon as the door is shut, and it immediately throws the heavy bolts into their locked position. The second spring in the case is acted upon by a clock movement (provided in duplicate to guard against accidental failure) at any determined hour to which the clock is set. As soon as the second spring is released by the clock it acts upon the door-bolts with great power, and immediately throws them into their unlocked position. There are various modifications and refinements on this general construction, all having for their object the automatic action of the bolts at a certain time by means of powerful springs released by a clock. W. F. Durfee.

Locke, David Ross: humorist; better known under his pseudonymn of *Petroleum V. Nasby*; b. at Vestal, Broome co., N. Y., Sept. 20, 1833; learned printing in the office of the Cortland *Democrat*; was successively editor and publisher of the Plymouth (O.) *Advertiser*, the Mansfield (O.) *Herald*, *The Bucyrus Journal*, and the Findlay (O.) *Jeffersonian*, and editor of *The Toledo Blade*. In 1861 he began to publish in *The Jeffersonian* his *Nasby* letters, finally collected in book form as *The Struggles—Social, Financial, and Political—of Petroleum V. Nasby* (1872). Among later productions are *The Morals of Abou Ben Adhem* (1875) and *A Paper City*, a novel (1878). D. at Toledo, O., Feb. 15, 1888. Revised by H. A. Beers.

Locke, John: philosopher; b. at Wrington, Somersetshire, England, Aug. 29, 1632. His first studies were pursued at Westminster School, London. In 1651 he became a member of Christ Church, Oxford, where he resided till 1664. Here his mind received that bent which gave him his subsequent renown as a philosopher. It was partly due to the reading of Descartes, whose clearness of exposition, so much in contrast with the crude instruction of the university, Locke admired greatly; but Locke owed his philosophical stimulus in part, and directly, to a discussion with five or six students in his rooms at Oxford, when, as he says, the thought came to his mind that the only sure ground of harmony in judgment must be found in a preliminary determination of the possibilities of the human mind. This "thought," which became the *Essay on the Human Understanding*, was taken up and laid aside, and written upon at intervals through a period of more than twenty years, and only finished in 1687. In 1664 Locke was secretary of legation at Berlin; in 1667 he became acquainted with Lord Ashley, afterward Earl of Shaftesbury, who, in gratitude for medical advice, received the young philosopher as a member of his family. During this time he directed the education of Shaftesbury's son, and that of his grandson, who became an elegant philosophical writer in Queen Anne's reign. Locke was brought, through his friend and patron, into the society of Buckingham, Halifax, and other distinguished men. When Shaftesbury became Lord Chancellor he gave to him the office of the presentation of benefices; but Locke and his patron soon fell into disfavor, and from 1675 to 1679 Locke was in France, mainly at Montpellier with Herbert, later Earl of Pembroke, to whom he dedicated his essay. From 1683 to 1688, on account of the state of his own country, he deemed it wise again to reside abroad. The revolution of 1688 enabled him to return from Holland to England, where he filled several civil offices, and was offered others, which on account of age and ill-health he declined. His last years, spent in the study of the Scriptures, were ministered to by Lady Masham, a daughter of Ralph Cudworth. He died at Oates, in Essex, a firm believer in the Christian religion, Oct. 28, 1704.

The Philosophy of Locke.—1. *Reasons for its Great Popularity and Influence.*—The *Essay on the Human Understanding*, which contains Locke's system, did not appear in London until 1690; but four editions, revised by the author, were issued before his death, and a fifth, with his last emendations, the year after, a tenth in 1731, and the thirteenth in 1748. Meantime it was translated into French, then becoming the universal language of scholars in Europe; and this translation, made in 1700, passed through five editions in fifty years. It was also translated into Latin, into Dutch and German several times, and since into modern Greek. These various editions and translations indicate the popularity and extensive influence of the *Essay*. As reasons for this may be mentioned—first, the author's public and social position, coupled with the clearness and assurance, if not always the self-consistency, of his utterances. Although wanting the condensation and critical power of such writers as Kant, his English ranks with the best prose of his time; and his familiar style, derived from the refined society in which he moved, was a help to his popularity, as his public life was already an introduction to his authorship. Second, his adherence to the cause of civil and religious liberty. In his work on *Civil Government* he advocated the rights of the people against the arbitrary rule to which they were being subjected. In 1684, by order of His Majesty, he was expelled from his benefice at Oxford, and was an exile on account of his too free opinions. He might have met with Sir Philip Sidney's fate if, instead of being secreted in Holland, he had fallen into the power of the king. On the accession of James II. William Penn proposed to procure for him a pardon, but the philosopher's noble reply was: "There is no need of pardon where there is no crime or fault." The above reasons, however powerful as anxiliaries, would not suffice to account for the influence of the *Essay* but for the third—that the times favored such a work. The psychological field was not much explored, and in attempting it Locke showed an independence which drew attention to him. At the same time good men, especially in England, were disposed to accept authority, and to assume that religion could find its support in faith, without any help from philosophy, or even against it. It followed, therefore, that unchristian thinkers found support for their favorite theories in the current and accepted philosophy of Locke. "Toward 1750," says Cousin, "the principles of Locke were spread through Europe; they were developed everywhere else, as well as in England." This indicates that the time was ripe for such a system as that announced by Locke. "Placed between the seventeenth and eighteenth centuries, he forms the transition from one to the other. In fact, run over all the sensualistic philosophers of the eighteenth century, there is not one who does not invoke the authority of Locke; and I do not speak merely of metaphysicians, but of moralists, publicists, and critics. Locke is the chief, the avowed master of the sensualistic school of the last century." (*Cousin.*)

2. *What the Lockian Philosophy is.*—Its aim is "to inquire into the original certainty and extent of human knowledge." With this in view, the author strives to show (Bk. i.) that there are no "innate ideas"—ideas being used for whatever is in the mind. If any of these are innate, then the expression of them—for example, "whatever is, is," or "it is impossible the same thing should be and not be"—must be accepted by all human beings, not a child or savage excepted; but, says he, idiots, children, and savages do not accept them; therefore they can not be innate. Such is the reasoning. The obstacles thus removed, the origin of knowledge is discussed (Bk. ii.). Fortunately, the author's positions can be given concisely almost in his own words: "Let us suppose the mind to be, as we say, white paper, void of all characters, without any ideas; how comes it to be furnished? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from experience; in that all knowledge is founded, and from that it ultimately derives itself." Again he says—and the passage is a fundamental postulate of this philosophy: "Our observation, employed either about external, sensible objects, or about the internal operations of our own minds, perceived and reflected on by ourselves, is that which supplies our understandings with all the materials of thinking. These two are the fountains of knowledge from whence all the ideas we have, or can naturally have, do spring." These

are called "sensation" and "reflection." And it is important to observe that the latter must wait on the former. "I see no reason to believe that the soul thinks before the senses have furnished it with ideas to think on." That is, the mind can only act upon what is given to it from without, furnishing nothing original from itself. In the last analysis the materials of knowledge are "ideas" due to "sensation" and "reflection."

Upon this basis the followers of Locke have developed his positions in two great directions. Some have proceeded to make a rigorous application of his theory of the origin of ideas, and what he calls sensation and reflection becomes sensation only. So a foundation was laid for sensationalism in England and materialistic naturalism in France. The other direction is seen in Berkeley, who used the "theory of ideas" to eliminate the external world from the sphere of reality and to give support to idealistic analysis. Historians of philosophy still disagree as to which of these tendencies represents the legitimate influence of Locke.

REFERENCES.—*Works of Locke* (ed. by Fraser, 1894); *Locke* (by Fraser, in Blackwood's Philosophical Classics, Edinburgh, 1890); *The Philosophy of Locke* (by Russell, in Sneath's Philosophical Series, New York, 1891); and the histories of philosophy by Ueberweg, Erdmann, Windelband, and Lewes.

Revised by J. MARK BALDWIN.

Lockhart: town; capital of Caldwell co., Tex. (for location of county, see map of Texas, ref. 5–H); on the Mo., Kan. and Tex., and the San Ant. and Aran. Pass railways; 30 miles S. by E. of Austin, the State capital. It is in an agricultural and stock-raising region, is noted for its springs, and has two weekly newspapers. Pop. (1880) 718; (1890) 1,233; (1900) 2,306.

Lockhart, JOHN GIBSON: author; b. at Cambusnethan, Lanarkshire, Scotland, in 1792; studied at Glasgow University 1807–10; graduated from Baliol College, Oxford, in 1817 as bachelor of law; passed advocate at Edinburgh 1816; became in 1817 a contributor to *Blackwood*, in which his articles were remarkable for vigor and scholarship; married in 1820 the daughter of Sir Walter Scott; was editor of *The Quarterly Review*, London, 1826–53; received in 1843 the sinecure auditorship of the duchy of Cornwall; was one of the writers of the *Noctes Ambrosianæ*. D. at Abbotsford, then the seat of his daughter, Lady Hope Scott, Nov. 25, 1854. His principal works are *Valerius* (1821); *Adam Blair* (1822); *Reginald Dalton* (1823); and *Matthew Wald* (1824), novels; *Don Quixote*, with notes (1822); *Spanish Ballads* (1824); *Life of Burns* (1825); of *Bonaparte* (1829); and of *Scott* (1837–39). Revised by H. A. BEERS.

Lock Haven: city; capital of Clinton co., Pa. (for location of county, see map of Pennsylvania, ref. 3–E); on the Susquehanna river, the Pennsylvania Canal, and the Beech Creek and the Penn. railways; 28 miles S. W. of Williamsport. It is in an agricultural region, and has several extensive manufactories, including tanneries, paper-mill, fire-brick works, sewer-pipe and clay works, machine-shops and cigar-factories. The city is the seat of the Central State Normal School (with 645 students, 22 teachers, and buildings valued at $275,000), is lighted by gas and electricity, has 2 libraries and a monthly, 2 daily and 2 weekly newspapers. Pop. (1890) 7,358; (1900) 7,210. EDITOR OF "EXPRESS."

Lockjaw: See TETANUS.

Lockland: village; Hamilton co., O.; on the Cleve., Cin., Chi. and St. L. and the Cin., Ham. and Dayton railways; 12 miles N. of Cincinnati (see map of Ohio, ref. 7–C). It has manufactories of cotton goods, paper, flour, bricks, and lumber. Pop. (1880) 1,884; (1890) 2,474; (1900) 2,695.

Lockout: See the Appendix.

Lockport: village (laid out 1837, incorporated 1853); Will co., Ill. (for location of county, see map of Illinois, ref. 3–G); one the Des Plaines river, the Illinois and Michigan Canal, and the Atch., Top., and S. Fé and the Chi. and Alton railways; 33 miles S. W. of Chicago. It is in an agricultural and productive limestone region; has a high school, graded public school, several Roman Catholic parochial schools, 10 churches, and 2 weekly newspapers, and manufactures flour, oatmeal, wire, straw-board, barbed wire, and brass goods. Pop. (1880) 1,679; (1890) 2,449; (1900) 2,659.

EDITOR OF "PHŒNIX."

Lockport: city (incorporated as a village in 1829); capital of Niagara co., N. Y. (for location of county, see map of New York, ref. 4–C); on the Erie Canal and the Erie and the N. Y. Cent. and H. R. railways; 25 miles N. by E. of Buffalo, 65 miles W. of Rochester. It is near the geographical center of one of the most profitable grain and fruit-growing counties in the State, and derived its name from five locks cut through solid rock to overcome a difference of 60 feet in the levels of the canal, and doubled in number on the enlargement of the canal in 1835. The surplus water at the upper level is discharged through two races, each with a fall of 53 feet to the lower level, thus supplying exceptional power for manufacturing. The industries include the manufacture of Holly water-works plants, milling machinery, indurated-fiber products, flour, steam-dredges, boilers, engines, railway trucks, aluminium, glass, carriages, furniture, paper, tackle-blocks, saws, reversible seats, and stave, broom, veneer, and chair-making machinery. There are 15 churches, a union, a high, and 5 public primary schools, 2 libraries (Union School, founded 1848, Young Men's Christian Association), Roman Catholic convent and young ladies' seminary, the Flagler Emergency Hospital, 2 homes for the friendless, 2 national banks with combined capital of $300,000, a savings, a private bank, and a weekly, 3 semi-weekly, and 3 daily newspapers. Pop. (1890) 16,038; (1900) 16,581. EDITOR OF "UNION."

Lockroy, lō'krwä', ÉDOUARD ÉTIENNE ANTOINE SIMON: journalist and politician; b. in Paris, July 18, 1838; accompanied Renan to Judea and Phœnicia in 1860–64; took part in Garibaldi's Sicilian expedition, and returning to France wrote for the newspapers some articles which caused his condemnation to four months' imprisonment. He was an original member of the National Assembly 1871. As editor of *Le Peuple souverain* he again got into trouble with the authorities, and was condemned to a brief imprisonment in 1872 for his duel with Paul de Cassagnac, and in 1873 for a newspaper article, *La Libération du territoire*, but in the latter year was elected to the Assembly. He voted with the extreme Left. Returned by successive elections, he became Minister of Commerce and Industry 1886–87; Minister of Public Instruction in 1888, and directed the organization of the Exposition of 1889. Besides his newspaper articles, he has published several volumes, among which are *À bas le Progrès* (1870); *La Commune et l'Assemblée* (1871); *L'Île révoltée* (1877); *Ahmed le Boucher* (1888); and *Journal d'une bourgeoise pendant la Révolution* (1881).

Lockwood, BELVA ANN BENNETT: lawyer; b. at Royalston, N. Y., Oct. 24, 1830; was educated in a district school; taught school at fifteen; was married at eighteen, but lost her husband next year; wrote for papers and magazines; graduated at Genesee College, Lima, N. Y., at twenty-seven; taught school eleven years; was married to Dr. Ezekiel Lockwood in 1868; studied law; graduated at the National University at Washington, D. C., and was admitted to the bar of the District in 1873. She was nominated in 1888 for President of the U. S. by the Equal Rights party.

SUSAN B. ANTHONY.

Lockyer, JOSEPH NORMAN, F. R. S.: astronomer; b. at Rugby, Warwickshire, England, May 17, 1836. He first became well known through the discovery, made independently by Janssen, that the solar protuberances were composed of glowing hydrogen, and could be observed on any clear day with a sufficiently powerful spectroscope. The French Academy commemorated this remarkable advance in the methods of investigating the gases around the sun by striking a medal bearing the effigies of the discoverers. Lockyer has principally devoted himself to ancient astronomy, solar physics, and spectroscopic observations generally, on which subjects he has written a number of works, including *Contributions to Solar Physics* (1873); *The Spectroscope and its Applications* (1873); *Studies in Spectrum Analysis* (1878); *The Meteoritic Hypothesis* (1891); *The Dawn of Astronomy* (1893); and is editor of *Nature*. S. NEWCOMB.

Locle, lōk'l: town; in the canton of Neuchâtel, Switzerland; on the Bied, 10 miles N. W. of Neuchâtel (see map of Switzerland, ref. 4–B). Its manufactures of clocks and watches are very celebrated, and the most extensive in the world. Its manufactures of lace are also important. The surplus water of the Bied is discharged into the Doubs through an artificial tunnel constructed to prevent inundation of the valley of the Bied. Pop. (1888) 11,312.

Lo'cock, Sir CHARLES, M. D., F. R. S., D. C. L. (Oxon.): physician; b. at Northampton, England, Apr. 21, 1799; studied at the University of Edinburgh, where he gradu-

ated in medicine 1821; established himself in his profession in London, and in 1840 was appointed, on the recommendation of Sir James Clarke, physician-accoucheur to the Queen, by whom, in recognition of his services, he was created a baronet Apr. 14, 1857, at which time he retired from the active practice of his profession. In the same year he was chosen president of the Royal Medical and Chirurgical Society, and became in 1863 honorary president of the Obstetrical Society. D. at Ryde, July 23, 1875.

Locomotion of Animals: See MECHANICS, ANIMAL.

Locomotive, or, more fully, **Locomotive Engine** [*locomotive* is from Lat. *lo'cus*, place + *move're*, *mo'tum*, move]: an engine mounted on wheels and capable of self-propulsion; commonly one operated by steam and intended for traction or propulsion on a railway. The railway locomotive engine illustrates better than any other form of motor the highest art of the engineer in the concentration of power into minimum space and weight. The machine consists of a steam-boiler of compact form, filled as completely as possible with tubes, which convey the furnace-gases to the smokestack and transfer heat from them to the water in the boiler. It is mounted on from four to twelve wheels, according to weight and special duty, and is driven by a pair of engines of the simplest construction, each coupled to its own set of wheels on either side of the locomotive. The whole combination, boiler, engines, and wheels, is connected by a frame of wrought iron in such a manner as to give maximum power in minimum space and weight. The steam pressure is often 150, sometimes 200, lb. to the square inch; the speed of piston and of revolution of engines and driving-wheels is as great as possible consistent with safety and freedom from serious risk of heated journals; the ratio of expansion of the steam is low, and the mean effective pressure high: and thus all conditions of design, construction, and operation are made to concur in the production of a compact and powerful machine capable of hauling trains of enormous weight or at very high speed. The smallest kinds of locomotive are those employed in mines for drawing small trains of light cars or wagons to the shafts; the heaviest are employed on the principal railways of the U. S. for hauling long and heavy trains or ascending steep gradients. The former weigh about 5 tons; the latter sometimes weigh 100 tons, e. g. the famous engine "999" of the New York Central Railroad, which first made a record in 1893 of 102, and later, in exceptionally favorable circumstances, of 112 miles an hour—the highest speed yet recorded. It has a cylindrical shell-boiler, with internal firebox and closely packed tubes, non-condensing engines, three-ported valves, with Stephenson links and gear, and a steam-blast produced by the action of the exhaust steam. The arrangement and number of wheels for fast and mixed traffic is usually as that shown in Fig. 1, but the size of the driving-wheels and their number vary with the duty for which the machine is constructed, the number being increased to a maximum and their diameter to a minimum for heaviest and slowest trains. Fast express engines have driving-wheels 6½ feet in diameter, and in special cases wheels as large as 8 feet in diameter have been adopted; the slow and powerful engines of long lines have wheels as small as 3½ and 4 feet in diameter. The forward end of the engine is often carried on a swiveling truck or bogie with four small wheels. The standard eight-wheeled engine usually distributes the total weight, two-thirds to the driving-wheels, one-third to the truck. The proportion carried by drivers increases with severity of duty up to a maximum, when all the weight is sometimes taken on driving-wheels, and the truck is displaced by the extended system of six, eight, or ten coupled drivers. The whole mass of engine and boiler is supported on heavy and very elastic springs, which prevent the jar and shock of the wheel on the roadbed reaching the machinery, and make the engine ride easily. Standard engines now weigh about 40 tons, often 45, for passenger traffic on the leading railways. Such engines have steam-cylinders 20 to 22 inches in diameter and 2 feet stroke of piston, their boilers containing from 25 to 35 sq. feet of grate surface and 1,500 to 2,000 sq. feet of heating surface. Many modifications of form are given the engine for special work. The Fairlie engine for narrow-gauge railways consists of a pair of engines set back to back, united by a common firebox with one or with two furnaces, and thus giving the hauling power of two common engines built for the same gauge. The Forney locomotive unites tender and engine on a common frame, and thus distributes weights of fuel and water to the driving-wheels to give adhesion and added hauling power. The "tank-engine," of which the last illustrates one form, is sometimes constructed on a very large scale. Thus locomotives built at the Baldwin locomotive-works, Philadelphia, for the Grand Trunk Railway, to be used in the St. Clair tunnel, under the bed of the St. Clair river, between Port Huron, Mich., and Sarnia, Ontario, have five pairs of 50-inch driving-wheels on each side of the boilers, the cab in the middle

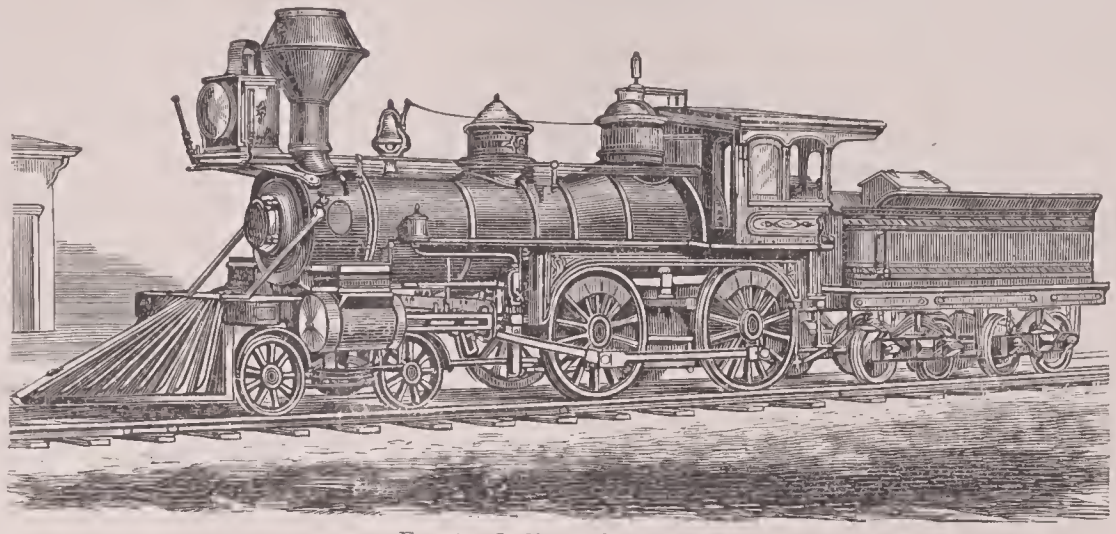


FIG. 1.—Ordinary locomotive.

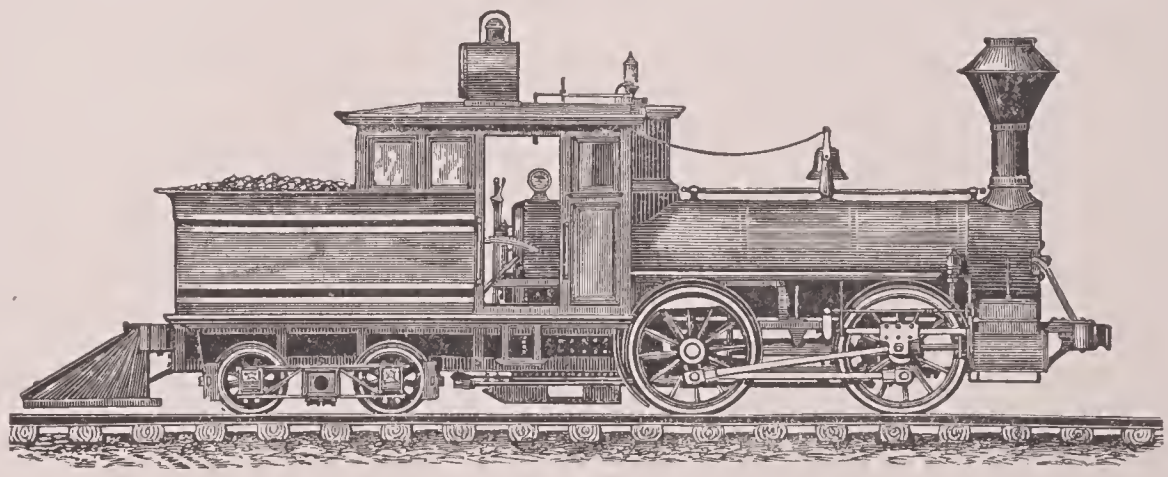


FIG. 2.—Forney locomotive.

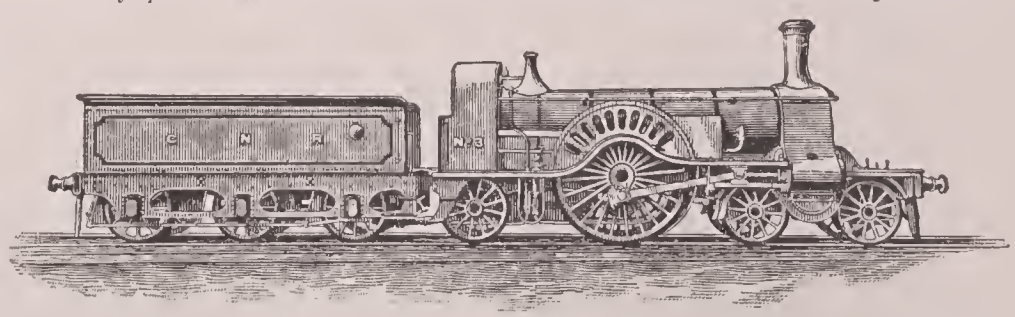


FIG. 3.—British express engine.

of the boiler extending out over the two tanks, one each side of the boiler. The cylinders are 22·28 inches, and the boiler 74 inches, in diameter, to carry 160 lb. of steam. Each locomotive with tanks filled weighs 200,000 lb., the average weight in running order, with tanks half filled, being about 180,000 lb.*

A favorite and successful type of engine used on British and continental railways is seen in the next figure. It has one pair of very large drivers, 7½ feet and sometimes 8 feet in diameter. British engines of this type have done extraordinary work. Such locomotives on the longer main lines, as between London and Glasgow, make an average of 50 miles an hour for 400 miles. The Midland Railway employs engines with cylinders 18 by 26, a single pair of drivers 7 ft. 4 in. diameter, with 1,240 feet of heating surface and 20 feet of grate, to haul trains of 225 to 250 tons weight, at nearly 50 miles an hour, and with a fuel expenditure of 26 lb. per mile. Compound engines of recent construction have wheels 7½ feet in diameter, and have made nearly 90 miles an hour. Compound locomotives are provided with arrangements by which the steam from the boiler, usually at comparatively high pressure, is conducted first into a small high-pressure cylinder, and then, after performing about one-half the total work in that cylinder, is passed into a second, larger, low-pressure cylinder, in which its work is completed with maximum expansion of the steam, and it thence enters the exhaust and blast pipes, and is rejected from the engine. This arrangement permits a more complete expansion of the steam, a larger thermodynamic transformation, and higher economy of operation without such serious exaggeration of thermal wastes consequent upon large expansion and wide range of temperature in the working cylinder, which, in the common, simple type of engine, places an early limit to gain by expansion. (See STEAM-ENGINE.) These amount often to nearly one-half of all the heat and steam and fuel in the simple engine and about one-fourth in the compound. The latter thus saves often one-fourth of all the steam used in the engine, and, by thus reducing the demand upon the boiler, makes the latter still more efficient, and the saving in fuel 30 to 35 per cent. Under unfavorable circumstances, however, the saving may be so small as to be unimportant. The average gain may be assumed to be above 20 per cent. of steam and not far from 25 per cent. in fuel in ordinary work.

The standard engine uses 30 to 35 lb. of steam per horse-power per hour, 4 to 5 lb. of fuel; the compound from 22 to 30 lb. of steam and from 2·5 to 3 lb. of good coal. Either engine hauling a train exerts a pull of from 1 to 2 tons on its draw-bar and from 500 to 1,000 horse-power. In exceptional instances, with heavy trains or extraordinarily high speeds, 1,500 to 1,800 horse-power has been attained. The engine has a life of about thirty years, costing 10 to 15 per cent. of its value for repairs and maintenance, and uses a quart of oil and a ton of coal usually for a run of 50 miles under average conditions.

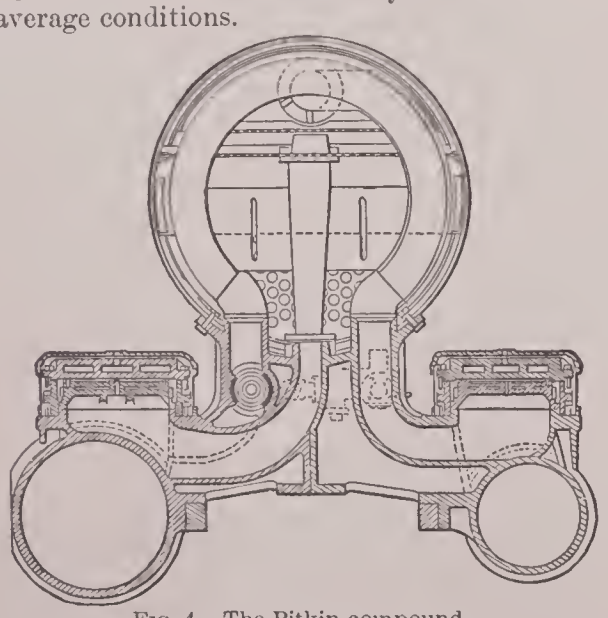


FIG. 4.—The Pitkin compound.

An illustration of the most common method of compounding the locomotive is seen in the accompanying engraving.†

It includes one high and one low pressure cylinder, with an ingenious intercepting-valve. The receiver has a volume 50 per cent. greater than that of the small cylinder, and the clearance in the latter is about 10 per cent., a proportion shown by the indicator to be desirable with the proportions of valves employed. The valves are arranged and the general disposition of parts is as in the standard engine of the old form.

The intercepting-valve is used to admit steam to the large cylinder before compound working begins. The ports, at starting, are closed, and no communication is open between the receiver and the large cylinder, which latter takes steam through a reducing-valve.

On starting, the exhaust from the small cylinder fills the receiver, and the back pressure taking effect on the intercepting-valve and destroying its equilibrium, it at once moves, and the large cylinder takes its steam properly for compound working.

This engine has the following dimensions: Cylinders, diameter, 20 and 29 inches; stroke of piston, 24 inches; ratio of cylinders, 2·1; diameter drivers (6), 68 inches; weight of engine, 126,800 lb.; heating surface, 1,677 sq. feet; grate surface, 28·57 feet. About 80 per cent. of the total weight is on the drivers.

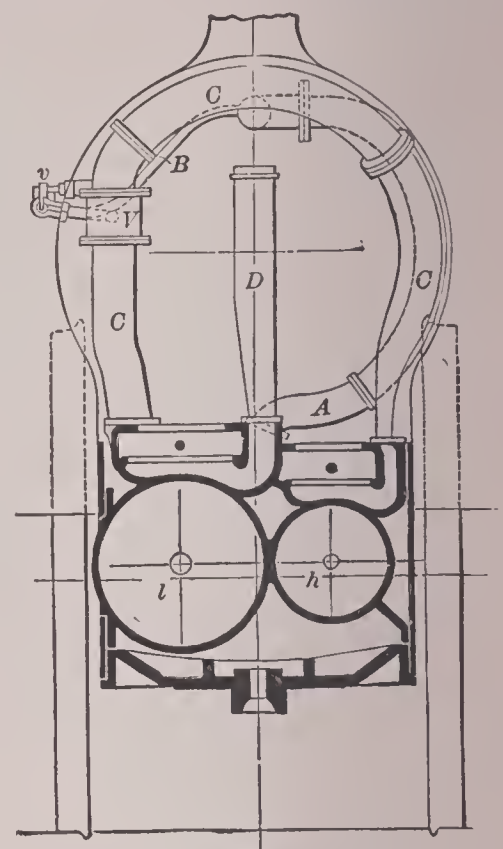


FIG. 5.—The Worsdell engine.

In the Worsdell form of engine the construction is as seen in the Fig. 5.* A is the steam-pipe, B the starting-valve connection, C the receiver, D the exhaust-pipe, and *v* and V are the starting and the intercepting valves. The engine here taken for illustration is an English passenger locomotive, having 16 and 26 inch cylinders, 24 inches stroke, drivers 80¼ inches in diameter. The steam-pressure is the same as the preceding, and the weight of engine 97,000 lb., of which 68,000 rests on the driving-wheels. The areas of heating and grate surface are respectively 1,323⅓ and 17⅓ sq. feet. Joy's valve-gear is employed.

In the Webb compound locomotive the steam enters two small, outside, high-pressure cylinders arranged like those of the standard engine, and is then discharged into a reservoir, from which it passes into a third, large, low-pressure cylinder set between the frames. The high-pressure cylinders drive one pair of wheels and the low-pressure cylinder is connected with the hinder of the two pairs of drivers, the two working independently, the usual side-rod connections being omitted. Where, as for heavy work, other drivers are added, they are coupled to the small engines and their wheels through the ordinary system of parallel rods. The locomotive with triple-expansion engines, three cylinders in series, is still in the experimental stage, but promises, with still higher steam-pressures than now customary, to give further economy.

The costs of operation of the locomotive average in the U. S. not far from 15 cents per "train-mile," nearly equally divided between expense for fuel, for attendance, for repairs, and miscellaneous minor items. R. H. THURSTON.

Locomotor Ataxia: See TABES DORSALIS.

Lo'cri, or **Locri Epizephy'rii**: an ancient city of Magna Græcia or Southern Italy; in the subsequent Roman province of Bruttium or Calabria, now Reggio. It was founded probably as early as 710 B. C. (according to Strabo) as a colony from Locris, in Greece, but whether from the eastern or western country of that name is uncertain. The

* *Manual of the Steam-engine*, R. H. Thurston, vol. i., p. 200.

† From *The Compound Locomotive*, Barnes & Woods. Also *Manual of the Steam-engine*, Thurston, vol. i., p. 208.

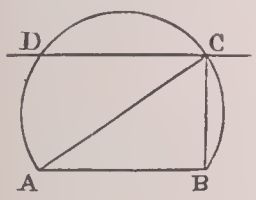
* *Engineering*, Mar. 30, 1888; Wood's *Compound Locomotives* Thurston's *Manual*.

original settlement was on Cape Zephyrium (Capo di Bruzzano), near the southeast point of the Calabrian peninsula, whence the name given to distinguish the colony from the mother-country. Ultimately the settlement was removed 15 miles farther N. Locri was celebrated as the first Greek state to adopt a written code of laws, the authorship of which was ascribed to a half-mythical legislator, Zaleucus. The Locrians were long in hostility with Rhegium and Crotona, and in alliance with Syracuse. The younger Dionysius seized upon the citadel at Locri on his expulsion from Syracuse (356 B. C.), and carried on a despotic government until expelled six years later. During the wars of the Romans with Pyrrhus and with the Carthaginians, Locri alternately favored all the contending parties, and consequently suffered by turns from all, especially from the Romans, who were finally victorious, and followed the example of Pyrrhus in plundering the famous temple of Proserpine. From this time Locri sank into insignificance; its very existence for many centuries is known only by passages in geographical treatises. Destroyed probably by the Saracens, its site remained unknown until the nineteenth century, when the remains of the walls of the two famous citadels and the foundations of the temple of Proserpine were discovered 5 miles from the town of Gerace.

Lo'cris (in Gr. Λοκρίς): the ancient name of two portions of the mainland of Greece, inhabited by a kindred people having the name of Locrians (Λοκροί). The eastern Locrians, divided by a projecting tongue of Phocian territory into two divisions, *Locri Epicnemidii* (from Mt. Cnemis) and *Opuntii* (from the town Opus), inhabited a narrow strip of land along the eastern coast of Greece opposite Eubœa. The western representatives, called—for what reason it is not clear—*Locri Ozolæ* (i. e. having an odor), occupied a territory shut in by mountains on the Corinthian gulf, between Ætolia, Doris, and Phocis. They were proverbially a wild and uncouth people. G. L. Hendrickson.

Locus [= Lat., liter., place]: in geometry, first, the line or surface generated by a point when moving according to a fixed law. Thus an ellipse is the locus of a point which moves in a plane in such a manner that the sum of its distances from two fixed points is always equal to a given distance. Second, the locus of a line is the surface generated by that line when moving according to a fixed law. Thus a hyperboloid of one sheet is the locus of a straight line which moves in such a manner as to touch three other straight lines, no two of which are parallel. To find the equation of a locus we have only to express the law of motion by one or more indeterminate equations.

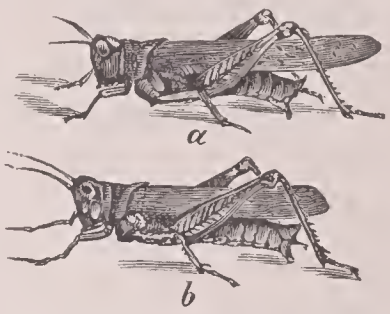
The following example illustrates the method of solving geometrical problems by the principles of loci: Let it be required to construct a triangle whose base is equal to a given line, whose area is equal to a given area, and whose vertical angle is equal to a given angle. Draw a line A B equal to the given base; on it, as a chord, construct an arc of a circle capable of containing the given angle; draw a line D C parallel to A B, and at a distance from it equal to the quotient of the given area by half the line A B; and from either point in which this line intersects the arc, as C, draw C A and C B; then will A C B be the required triangle. For D C is the locus of the vertices of all the triangles whose common base is A B and whose areas are equal to the given area, and the arc A C B is the locus of the vertices of all the angles whose sides pass through A and B, and which are equal to the given angle; hence the points of intersection are the vertices required. If D C cuts the arc in two points, there are two solutions; if it is tangent to the arc, there is but one solution; if it does not intersect the arc, and is not tangent to it, the solution is impossible.



Revised by R. A. Roberts.

Locust [from Lat. *locus'ta*, locust, grasshopper. Cf. Lobster]: properly, the migratory locust of the Old World (*Œdipoda migratorium*) and the locust of Western North America (*Caloptenus spretus*). The term "locust" is often wrongly applied to the cicada or seventeen-year locust. (See Cicada.) The transformations of the locust, as in all the grasshoppers, are very slight, the larva differing from the adult chiefly in wanting wings; but even in this state they are said by African travelers to travel great distances. The eggs are large, long, cylindrical, and laid late in the summer in packets of about seventy-five, resembling cocoons, in holes bored in the ground by means of their stout horny ovipositors. The voracity of the locust, and of grasshoppers generally, may be explained by the anatomy of the alimentary canal, which is highly developed, the gizzard being provided with from six to eight rows of horny denticulated plates, situated on ridges, the whole number of teeth in some species amounting to 270. The stomach and salivary glands are highly developed, the large jaws further adapting it for its vegetable diet. The air-tubes (tracheæ) dilate into numerous large air-reservoirs, which assist it in taking its long-sustained flights. The ears of the locust are two vesicles situated at the base of the hind-body or abdomen, each supplied by an auditory nerve sent from the third thoracic ganglion. The stridulating noise this and many other grasshoppers make is produced by rubbing the thighs against the wings. The migratory locust of the Old World is widely distributed, being found all over Africa, in Western Asia, and Southern Europe, sometimes occurring in Belgium and England. It is said to travel about 16 miles a day. It molts five times, at intervals of about six weeks. The locust is eaten and is considered nutritious by the natives of the country in which it is found.

The locust of North America is the widely distributed red-legged "grasshopper" (*Caloptenus femur-rubrum*, Harris, Fig. 1, *b*) with its allied species (*Caloptenus spretus*, Uhler, Fig. 1, *a*), which inhabits the U. S. W. of the Mississippi river, though occasionally found in New England. The eastern species does the most damage in Northern New England and Canada. The western species (*spretus*) breeds most abundantly in the elevated portions of Colorado and northward, and migrates to the plains below. It also breeds abundantly in Iowa and Minnesota, and is so voracious as to drive farmers from their lands. The young of the *spretus* are hatched in March, April, and early in May in Texas, Colorado, and Kansas, and at once begin their ravages. Late in the season, by the last of June, they acquire wings, becoming fearfully destructive, though most destructive before acquiring their wings. They are more active by night than by day. Late in summer so abundant do they become that an observer in Texas has seen "the whole surface of the earth so broken up by their borings that every inch of ground contained several patches of eggs."



Red-legged grasshopper, and its long-winged Western variety.

A. S. Packard, Jr.

Locust (in Lat. *locusta*): a tree technically named *Robinia*, in honor of John Robin, herbalist to Henry IV. of France, and of his son, Vespasian, who first cultivated it in Europe. The beautiful genus received its name from Linnæus, and belongs to the sub-family *Papilionaceæ*, of the family *Leguminosæ*. The five-toothed calyx is short and slightly two-lipped. The standard is large and rounded, turned back, and scarcely longer than the wings and keel. The stamens are in two bundles—i. e. diadelphous. The style is bearded next the free stamen; the pod linear, flat, several-seeded, margined on the seed-bearing edge, and with thin, flat valves. Leaves odd-pinnate, with stipels at the base of the leaflets. The flowers are very showy, in pendulous racemes, and in the common locust are exceedingly fragrant. *Robinia pseud-acacia*, the common locust of the U. S., is called false acacia from the resemblance it bears to the true acacia. The tree never attains great size in the New England or the Middle States, but reaches its perfection in Kentucky and Tennessee, where it sometimes exceeds 4 feet in diameter, and grows to a height of 80 feet.

The wood of the locust is close-grained and compact. Its medullary rays are close and numerous. The color varies, but the reddish-tinted is the most valuable for timber. The wood is remarkable for its strength and durability, and for its stiffness, hardness, elasticity, and weight. Fence-posts, railway-sleepers, and treenails in naval architecture are made of it. It is considered as durable as the live-oak. It is used to some extent in cabinet-making, but only slightly in house-building. For mill-cogs it is very valuable. Valuable as the wood is for many economic purposes, graceful as is the aspect and foliage of the tree, and beautiful as are the flowers, the locust is yet so infested by many kinds of

insects as to make it objectionable. Where it is grown for timber it should be planted in groves, as then only the trees on the margin seem to be affected. All parts of the tree—leaves, bark, wood, and seeds—are subject to insect ravages, almost threatening its extermination. The locust is considerably used for hedges, for which purpose it is one of the best plants where quick-growing and very hardy trees are needed. It is easily propagated by the suckers which spring from the roots, and still more readily by the seed, which is best preserved in the pod. It prefers a rich, loamy soil, and the young plants will often grow from 2 to 3 feet in the first season. There are two species of *Robinia* found in cultivation besides the *pseud-acacia*—viz., the *Robinia viscosa* and the *Robinia hispida*. The latter—a mere shrub—is known as the rose acacia, and is distinguished by its rose-colored, inodorous blossoms and hairy stems. It is apt to spread and become troublesome. The honey-locust is a different tree (*Gleditschia triacanthos*), although belonging to the same family. See GLEDITSIA. Revised by L. H. BAILEY.

Lodge, EDMUND, F. S. A.: historian; b. in London, England, June 13, 1756; served in the army in his youth, and afterward devoted himself to antiquarian pursuits, especially genealogy. He became a member of the Heralds' College; was promoted to the office of Lancaster Herald 1793, Norroy King-of-Arms 1822, and Clarencieux King-of-Arms 1838. D. in London Jan. 16, 1839. He published, among other works, *Illustrations of British History, Biography, and Manners in the Reigns of Henry VIII., Edward VI., Mary, Elizabeth, and James I.* (3 vols., 1791), and *Portraits of Illustrious Personages of Great Britain* (1821–34).

Lodge, HENRY CABOT: politician and author; b. in Boston, May 12, 1850; was educated in Boston at a private school; graduated at Harvard in 1871, and at the Harvard Law School 1875, and for the next few years applied himself chiefly to literary work. He was assistant editor of *The North American Review* 1874–76, of *The International Review* 1879–81, and in the meanwhile published *Life and Letters of George Cabot*. He served in the State Legislature 1880–81; published *Short History of English Colonies* (1881); edited two series of *Popular Tales*, and a volume of *Ballads and Lyrics*; published *Life* of Alexander Hamilton (1883), and *Life* of Daniel Webster; elected chairman of Republican State committee, and conducted campaign which resulted in defeat of Gen. Butler; 1884 published *Studies in History*; sent as delegate-at-large to Republican convention at Chicago; ran as Republican candidate for Congress in Sixth District, and was defeated by some 255 votes in a total of 30,000; edited an edition of *Works of Alexander Hamilton*, and published *Boston*, in the Historic Towns Series. He was representative to Congress from Massachusetts 1886–92, and in 1893 and 1899 was elected U. S. Senator.

Lodge, OLIVER JOSEPH, F. R. S.: physicist; b. near Stoke-upon-Trent, Staffordshire, England, June 12, 1851. He is a graduate of the University of London (B Sc. 1875, D. Sc. 1877). In the former year he became demonstrator in Physics in University College, London, and in 1877 was appointed assistant professor in the same institution. Since 1881 he has been Professor of Physics in University College, Liverpool. Dr. Lodge is the author of many important papers, chiefly electrical. He was a forerunner of Hertz in the domain of electric induction, and has done much to make clear the function of ether in propagating electro-magnetic and electrostatic disturbances. He has also written an elementary text-book on *Mechanics* (1877), well-known semi-popular volumes entitled *Modern Views of Electricity* (his best-known work, 1889), and *Lightning Guards*; also a series of biographical sketches under the title *Pioneers of Science*. Dr. Lodge is a member of the Institute of Electrical Engineers, and of the physical societies of London and Liverpool.
E. L. NICHOLS.

Lodge, THOMAS: dramatist; b. in Lincolnshire, England, about 1555; entered Oxford University in 1573; was a law-student at Lincoln's Inn in 1584; was for some time an actor; was a soldier in the expeditions of Clarke and Cavendish; studied medicine at Avignon, and practiced in London, where he died of the plague in Sept., 1625. He was the author of *Rosalynde*; *Euphue's Golden Legacie* (1590), a novel, the basis of Shakspeare's *As You Like It*; *True Tragedies of Marius and Sylla* (1594), a drama; *A Margarite of America* (1596), a tale; a *Treatise of the Plague* (1603); *Phillis*, a poem; and a number of charming madrigals. With Greene he wrote *A Looking-glass for London and England* (1594). Revised by H. A. BEERS.

Lodi, lō'dē: town; in the province of Milan, Northern Italy (see map of Italy, ref. 3–C). It lies 20 miles S. E. of Milan, on the right bank of the Adda, which is here crossed by a bridge, the river being navigable for large boats until it reaches the Po. Lodi was the theater of one of the most daring and brilliant exploits of the French under Bonaparte. On May 10, 1796, Napoleon, after the terrible passage of the long and narrow bridge under the full fire of the Austrian batteries, won the victory which secured him the possession of Lombardy. The streets and piazzas of Lodi are, for an old town, broad, spacious, well-paved, and clean, and many of the public buildings are worthy of notice. The cathedral dates from the twelfth century, and other churches contain fine marbles, bronzes, frescoes, and especially wood-carvings of much merit. The educational and charitable institutions of Lodi are numerous, and co-operative associations have proved very successful. Its majolica has a high reputation; also its silk and linen, but the chief article of the Lodi market is the famous Parmesan cheese, which is made in large quantities in the neighborhood. Pop. about 18,700.

Lodz: city: in the government of Piotrokow, Russian Poland (see map of Russia, ref. 8–A). It is well built, and has very extensive manufactures of cotton, woolens, and linens. In 1821 it had only 800 inhabitants, but the establishment of cotton-manufactures has made it the second town in Poland. Pop. (1897) 314,780.

Loess [= Germ. *löss*, from *lösen*, to loosen]: a name first used to designate certain superficial deposits along the Rhine, and subsequently extended to deposits of similar appearance in other countries, which were formed, however, under various conditions, and in some instances deserve individual names. At many localities the loess rests on or is included in glacial deposits, and in all cases is referred to Pleistocene or recent times.

Characteristics.—Loess is an exceedingly fine, usually light-yellow, unconsolidated deposit resembling clay. It is composed of angular or but slightly rounded grains of quartz, which make up from 60 to 75 per cent. of its mass, together with similarly unworn and undecomposed fragments of other minerals, and contains also sufficient calcium carbonate to cause it to effervesce with acids. The average size of the fragments composing it is less than ·005 of a millimeter. Although usually homogeneous, it sometimes grades into coarse deposits of various character, but in most localities the stratification is so obscure that it can not be recognized. The deposit is so soft that it crumbles between the fingers, but resists weathering in a remarkable manner, and stands in vertical walls under various climatic conditions for many years; this is due to its porosity, which enables it to absorb water and thus prevent erosion. Its retention of moisture, together with its physical and chemical composition, render it exceedingly favorable for agriculture. It is frequently traversed by small vertical tubes, and contains hard nodules or concretions, of various shapes. Fossils are usually scarce, but at times land shells occur in abundance, and fresh-water shells and the bones of land animals are sometimes found.

Distribution.—Loess occurs as an irregular fringe along the borders of the valleys of the Rhine and Danube, and in a similar position along the Mississippi, Missouri, Iowa, Ohio, etc., where it is known as the "bluff formation." It also covers vast areas in Central Asia, and has been reported in other countries. A deposit apparently undistinguishable from the loess of Asia floors many of the valleys of the arid region between the Rocky Mountains and the Sierra Nevada.

Origin.—The occurrence of loess along the border of river-valleys, together with other features, has led to the conclusion that in such localities it was deposited by the streams themselves when broader and more sluggish than now and highly charged with glacial silt. In many instances river valleys were filled in this manner from side to side to a depth of 200 feet or more, and the streams in re-excavating their channels left a bluff of loess on either bank. In Iowa loess occurs on the summits of eminences, and is thought to have been deposited in glacial lakes. In Asia loess in valleys inclosed by mountains occurs at various altitudes up to several thousand feet, and has been furrowed deeply by streams. These deposits have been studied by von Richthofen, who concluded that they are accumulations of dust blown from adjacent deserts. This explanation is not considered satisfactory, however, by all who have studied the deposits in question. In the arid region of the U. S.

the valleys are filled to the depth of many hundreds of feet with material having all the essential features of the loess of Asia. These deposits, named "adobe" by the present writer, are composed of fine angular mineral fragments, washed from the neighboring mountains, and are still in process of accumulation. Should they be dissected by streams, the peculiar topographic features of the loess region of Asia would be reproduced. (See PLAYA.) Consult also *Driftless Area of the Upper Mississippi Valley*, by Chamberlin and Salisbury, in *Sixth Ann. Rep. U. S. Geol. Surv.*; *Pleistocene History of Northeastern Iowa*, by W J McGee, in *Eleventh Ann. Rep. U. S. Geol. Surv.*; *Sub-aërial Deposits of the Arid Region of North America*, by Israel C. Russell, in *The Geological Magazine* (London), vol. vi.

ISRAEL C. RUSSELL.

Lofo'den, or **Lofo'ten**: a group of islands situated between lat. 67° 30′ and 69° 30′ N., and stretching along the northwestern coast of Norway. The largest are Andö, Langö, Hindö, East Vaagö, and West Vaagö. They are high and rocky, presenting wild, rugged, and deeply indented coasts, and rising in some places of the interior to the height of 4,000 feet. The inhabitants number about 30,000, partly of Norwegian, partly of Finnish descent. Sheep-farming is carried on, and along the coasts of the fiords a little barley, oats, and potatoes can be cultivated, but the islands derive their importance from the immensely rich fisheries, which each summer employ nearly 30,000 men, and form a source of national wealth to Norway. When the cod-fishing is over, at the end of April, the herring-fishing begins and continues the whole summer; also great numbers of lobsters are caught. This fishing is not without its dangers. The currents around and between the islands are so rapid and tortuous, and subject to such violent changes from ebb and flood, that during spring and fall, when hard weather sets in, these waters often become unnavigable. Even whales are sometimes dashed to pieces against the rocks of the coasts. See MAELSTROM.

Log: an apparatus for measuring the velocity of a ship at sea. Usually it consists of a wooden float, weighted on one side so that it will float upright, and having a line attached to it in such a manner as to bring the flat side of the float so as to offer the greatest resistance to a force tending to drag it through the water. The attached line is about 150 fathoms in length, and when not in use is wound on a light running reel. The line is divided into equal parts, each of which is equal to $\frac{1}{120}$ of a nautical mile, the points of division being marked by *knots*, formed by passing pieces of twine between the strands of the line, and leaving the free ends to project on each side of the line. The first knot is placed at a considerable distance from the float or log, and is very prominently marked. The part of the line between the log and the first knot is called the stray line; its use is to allow the log to become settled before the count is commenced. To use the log and line, the log is thrown over from the lee quarter of the vessel, and the line is then unwound from the reel as fast as the vessel sails. At the instant the first point of division passes from the reel a half-minute sand-glass is inverted, and when the last sand falls the reel is stopped. The number of equal spaces that have been unwound indicates the number of nautical miles the ship is sailing per hour, inasmuch as a half minute bears the same relation to an hour that one of the divisions of the line does to a nautical mile. The log is thrown from time to time, and the results are recorded in the logbook. To secure accurate results, the line should be so prepared as to prevent stretching. To guard against variations of length due to hygrometric changes, the line is usually saturated with oil. If it is found that the line has changed in length, a correction must be applied to the measured rate of the vessel, and the line must be graduated anew.

The so-called patent log consists of a light rod of metal with spiral flanges, which is attached to the end of a long line and thrown over the ship's taffrail, to be drawn through the water as she moves. The spiral form of the flanges causes the rod and line to revolve. At the other end the line is attached to a clockwork, which it moves around so that the miles made are indicated on a dial.

Logan: city; capital of Hocking co., O. (for location of county, see map of Ohio, ref. 7–F); on the Hocking river, the Hocking Canal, and the Columbus, Hock. Val. and Tol. Railway; 18 miles S. E. of Lancaster, 51 miles S. E. of Columbus. It is in a coal and iron mining region; manufactures flour, woolen goods, furniture, and foundry products; has a large trade, and contains a semi-weekly and three weekly newspapers. Pop. (1880) 2,666; (1890) 3,119; (1900) 3,480.

Logan: city; capital of Cache co., Ut. (for location of county, see map of Utah, ref. 2–M); on Logan river, and the Union Pac. Railway; 66 miles N. of Ogden, 90 miles N. of Salt Lake City. It is in an agricultural and mining region; is the seat of Brigham Young College (Latter-Day Saints), New Jersey Academy (Presbyterian), and the Utah Agricultural College and experiment station; and contains a Mormon temple, Presbyterian, Methodist Episcopal, and Protestant Episcopal churches, 7 public schools, Methodist Episcopal and Protestant Episcopal schools, and 3 semi-weekly newspapers. Pop. (1880) 3,396; (1890) 4,565; (1900) 5,451.

EDITOR OF "JOURNAL."

Logan: Indian chief; b. about 1725; the son of a Cayuga chief who lived at Shamokin, in Pennsylvania. He bore the name of Tah-gah-jute, but took also the name of his friend James Logan, acting Governor of Pennsylvania. He was a man of fine physical and mental powers, and was always friendly to the whites until 1774, when a party of ruffians murdered his wife and all his children. At that time he lived near the Ohio river, having removed there about 1767. For six years after the murder of his family Logan and his followers kept the West from Detroit to the Holston in terror, and slaughtered great numbers of settlers. A well-known and eloquent speech which Logan sent to the whites by the interpreter a few months after the murder of his family is preserved in Jefferson's *Notes on Virginia*, but its authenticity and the accuracy of its statements are open to serious question. Logan, while intoxicated, attacked a party of friendly Indians at Detroit in 1780, and was killed in the affray by one of his own kinsmen. A granite monument was erected to his memory at Fair Hill Cemetery, near Auburn, Cayuga co., N. Y. See *Ta-gah-jutè, or Logan the Indian, and Captain Michael Cresap*, by Brantz Mayer (New York, 1867).

Logan, GEORGE, M. D.: U. S. Senator; grandson of James Logan; b. at Stenton, near Philadelphia, Sept. 9, 1753; studied medicine in Edinburgh; returning to the U. S. in 1779, served in the Pennsylvania Legislature for several terms, and was a warm partisan of Jefferson and the Republican party under the administration of John Adams. In 1798, during the imminent peril of war between the U. S. and France, Dr. Logan, who was a strict member of the Society of Friends, went to Paris as a volunteer peacemaker, and was denounced for so doing by the Federalists, who procured the passage by Congress of the so-called Logan Act, Jan. 30, 1799, making it a high misdemeanor for a private citizen to take part in a controversy between the U. S. and a foreign power, and the law slightly modified remains on the statute books. (Revised Statutes of the U. S., section 5335.) Dr. Logan was a member of the U. S. Senate 1801–07; went to England in 1810 in the hope of contributing to preserve peace with that country; was a member of the Philosophical Society and of the board of agriculture, and author of several papers on scientific farming. D. at Stenton, Apr. 9, 1821.

Logan, JAMES: statesman and author; b. at Lurgan, Ireland, Oct. 20, 1674, of Scotch Quaker stock; was well educated, and became a merchant; removed in 1699 with Penn to Philadelphia; was long in public life as provincial secretary, chief justice, etc., of Pennsylvania; was president of the council and acting governor 1736–38; author of *Experimenta de Plantarum Generatione* (Leyden, 1739); a translation of Cicero's *De Senectute* (1744, printed by Franklin); and other works in Latin and in English prose and verse; was the founder of the Loganian Library. D. at Stenton, near Germantown, Pa., Oct. 31, 1751.

Logan, Gen. JOHN A.: U. S. officer and statesman; b. in Jackson co., Ill., Feb. 9, 1824; received a limited common-school education, and on the outbreak of the war with Mexico enlisted as a private in the First Illinois Volunteers, of which regiment he became quartermaster with the rank of first lieutenant. Returning at the close of the war, he was elected clerk of the court of his native county in 1849; in 1852 graduated at the Louisville University, and was admitted to the bar, attaining popularity and success in his profession; was elected to the State Legislature in 1852, 1853, 1856, and 1857, and was prosecuting attorney 1853–57; was elected to the U. S. Congress in 1858, and again in 1860, resigning his seat to enter the army; in Sept., 1861, was appointed colonel of the Thirty-first Illinois Volunteers,

which he led at the battle of Belmont in November; at Fort Donelson in Feb., 1862, was wounded, and the following month appointed a brigadier-general of volunteers; engaged at Pittsburg Landing in April, and in the West until Nov., 1862, when he was promoted to be major-general; throughout the Vicksburg campaign was in command of a division of the Seventeenth Corps, and was distinguished at Port Gibson, Champion Hills, and in the siege and surrender of Vicksburg; in Oct., 1863, was placed in command of the Fifteenth Corps, which he led with great credit until the death of McPherson, when he succeeded to the command of the Army of the Tennessee. He was, however, shortly after relieved by Gen. O. O. Howard, and returned to the command of his corps, which he led until the fall of Atlanta, when the eventful political crisis, involving the choice of a President, demanded his voice and influence at home, and consequently he did not rejoin his corps until the arrival of Sherman's army at Savannah, after its famous "march to the sea"; when, resuming his command, he retained it through the subsequent march through the Carolinas, and in May, 1865, succeeded Gen. Howard in command of the Army of the Tennessee. He resigned his position in the army in Aug., 1865, and in the November following was appointed minister to Mexico, but declined; subsequently was elected to the Fortieth and Forty-first Congresses, and in 1870, 1878, and 1885 to the U. S. Senate from his native State. He was nominated for Vice-President of the U. S. by the Republican national convention at Chicago, Ill., June 6, 1884; wrote *The Great Conspiracy; its Origin and History* (1885); also *The Volunteer Soldier of America*, published in 1887. D. in Washington, D. C., Dec. 26, 1886. See *Life and Services of Gen. John A. Logan*, by G. F. Dawson (1887).

Logan, Sir William Edmond, LL. D., F. R. S., F. G. S.: geologist; b. at Montreal, Canada, Apr. 23, 1798; graduated at the University of Edinburgh in 1817, and in 1818 became partner in a mercantile house in London; was 1829–38 manager of a coal-mining and copper-smelting enterprise at Swansea, Wales, and prepared geological maps and sections of that region for the ordnance survey; was director of the geological survey of Canada 1842–69, publishing valuable reports and many important scientific papers; was made a chevalier of the Legion of Honor in 1855, a knight by Queen Victoria in 1856, and received several valuable medals and other distinctions. D. in Wales, June 22, 1875. He was the first to apply physical, as distinguished from mineralogical, criteria in the classification of the crystalline rocks of Canada, grouping them by means of their physical relations into a number of great natural systems; and he thus not only initiated what modern science regards as the rational mode of investigation, but accomplished specific results of signal importance. Revised by G. K. Gilbert.

Loganiads: the *Loganiaceæ*, a family of dicotyledonous trees, shrubs, and herbs, mostly tropical, but having a few representatives in the U. S., and briefly characterized by regular gamopetalous flowers, opposite leaves, 4 or 5 partite calyx, hypogynous, regular or irregular, 4 or 5 or 10 cleft corolla, and 2-celled ovary. It contains a large number of poisonous plants. Strychnine, curare, etc., are among its deadly principles. Spigelia and gelsemium, both active poisons and valuable medicines, are the most important native loganiads of the U. S.

Logan, Mount: the highest summit in North America; situated in the Alaskan Alps on the Canadian side of the international boundary. It is visible from the Pacific Ocean at the south, but was not specially noticed until the year 1890, when the range was partially explored by an expedition sent out by the National Geographic Society and the U. S. Geological Survey. The chief of the expedition, I. C. Russell, recognized the peak as an important feature of the country, and named it in honor of Sir William Logan, formerly chief of the Canadian Geological Survey. Two years later the U. S. Coast and Geodetic Survey sent a party under J. H. Turner to make surveys in the same region, and it was through his triangulation that the altitude of the peak was determined and its supremacy discovered. It stands in N. lat. 60° 30′, W. lon. 140° 24′, and has an altitude of 19,500 feet. So far as authentic measurements show, its nearest rivals on the continent are Mt. Orizaba, Mexico, 18,300 feet, and Mt. St. Elias, 18,100 feet, a near neighbor of Mt. Logan, but standing within the territory of the U. S. The peak has not been ascended nor closely approached.

Two other peaks bear the same name. One in Northern Utah (10,000 feet) overlooks Cache valley; the other, in Northern Arizona (7,700 feet), stands near the Grand Cañon of the Colorado. G. K. Gilbert.

Logansport: city; capital of Cass co., Ind. (for location of county, see map of Indiana, ref. 4–D); at the junction of the Wabash and Eel rivers; on the Pitts., Cin., Chi. and St. L., the Vandalia, and the Wabash railways; 70 miles N. of Indianapolis. It is in an agricultural region, has valuable timber and building-stone in its vicinity, and derives large power for manufacturing from the two rivers. The principal manufactures are galvanized iron, linseed oil, wind-pumps, paper, hubs and spokes, flour, and plow-handles. The city contains improved water-works, natural and manufactured gas and electric-light plants, electric street-railway, 9 public-school buildings, public-school property valued at $200,000, a Universalist college, 2 national banks with combined capital of $450,000, and 3 daily, 6 weekly, and 2 other periodicals. The city has an extensive trade in grain, pork, and lumber, facilitated by 10 main and branch railways. Pop. (1880) 11,198; (1890) 13,328; (1900) 16,204. Editor of "Journal."

Logaœ'dic Meters [*logaœdic* is from Gr. λογαοιδικός; λόγος, prose or speech + ἀοιδή, song]: meters or verses containing in each colon one or more cyclic dactyls followed by one or more trochees, and sometimes preceded by one or two polyschematic feet regularly in three-eighths time, as – ⏑, – >, ⏑⏑, ⏑ – (in Greek even ⏑⏑). One of these latter feet is called a "basis," two a "double basis." The verse may have anacrusis besides double basis. In most logaœdic cola, especially in Latin, a basis is either a pure or an irrational trochee. Within a verse a colon often ends with the triseme syllable (⌙) instead of a trochee.

The chief logaœdic verses are the following:

I. Without basis.

1. *Adonic.*—Nomen imago.

—⏑ ⏑ | – ⏑ |

2. *Aristophanic.*—Temperat ora frenis.

—⏑ ⏑ | – ⏑ | ⌙ | – ∧ |

3. *Lesser Alcaic.*—Nec veteres agitantur orni.

—⏑ ⏑ | —⏑ ⏑ | – ⏑ | – ⏑ |

II. With basis.

4. *Pherecratean.*—Vis formosa videri.

– > | —⏑ ⏑ | ⌙ | – ∧ |

5. *Glyconic.*—Pulchris excubat in genis.

– > | —⏑ ⏑ | – ⏑ | – ∧ |

6. *Phalœcean.*—Passer mortuus est meae puellae.

(Not in Horace.) – > / – ⏑ / ⏑ – | —⏑ ⏑ | – ⏑ | – ⏑ | ⌙ | – ∧ |

III. With double basis.

7. *Sapphic.*—Pauca nuntiate meae puellae.

– ⏑ | – ⏑ | —⏑ ⏑ | – ⏑ | ⌙ | – ∧ |

(Horatian scheme: – ⏑ | – > | –, ⏑ | – ⏑ | ⌙ | – ∧ |)

IV. With double basis and anacrusis.

8. *Greater Alcaic.*—Non semper idem floribus est honor.

> ⋮ – ⏑ | – > | —⏑ ⏑ | – ⏑ | – ∧ |

V. Verses of more than one cola, containing "syncope" (⌙) within: so-called "choriambic rhythm." (The true choriambus, – ⏑ ⏑ –, is confined to higher lyric poetry in Greek.)

9. *Lesser Asclepiadean.*

Laudat rura sui, mox reficit rates.

– > | —⏑ ⏑ | ⌙ ‖ —⏑ ⏑ | – ⏑ | —∧ |

10. *Greater Asclepiadean.*

Quae mens est hodie, cur eadem non puero fuit.

– > | —⏑ ⏑ | ⌙ ‖ —⏑ ⏑ | ⌙ ‖ —⏑ ⏑ | – ⏑ | – ∧ |

11. *Greater Sapphic.*

Saepe trans finem iaculo nobilis expedito.

– ⏑ | – > | —⏑ ⏑ | ⌙ ‖ —⏑ ⏑ | —⏑ | ⌙ | – ∧ |

12. *Priapean* = Glyconic + Pherecratean.

13. *Eupolidean* (not in Latin): basis at the beginning of each colon:

ὦ θεώμενοι, κατερῶ πρὸς ὑμᾶς ἐλευθέρως.

– > / – ⏑ / ⏑ ⏑ ⏑ | – ⏑ | —⏑ ⏑ | ⌙ ‖ – > / – ⏑ / ⏑ ⏑ ⏑ | – ⏑ | – ⏑ | – ∧ ‖

VI. Some metricians, ancient and modern, include among logaœdic verses those that contain a dactylic followed by a trochaic colon, as

14. *Greater Archilochian.*

Solvitur acris hiems grata vice veris et Favoni.

$$- \overset{\sim}{\cup} | - \overset{\sim}{\cup} | - \overset{\sim}{\cup} | - \cup, \| - \cup | - \cup | \llcorner | - \wedge \|$$

VII. Sometimes a trochaic or iambic verse occurs among logaœdic verses in the same period, as the third line of the Alcaic stanza:

15. Descendat in campum petitor.

$$> \vdots - \cup | - > | - \cup | - \cup |$$

There is no definite limit to the variety of logaœdic cola and their combinations in lyric poetry. The following sample is from Pindar:

Ἐλατὴρ ὑπέζτατε βροντᾶς ἀκαμαντόποδος Ζεῦ τεαὶ γὰρ ὧραι.

$$\cup \vdots - \cup | - \cup \cup | \llcorner \| - \cup \cup | - \cup \cup | \llcorner \| - \cup | - \cup | - \cup \|$$

In modern languages the systematic use of logaœdic rhythm is almost restricted to imitations of classic poetry, such as Tennyson's *Phalaeceans*:

Look, I come to the test, a tiny poem
All composed in a meter of Catullus.

The name logaœdic is thought by some to be due to the prose-like irregularity; others believe it signifies "speech sung" (words set to music). Possibly it was first applied to verses with bases, which, like the lines in our chants, may have started without definite measure and ended metrically. See Meters, Prosody, and Rhythm. M. W. Humphreys.

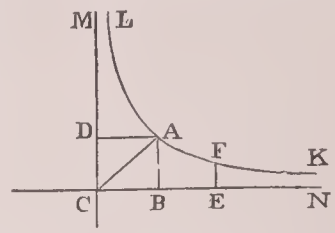
Logarithms [Gr. λόγος, reason, proportion, ratio + ἀριθμός, number (whence Eng. *arithmetic*)]: The logarithm of a number is the exponent of the power to which it is necessary to raise a fixed number to produce the given number. The fixed number is called the *base*. Thus in the equation $10^3 = 1{,}000$, 3 is the logarithm of 1,000, the base being 10. Any positive number except 1 may be taken as a base, and for each base there is a corresponding *system of logarithms*; there is therefore an infinite number of systems of logarithms, but only two of them are in general use—the *Napierian* and the *common* system. The Napierian system, named after its inventor, Baron Napier, is the system whose base is 2·718281828 . . .; the common system is the system whose base is 10. In what follows we shall designate Napierian logarithms by the symbol l, and common logarithms by the symbol *log*.

Uses.—Napierian logarithms are mostly employed in the higher branches of analysis and in scientific investigations. Common logarithms are used in practical computations, where they serve to convert the operations of multiplication and division into the simpler ones of addition and subtraction. In trigonometric computations their use is almost indispensable. Computations by means of logarithms are made in accordance with the following principles: 1, the logarithm of the product of any number of factors is equal to the sum of the logarithms of the factors; 2, the logarithm of a quotient is equal to the logarithm of the dividend diminished by that of the divisor; 3, the logarithm of any power of a quantity is equal to the logarithm of the quantity multiplied by the exponent of the power; and 4, the logarithm of any root of a quantity is equal to the logarithm of the quantity divided by the index of the root. In applying these principles the logarithms needed are taken from tables called tables of logarithms. The method of forming these tables will be explained hereafter.

General Properties of Logarithms.—In the exponential equation $a^x = n$ we may regard a as the base of any system of logarithms, in which case x will be the logarithm of n taken in that system. The discussion of this equation indicates the following general properties: 1, the logarithm of 1 in any system is equal to 0; 2, the logarithm of the base of any system, taken in that system, is 1; 3, in any system whose base is greater than 1 the logarithms of all numbers greater than 1 are positive, the logarithms of all numbers less than 1 are negative, the logarithm of 0 is $-\infty$, and the logarithm of ∞ is $+\infty$; 4, in any system whose base is less than 1 the logarithms of all numbers greater than 1 are negative, the logarithms of all numbers less than 1 are positive, the logarithm of 0 is $+\infty$, and the logarithm of ∞ is $-\infty$; 5, there are no real logarithms of negative numbers in any system. These general properties are used in analytical investigations.

Relations between Different Systems.—Every logarithm is composed of two factors. The first factor is constant for the same system, and depends for its value on the base of that system; the second factor is independent of the base of the system, but is dependent on the particular number in question, and changes with it. The constant factor corresponding to any system is called the *modulus* of that system. The modulus of the Napierian system is 1, that of the common system is ·4342945, and that of any system is equal to the reciprocal of the Napierian logarithm of the base of that system. Since the Napierian logarithms of all numbers less than 1 are negative, and of all numbers greater than 1 are positive, it follows that the modulus of a system whose base is less than 1 is negative, and that the modulus of a system whose base is greater than 1 is positive. A modulus may have any value from $-\infty$ to $+\infty$; it is to be observed that the modulus decreases algebraically as the base increases. If we multiply the Napierian logarithm of any number by the modulus of any system, the product is the logarithm of the same number in that system. This principle enables us to find the logarithm of any number in any system when we have a table of Napierian logarithms.

Geometrical Relations.—Napierian logarithms are sometimes called hyperbolic logarithms, on account of their relation to the equilateral hyperbola; there is, however, no good reason for this distinction, inasmuch as the same relation that exists between the logarithms of this system and a particular equilateral hyperbola exists also between those of any system whatever and some other equilateral hyperbola. To explain the nature of this relation, let LAK be one branch of an equilateral hyperbola, whose equation, when referred to its asymptotes, CN and CM, is $xy = m$; let A be the vertex and let F be any point on the curve; and let CB and CE be the abscissas of A and F, the latter being called the *terminal* abscissa. The square described on the co-ordinates of A is equal to m, as may be shown from the equation of the curve. Now it may be proved by means of the calculus that the area $CDAB$ is to the area $BAFE$ as 1 is to the Napierian logarithm of CE. Denoting the area $BAFE$ by A, and CE by x, we have



$$m : A :: 1 : lx, \ldots \quad \therefore A = mlx; \ldots (1).$$

Hence the area between an equilateral hyperbola and one of its asymptotes, estimated from the ordinate of the vertex up to any other ordinate, is equal to the logarithm of the terminal abscissa taken in a system whose modulus is the square described on the co-ordinates of its vertex. If we take the conjugate of the hyperbola LAK, whose equation is $xy = -m$, equation (1) will become

$$A = -mlx \ldots (2).$$

The numerical value of m in equations (1) and (2) depends upon the value of CB; by giving suitable values to CB, m may be made to have any value from 0 to $+\infty$; that is, $\pm mlx$ may be made to represent the logarithm of x in any system whatever. If we make $CB = 1$, we have $m = 1$, and equation (1) becomes $A = lx$, a result that conforms to the Napierian system. The value of the area A may be expressed by an infinite series in terms of x, and this series may be used as a means of computing a table of logarithms. Such a series was originally employed for this purpose, but its use has been superseded by others found to be more convenient.

Tables of Logarithms.—Tables of logarithms are tables from which we may find the logarithm corresponding to any number, or the number corresponding to any logarithm, within certain limits. Every logarithm consists of two parts—an entire part, called the *characteristic*, and a decimal part, called the *mantissa*. Either of these parts may be 0, and the characteristic may be either positive or negative, but the mantissa is always positive. The characteristic may be found by a very simple rule, and for this reason it is not given in the ordinary tables; the decimal point is also omitted in writing the mantissa. The manner of arranging the tables, as also the manner of using them, will be best learned from the explanations which precede each collection of tables: and to these the reader is referred for all information of that nature. In addition to the logarithms of natural numbers, the tables usually contain the logarithms of the principal circular functions—sine and cosine, the tangent and cotangent, from 0° to 90°. The inconvenience of negative characteristics is avoided by adding 10 to each log-

arithm ; an allowance is made in the final result for each 10 thus added. The same device is employed in using the logarithms of ordinary decimals.

Logarithms were invented by Baron Napier, who published an account of the same in 1614 in a work bearing the title *De mirifici Logarithmorum Canonis Constructione*. The first table of common logarithms was published by Briggs in 1624 under the title of *Arithmetica Logarithmica*. He calculated the logarithms of all the numbers from 1 to 20,000, and also from 90,000 to 100,000, carrying out his figures to 14 decimal places. In 1628 Adrian Vlack supplemented the work of Briggs by publishing a book bearing the same title, *Arithmetica Logarithmica*, in which he supplied the logarithms of the numbers from 20,000 to 90,000, but at the same time he reduced the number of decimal places to 10. Vlack included in his work the logarithms of the sines, tangents, and secants for each minute of arc from 0° to 90°. Five years later the same author published a table of the logarithms of sines and tangents, for every *hundreth* of a degree from 0° to 90°, which had been computed by Briggs. In 1797 Vega published an edition of Vlack's tables, but the work is out of print and copies are difficult to be found. Probably the best accessible tables are those of Bruhns, published at Leipzig, in both German and English.

Antilogarithms.—An antilogarithm is the number corresponding to a given logarithm. Thus 100 is the antilogarithm of 2 in the common system. Antilogarithms, in the common system, are denoted by the symbol $\log^{-1}$. Thus $\log^{-1} 2 = 100$ is equivalent to the expression, the number whose logarithm is 2 is equal to 100.

Revised by S. Newcomb.

Loggerhead Turtle: a large sea-turtle (*Thalassochelys caretta*) inhabiting the tropical Atlantic and Indian Oceans, so named from its large head, by which it can be readily distinguished from the green turtle. The flesh is not palatable, but the species, especially the smaller individuals, is often brought to market. In the Southern U. S. the name is often applied to the snapping turtle (*Chelydra serpentina*).

F. A. L.

Logic [from O. Fr. *logique*, Lat. *lo'gica*, from Gr. λογική (sc. τέχνη, art), logic, liter., fem. of λογικός, pertaining to thought or reasoning, deriv. of λόγος, word, reason, thought]: the science of the processes and laws of discursive knowledge. The processes involved are conception, judgment, and reasoning. Logic assumes the whole content of the unreflective consciousness, what Hodgson calls "the perceptual order," and also certain axioms and first principles on which reflection proceeds. *Conception* is the process through which we reach notions of the abstract properties and the genera and species of things. Notions when named are called *terms*, and are classified as abstracts and concretes, singulars and generals, absolutes and relatives, positives, negatives, and privatives, collectives and distributives, etc. They are also distinguished in view of their *extension* or object-reference, their *intension* or meaning, and also in view of their *denotation* and *connotation*, terms almost equivalent, respectively, to extension and intension. Terms indicating genera and species are also open to *definition* and *division*, the former process developing their meaning or generic and specific characters, the latter fixing their place in a logical classification. The principal rules for these processes are: for *definition*, that it shall be sufficient to indicate the genus and differentiæ of the term defined, and that the terms of the definition shall be clearer than the thing defined; for *division*, that cross-divisions shall be avoided, and that the sum of the species shall exhaust the class divided.

Judgment is the function through which we combine or separate the contents of two notions or terms by means of assertion, as when on contemplating the notional content of Athenian and Greek we assert that the Athenians are Greeks. Assertions when verbally stated become *propositions*. The logical treatment of propositions embraces their classification, distribution of their terms, and their interrelations. The classification of propositions on the basis of quantity and quality gives the four traditional forms, the universal and particular affirmatives and negatives, symbolized by the vowels A, E, I, and O. The terms in propositions are distributed or undistributed, according as the assertion includes *all* or only *part* of the class which the term names. The interrelation of propositions is called their *opposition*, and may be of three distinct species—contradiction or quantitative and qualitative opposition combined; contrariety or opposition of quality; subalternation or opposition of quantity. The properties of propositions lay the foundation for their inferential use.

Reasoning is the function by which the mind proceeds from a present content called data to other content which it reaches through inference. This is achieved either by connecting facts with principles or laws through generalization, that is, by Induction (*q. v.*), or by connecting a principle or genus with its species by means of specialization, that is, by *deduction*. Of deductive inference it is customary to distinguish two species, named respectively immediate and mediate. Immediate inference is the process by which the direct implications of judgments are drawn out. No assertion stands alone, but is a member of a logical community which is affected throughout by its action. Every judgment, besides what it explicitly asserts, both affirms and denies by implication. It is the business of immediate inference to develop these implications. Its principal methods are *opposition*, which proceeds on the relations of contradiction, contrariety, and subalternation; *conversion*, which transposes the terms of the judgment either simply, that is, without change of quantity and quality, or *per accidens*, that is, by a change of quantity from universal to particular. Of the four fundamental forms, E and I convert simply, while A is converted *per accidens*. O can be converted by being first changed into I. Other methods of immediate inference are *obversion*, which develops the assertion of the opposite quality that is implied in every judgment; *contraposition*, which gives the converse of this opposite; the addition or transposition of qualifying words or phrases and other devices of which special mention need not be made. Immediate inference is a most fruitful source of conclusions both in its popular use and in the stricter employment of it in science and philosophy.

Mediate inference is the process by which conclusions are indirectly reached through a comparison of assertions. It embodies itself in several types, namely, the *calculative*, which is founded on pure relations of quantity, and embraces all mathematical and quasi-mathematical reasoning; the *subsumptive*, which is founded on relations of genera and species, and includes all distinctively syllogistic reasoning; the *generalizing*, which is founded on relations of facts, and constitutes the special instrument of induction. The *subsumptive* type is the special instrument of the traditional logic. Subsumptive reasoning proceeds by so relating the contents of two terms to that of a third or common term in two propositions, of which one enunciates a general principle, the other a specification under it, as to render a conclusion as to their relation to each other possible.

The first judgment or proposition enunciating the general principle is called, technically, the major premise; the other is called the minor premise, and the two, together with the inference or conclusion drawn from them, constitute what is called a syllogism. Of these three parts all syllogisms consist; but for the most part we have in practice either (1) an omission of one of the premises, as A is B, therefore A is C, in which case we call the abridged form an enthymeme, or (2) several premises following each other in some regular order, and only one conclusion drawn from them, as A is B, B is C, C is D, therefore A is D. This is called a sorites. In such cases we have, in fact, two or more syllogisms condensed into one formula by the omission of some of the propositions that would have appeared if each of the syllogisms had been stated in full, each with its own premises, and the conclusion to each pair distinctly stated as such in due order. Thus, in the example just given, we have, in fact, (1) B is C, A is B, therefore A is C; (2) C is D, A is C, therefore A is D; that is, the second premise of the sorites becomes the major premise of the first syllogism; the first is the minor premise, and the conclusion is a proposition that did not appear in the sorites at all. Then for the second syllogism the third premise of the sorites is used for major premise, and the conclusion of the first syllogism is used for minor premise, and so on until we come to a syllogism that has for its conclusion the same proposition as the sorites itself. In the case of the enthymeme the premise is omitted, because it is a part of the common sense or the acknowledged science of mankind, and therefore needs no repetition or explicit statement. It is, however, a part of the syllogism or argument as truly and as really as though it were expressed, since without it no conclusion can be drawn from any proposition which would contain any term that was not contained in the prop-

osition used as a premise itself. Hence the means by which we can find the suppressed or omitted premise is one of the most important parts of logic in a practical point of view.

There are three species of syllogisms determined by the specific relations on which they are founded. The *categorical* syllogism rests on the relation of individuals or species to their genus. The major premise in the categorical syllogism is some proposition about genus. Since the individual and species are contained in the genus, any proposition about genus will be unqualifiedly applicable to them also. For example, if genus *homo* is fallible, then Socrates and the Athenians will be fallible also. Besides the categoricals there are two species of *hypothetical* syllogisms—the *conjunctive* and *disjunctive*, as they are styled by Fowler. The peculiar character of the *conjunctive* syllogism arises from the fact that it rests on a categorical proposition about genus, which is not enunciated. Thus in the conjunctive statement, if it rains the ground will be wet, is implied the categorical, rain wets the ground, and in the conjunctive, if Socrates is an Athenian he is a Greek, is implied the categorical, the Athenians are Grecks. The ground-prineiple of the conjunctive syllogism is therefore an unenunciated categorical proposition, on the strength of which we assume a relation of conditional dependence of subject or predicate, and say, if rain, then wet ground; if Athenian, then Greek. The *disjunctive* syllogism also rests on a categorical presupposition, namely, that of a genus or whole within which the disjunction takes place. Thus if we assert disjunctively that a triangle is either isosceles, right angled, or scalene, we do so on the presupposition of a containing figure of which these are the only alternative species. They are the possibilities among which the aetuality is to be found.

The rules of the hypotheticals may be briefly stated. In a conjunetive syllogism if we affirm the antecedent we prove the eonsequent, and *vice versa* if we deny the consequent we disprove the antecedent. Thus

If A is B, C is D.

A is B,	C is not D,
Therefore C is D.	Therefore A is not B.

Any other mode of completing the syllogism would be fallacious. This will be obvious from a simple example: "If John has a fever he is sick. John has a fever, therefore he is sick"; "John is not sick, therefore he has not a fever." This is right; but if we say, "John has not a fever, therefore he is not sick," or if we say, "He is sick, therefore he has a fever," it would be manifestly wrong.

In a disjunctive syllogism it is always safe to deny one of the parts or propositions as a means of proving the other, as "A is either B or C; A is not B, therefore A is C; or A is not C, therefore A is B." Polypes are either plants or animals: they are not plants, therefore they are animals; bnt the other method of completion, offering one proposition to disprove the other, is not always valid. Thus "Coleridge is either a poet or a philosopher; he is a philosopher, therefore he is not a poet." In this case poets and philosophers are not what are called co-ordinate parts or species, for a man may be both a poet and a philosopher at the same time. The *dilemma* is a complex hypothetical combining both conjunctive and disjunctive elements.

The most important and fundamental species of syllogism is the *categorical*, and it is in its elaboration that most of the machinery of logic has been developed. The categorical syllogism is formally a combination of three propositions, two of which are called *premises*, the third *conclusion*. For example, we argue, the causes of crime should be suppressed; ignorance is a cause of crime; therefore ignorance should be suppressed. Here the major enunciates a general principle, the minor makes a specification under it, and the conclusion applies the principle to the case specified in the minor. In the categorical syllogism three terms are employed, namely, a major and minor between which the reasoning is seeking a connection, and a middle term which stands so related to the major and minor as to show that one is wholly or in part included in or excluded from the other. Thus arise the different varieties of affirmative and negative conclusions. Now, it is manifest that with A for major premise we may have either A, E, I, or O for minor, and thus four pairs of premises, A A, A E, A I, and A O, and with each pair we can have either A, E, I, or O for a conclusion; and thus sixteen syllogisms differing from each other in what is called the mood of the syllogism. In like manner we may have sixteen with either E, I, or O for major premise, making in all sixty-four moods. Thus, for an example of A A A, we have, "All S are M, all M are P; therefore all S are P"; of E E E, "No S are M, no M are P; therefore no S are P." The former is at once seen to be valid, and the latter is about as obviously invalid or fallacious, actually proving nothing.

In the above example S was used to denote the subject of the conclusion, which is therefore called the minor term, and is found only in the minor premise. P was used for the predicate of the conclusion. It is therefore called the major term, and is found only in the major premise. M stands for what is called the middle term. It is found in both premises, but not in the conclusion. It may, however, occupy either of four positions in the premises, as (1) subject of the major premise and predicate of the minor; (2) predicate in both; (3) subject in both; or (4) the inverse of the first, predicate of the major premise, and subject of the minor. These varieties of position constitute what is called the figure of the syllogism. As each of these positions of the middle term may be found in either of the sixty-four moods, we may have 256 different categorical syllogisms.

Most of these 256 syllogisms are invalid—not only worthless, but actually delusive. Hence the discovery of some rules and practical tests of validity is of the utmost importance. *Fallacies* may be of two kinds—either (1) in form or (2) in diction. A fallacy is said to be in form when it is obvious on the mere inspection of the form of the syllogism, without considering or knowing the meaning of the propositions, or of its terms even; as "M is not P, S is M; therefore S is P"; but when there is no fallacy in form there may be one in diction, which renders the reasoning worthless. This can be discovered and exposed only by a consideration of the meaning of the several propositions considered separately. Thus "Light comes from the sun, feathers are light; therefore feathers come from the sun." In this case the form is faultless, but the diction is fallacious. The word "light" is ambiguous, and means one thing in one premise and something else in the other.

Besides these two classes of what are called logical fallacies there are one or two others, called extra-logical fallacies, of which we shall say a word in conclusion. First we shall speak of fallacies in form:

(1) There may be no more than three real terms. There may be any number of words, for nouns will often have several adjectives and modifying clauses, but for the purposes of logic a noun with all its adjectives may be considered as one word. As an example of the "fallacy of many terms," as it is called, we have the following: "My hand touches the pen, the pen touches the paper; therefore my hand touches the paper." Here, as we see on a careful analysis, we have four terms, four different things really spoken of: (1) my hand, (2) that which "touches the pen," (3) "the pen," and (4) that which "touches the paper"; and the syllogism *implies*, though it does not state, that whatever touches the pen is the pen, which is of course absurd. It will sometimes happen, however, that what is thus implied is not only not absurd, but is in fact quite true. In that case the apparent fallacy is only an abridged form of the sorites, of which we shall say more below.

(2) If both premises are negative, there can be no conclusion. Thus "S is not M, M is not P." After these premises we can have no conclusion. "Horses are not men, men are not birds." It is true that horses are not birds, but if we say "Horses are not men, and men are not quadrupeds," we can have no conclusion, although we know otherwise that horses are quadrupeds. It will sometimes happen, however, that there is an appearance of two negative premises when one or both of them is really affirmative. Thus "No one who has not enough can be called rich, but no miser has enough: therefore, no miser can be called rich." Here two of the negatives virtually correct each other, making for the middle term "person not having enough," and the inference is as valid as though the middle term were positive, "persons having enough," or "No S is M" (which is equivalent to "S is not M"). "Whatever is not M is P" (equivalent to "All not M is P"), "therefore S is P."

(3) It is found to be necessary that the middle term should be used once at least, as either the subject of a universal proposition or the predicate of a negative one. The failure to fulfill this condition constitutes what is called an undistributed middle. Thus "Horses are animals, foxes are animals; therefore horses are foxes"; but horses and foxes are co-ordinate species of animals, and therefore can not be

predicated of each other. Even this fact, however, is not proved by the premises, for we may have "Dogs are animals, spaniels are animals." Spaniels are a species or variety of dogs, so that in this case the major and the minor terms are subordinate rather than co-ordinate, and may be predicated of each other affirmatively.

(4) Neither the minor nor the major term may be used in the conclusion as subject of a universal proposition, or as predicate of a negative one, unless it had been used in one or the other of these ways in the premises. The violation of this condition constitutes what is called "illicit process," and the fallacy is called illicit process of the minor when the minor term is used in violation of this law, and when the major term is so used, the fallacy is called illicit process of the major. Here, again, the demonstration of the law would require more space than can be spared to it. As an example of illicit process of the minor term we may have the following: "Horses are quadrupeds, and horses are useful animals; therefore *all* quadrupeds are useful animals." It would be legitimate to say either "Some quadrupeds are useful animals," or "*Some* useful animals are quadrupeds." Then, for an example of illicit process of the major, we have, "Negroes have black skins, the Arabs are not Negroes; therefore the Arabs have not black skins." Here the negative term "black skins" is predicate of a negative conclusion, whereas it was not used as either subject of a universal or as predicate of a negative premise. It was predicate of an affirmative proposition in the major premise.

There are several other convenient rules known to the expert logician, but they are too abstruse and technical to admit of being given here. There are, however, two that may be given that are of great practical value, though resulting from the application of the preceding four: (1) After two particular premises there can be no conclusion, for it is found that in all such cases a conclusion would involve either an undistributed middle or an illicit process.* (2) After one particular premise there can be no universal conclusion, for the same reason as that just given in regard to any conclusion after two partial propositions. (3) It is also found that after one negative premise there can be no affirmative conclusion. We have seen that after two negative premises there can be no conclusion whatever, but if one of the premises be negative, any affirmative conclusion involves a violation of the fundamental conditions of validity.

Generally, however, the syllogism is left incomplete, and some premise is assumed without being stated. For this and for other reasons it becomes very important to know how to find and put into explicit statement the assumed premise. This can always be done by means of the principles and rules already laid down, but for the purpose now before us another set of rules is more immediately applicable. Of course we have in the enthymeme the conclusion and one premise. We have therefore all the terms that can be used, and the problem is to find the other and assumed premise, such in character as that it will complete the syllogism without violating any of the rules above laid down. The four rules are as follows: (1) If the conclusion be universal affirmative, both premises must be affirmative, and the minor and the middle terms must be distributed. (2) If the conclusion be particular affirmative, both premises must be affirmative, and only the middle term need be distributed. (3) If the conclusion be particular negative, one premise must be negative, and the middle and the major term must be distributed. (4) If the conclusion be universal negative, one premise must be negative, and all three of the terms must be distributed.

It is necessary to pass to the consideration of fallacies in diction. Logic assumes that the terms in any argument, like the letters in an algebraic equation, shall denote each one and the same thing throughout the argument or solution, and that language for the most part shall be used literally, each word describing its object or event as it is, and that no proposition shall have, either expressly stated or necessarily implied, two propositions in one, one of which may be true, while the other is false. Thus if I say, "A man has ceased to be a liar," I *imply* that he has been a liar, and I *assert* that he is not one now; but of course either of these assertions may be true, while the other is false, and they may therefore be both true at the same time. Subject to these conditions, all the fallacies in diction may be referred to four classes. (1) *Ambiguous Middle.*—In this one term (usually the middle term) is used to denote one thing in one proposition and something else in another. Thus in the example already cited, "*Light* comes from the sun, feathers are *light*," here both premises may be true separately if we shall take the word *light* to mean different things in each of them, but not otherwise. (2) *Variation.*—This may be in quantity, condition, etc. Thus "Money will buy whatever is for sale; a ten-cent piece is money," etc. Here the word "money" is not used ambiguously; it means the same thing in each premise, but it is used with reference to different quantities in each premise, and the premises will be assented to only as we so understand the words. (3) *Division and Composition.*—This fallacy consists in using a word (usually the middle term) as a collective term in one place and as a general distributive in the other. Thus in the proposition, "The Romans conquered Carthage," the word "Romans" is used as a collective term. If, now, we should say after the first, "Cicero was a Roman, therefore he conquered Carthage," our fallacy would be one of division; but if the word is first used as general distributive and then as collective, the fallacy takes the form which is called composition. (4) *Substance and Accidents.*—A property may be accidental in one premise, and yet used so as to make it essential in the other or in the conclusion; or it may be affirmed with regard to some property, mode, or accident in a premise, and then affirmed in reference to its substance in the conclusion, and *vice versa*. This constitutes what is called the fallacy of substance and accidents. Thus the example usually given is, "We eat what we buy in the market; we buy raw meat in the market; therefore we eat raw meat," or eat our meat raw. We buy our meat not because it is raw, but rather because it is meat; the "rawness" is merely accidental to the act of purchasing and to the premise, but in the conclusion it is so placed as to make it essential to its meaning. This is called the fallacy of accidents; but if we should say of a certain man, in reference to his pecuniary responsibility, "He is good," and should thus infer by means of a major premise that he is a good "man," we should have the fallacy in the other form, applying what is said in reference to some accidental mode, property, or attribute to the substance itself. This is called the fallacy *a dicto secundum quid ad dictum simpliciter*. Of all the fallacies in diction, those belonging to this class are the most subtle and difficult of detection and exposure.

Extra-logical fallacies are of two kinds—fallacies in matter and fallacies in method.

In regard to the matter, there are several forms of fallacy that are to be noted. The first is what is called *non vera pro vera*—the using a premise that is untrue as though it were true. This applies as well to those propositions that are implied, and can be formed only in the ways of completing imperfect formulas already spoken of, as to those that are expressly stated as premises. Of course, when a premise that is false is used as a real premise the argument fails to prove anything, and will be so regarded by all persons that know its falsity. Then, again, we have what is called *non causa pro causa*, which consists in using as a premise a proposition which, though true enough, is not a premise irrelevant to the conclusion. A proposition occurring in the course of an argument is always irrelevant, or *non causa*, when it can not be connected with the rest as one in a series that makes a sorites by having one of its terms in common with the preceding proposition and the other common to it and the succeeding proposition. Thus if we have "A is B, B is C, C is D, ∴ A is D," the propositions follow in logical order, and are logically connected, but if among them should occur "C is H or M is P," we could not connect such a proposition with the other premises, and although true it would be no premise to A is D.

The fallacies in method may also be of several kinds. First, we have what is called a begging of the question, or *petitio principii*. As a general rule, one of the premises is so evidently true that it may be assumed without proof and without remark, while all effort at proof should be directed to the other. If an orator, however, assumes as true or as conceded that which his auditors expect or desire to have proved, they accuse him of begging the question; that is, of assuming the very thing they want to have proved before they will assent to his proposition. Logically, both premises should be proved, but rhetoric requires that we should spare ourselves the labor and the audience the annoyance of listening to proof of what nobody doubts. In some cases this begging of the question takes the form of reasoning in a circle—*curriculum nefas*. Suppose we have

* An exception to this rule is the plurative judgment pointed out by De Morgan.

three propositions, 1, 2, and 3, and we use 1 and 2 as premises to prove 3, and then 1 and 3 to prove 2, or 2 and 3 to prove 1, we are in such a case reasoning in a circle; that is, we first deduce a conclusion from premises, and then use that conclusion as a premise to prove one or the other of its premises—that is, its own premises.

The other recognized form of fallacy in method is called mistaking the issue, or *ignoratio elenchi*. One first mistakes the real proposition that is to be proved, and then, seeking proof for his supposed conclusion, does not find the proof that is required for the real conclusion which should be established; and he is said to be ignorant of the proof or to have mistaken the proof, because he had first mistaken the proposition to be proved. A case is cited from Greek history: The Athenians were deliberating whether to put the Mitylenians to death. One orator had tried to show that it was *just* to do so. Another replied that that was not the proposition to be proved; it did not answer the question, for the question really was whether it was *expedient* to do so: nobody doubted the justice of the measure.

At the basis of logic are certain principles called laws of thought. These are identity and difference, and sufficient reason; the former governs by the deductive processes; the latter those of induction. These principles have both psychological and metaphysical roots, the development of which rests beyond the scope of this article.

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Revised by ALEXANDER T. ORMOND.

Logistics [from Gr. λογιστικός, skilled in calculation, fr. λογίζεσθαι, to calculate, fr. λόγος, word, number, reckoning]: that branch of the art and science of war which deals with transporting and supplying armies. It includes arranging and timing marches, preparing and transmitting orders, directing railway and water transportation, selecting and regulating camps and cantonments, as well as the manufacture, purchase, transportation, and distribution of arms, munitions, and supplies of all kinds. It is intimately connected with strategy in the location of bases and dépôts with reference to collecting supplies; and in secrecy, in preparation of means of transport and destination of stores provided, etc., and with *tactics* in that the operations for collecting information, foraging, arranging and timing marches, locating camps, etc., should be so made that the best protective measures may be taken by the troops in accordance with tactical principles and with the least labor and fatigue. See WAR.

JAMES MERCUR.

Logog'raphers [Gr. λογογράφοι, literally, writers of prose]: a name applied to the older Greek chroniclers who mark the transition from the poetical narrative of the epos to true historical composition. Ionia was the home of the earliest Greek prose, and most of the logographers were Asiatic Greeks. Their style was simple and inartificial, though largely imbued with epic elements; there was no organization of the material, and the only criticism was the criticism involved in the incongruity of the legends recorded. The period of the logographers begins toward the end of the sixth century B. C., and straggling representatives of the class are found down to the time of the Peloponnesian war. See HECATÆUS, HELLANICUS, HERODOTUS, and PHERECYDES OF LEROS. The scant fragments are collected in Müller's *Fragmenta Historicorum Græcorum*.

B. L. GILDERSLEEVE.

Log'os [= Gr. ὁ Λόγος, the divine Reason or creative Word manifesting itself, a special use of λόγος, word, discourse, reason (i. e. either thought as actively expressing or manifesting itself or speech as the direct active expression of thought); deriv. of λέγειν, put, put together, reckon, speak (rationally), say, tell]: a term which has a peculiar significance in Philo, St. John, and the early Greek Fathers, and is important in the doctrine of Christ.

(1) Philo, a Jewish philosopher of Alexandria, who endeavored to harmonize the Mosaic religion with Platonism (d. about 40), derived his Logos view from the Solomonic and later Jewish doctrine of the personified *Wisdom* and *Word* of God, and combined it with the Platonic idea of *Nous*. The Logos is to him the embodiment of all divine powers and ideas (the ἄγγελοι of the Old Testament, the δυνάμεις and ἰδέαι of Plato). He distinguished between the Logos inherent in God (λόγος ἐνδιάθετος), corresponding to reason in man, and the Logos emanating from God (λόγος προφορικός), corresponding to the spoken word which reveals the thought. The former contains the ideal world (the κόσμος νοητός); the latter is the first-begotten Son of God, the image of God, the Creator and Preserver, the Giver of life and light, the Mediator between God and the world, also the Messiah (though only in an ideal sense—as a theophany, not as a concrete historical person). Philo wavers between a personal and impersonal conception of the Logos, but leans more to the impersonal conception. He has no room for an incarnation of the Logos and his real union with humanity. Nevertheless, his view has a striking resemblance to the Logos-doctrine of John, and preceded it as a shadow precedes the substance. It was a prophetic dream of the coming reality. It prepared the minds of many for the reception of the truth, but misled others into Gnostic errors.

LITERATURE.—Gfrörer, *Philo und die Alexandrinische Theosophie* (1831); Dähne, *Jüdisch-Alexandrinische Religionsphilosophie* (1834); Grossmann, *Quæstiones Philon.* (1841); Keferstein, *Philo's Lehre von dem Göttlichen Mittelwesen* (1846); Langen, *Das Judenthum zur Zeit Christi* (1867); and especially Emil Schürer, *Lehrbuch der Neu-Testamentlichen Zeitgeschichte* (1874, pp. 648, *seq*; 2d ed. under the title *Geschichte des jüdischen Volkes*, 1890).

(2) St. John uses Logos (translated *Word*) four times as a designation of the divine, pre-existent person of Christ, through whom the world was made, and who became incarnate for our salvation (John i. 1, 14; 1 John i. 1; Rev. xix. 13. The passage 1 John v. 7 is spurious, and omitted in all critical editions and in the Revised English Version). Philo probably suggested the use of the term (although there is no evidence that John had read a single line of Philo), but the idea was derived from the teaching of Christ, and from the Old Testament, which makes a distinction between the hidden and the revealed being of God, which personifies the Wisdom of God and the Word of God, and ascribes the creation of the world to the Logos (Ps. xxxii. 6, Sept.). There is an inherent propriety in this usage in the Greek language, where Logos is masculine and has the double meaning of thought and speech. Christ as to his divine nature bears the same relation to God as the word bears to the idea. The word gives shape and form to the idea, and it reveals the idea to others. The word is thought expressed (λόγος προφορικός), thought is the inward word (λόγος ἐνδιάθετος). We can not speak without the faculty of reason, nor think without words, whether uttered or not. The Christ-Logos is the Revealer and Interpreter of the hidden being of God, the utterance, the reflection, the visible image of God, and the organ of all his manifestations to the world (John i. 18; comp. Matt. xi. 27). The Logos was one in essence or nature with God (θεὸς ἦν, John i. 1), yet personally distinct from him, and in closest communion with him (πρὸς τὸν θεόν, John i. 1, 18). In the fullness of time he assumed human nature, and wrought out in it the salvation of the race which was created through him (i. 14). John, in the Prologue to his Gospel, prepared the Hellenic readers who were familiar with the Philonic Logos doctrine, for the history of Jesus.

LITERATURE.—See the commentaries of Lücke, de Wette, Olshausen, Hengstenberg, Meyer, Luthart, Godet, Lange (Schaff's ed.), Alford, Westcott, and Milligan on the Prologue of John's Gospel; also M. Stuart's *Examination of John i. 1–18*, in *Bibliotheca Sacra* for 1850 (pp. 281–327); Röhricht, *Zur Johanneischen Logoslehre*, in the *Theol.*

Studien und Kritiken for 1868 (pp. 299–315); and H. P. Liddon, *Bampton Lectures on the Divinity of Christ* (London, 1867, lect. v., pp. 310–411).

(3) The Logos doctrine of the early Greek Fathers—Justin Martyr, Clement of Alexandria, and Origen—is based upon Philo and the Prologue of John's Gospel, and was an important factor in the development of the Nicene Creed. See especially Baur, *History of the Doctrine of the Trinity and Incarnation*, and Dorner, *History of Christology*; also the monographs of Semisch and Engelhard on *Justin Martyr*.

PHILIP SCHAFF.

Logroño, lō-grōn′yō: province of Spain; situated between Alava, Navarre, Soria, and Burgos, in the basin of the Ebro. Area, 1,945 sq. miles. It produces an abundance of corn, wine, fruits, and vegetables; is also rich in ores and mineral springs. That part of the province which stretches along the southern bank of the Ebro is an undulating plain, very fertile, especially in its western parts—the so-called La Rioja—which produce excellent wine and oil. The southern parts of the province, however, are very much broken up by offshoots of the sierras which separate the basin of the Ebro from that of the Ducre, and which in Pico Santa Ives rises 7,380 feet. The mineral wealth of the province is completely undeveloped, and the manufacturing industry is inconsiderable. Pop. (1887) 181,465.

Logwood [named from being imported in logs; also called **Campeachy Wood**]: the red heart-wood of a leguminous tree (*Hæmatoxylon campechianum*), from 20 to 50 feet in height. This tree is a native of Mexico and Central America, but is naturalized to some extent in the West Indies. Logwood is the most important dyewood known, and is exported in great quantities. It makes many shades from black to red and lilac, according to the mordant employed. The extract or inspissated juice is largely prepared in its native countries, and is exported. In medicine, logwood is a mild astringent, from the presence of tannic acid. For use in the arts logwood is usually supplied in the form of chips, powder, or solid extract.

Composition.—Logwood contains a peculiar principle, *hæmatoxylin*, a volatile oil, fatty bodies, resinous bodies, tannin, or a body nearly allied to it, acetates, oxalates, chlorides, sulphates, and phosphates of potassium, sodium, magnesium, calcium, aluminium, iron, and manganese, with some silica. *Hæmatoxylin*, $C_{16}H_{14}O_6$, discovered by Chevreul in 1811, is the characteristic principle of logwood; though it is not itself a dye, it readily yields by oxidation (loss of hydrogen), the real logwood dye, which is hæmatein. *Hæmatein*, $C_{16}H_{12}O_6$, is the result of the action of the air on hæmatoxylin in the presence of bases, and exists, in combination with metallic oxides, in all fabrics dyed with logwood or its preparations. It is easily prepared by exposing to the air an ammoniacal solution of hæmatoxylin and drying the resulting precipitate at 130° C. It forms colored lakes with metallic bases; blue or violet with alumina, copper, and tin; black with iron and chromium.

Dyeing with logwood is accomplished with the decoction of the wood or with the extract. It is used for reddish, violet, blue, and black shades, but chiefly for black. Logwood was introduced into England in the time of Elizabeth, but, as the colors then obtained were very fugitive, its use was prohibited under severe penalties. The use of indigo was forbidden at the same time, as it interfered with the use of the native wood. A century later the restrictions on these most useful dyes were removed.

Logwood blacks are the most important shades produced by this dyewood. Cotton is dyed black by boiling in a decoction of logwood, to which a little quercitron is added to give a brownish shade to the black; it is then immersed in milk of lime, then in a cold solution of ferrous sulphate (copperas). It is then returned to the original logwood decoction, to which some soda-ash has been added in the meantime. It is taken out, some copperas is added to the decoction, and it is again submitted to the bath. Wool is dyed black by first boiling it in a solution of copperas, blue vitriol, and argol, then immersing in the logwood decoction. Silk, after being freed from gum by boiling with Marseilles soap, is mordanted with acetate of iron, washed, placed in a solution of quercitron and alum, and finished in a decoction of logwood, to which a little soap is added.

The *iron blacks* do not resist the action of acids, which withdraw the iron, leaving the hæmatein as a red spot; to obviate this defect, potassic bichromate, in combination with cupric sulphate (blue vitriol), is substituted. The resulting black, which is a compound of hæmatein with the oxides of chromium and copper, withstands both acids and alkalies better than the iron compound. Cotton is first boiled in the logwood decoction, with or without quercitron, then placed in the solution of bichromate and blue vitriol. After adding some soda-ash to the original logwood decoction, the cotton is again placed in it; finally, copperas is added to this bath, and the cotton is once more submitted to its action. Wool is first boiled in a solution of bichromate, blue vitriol, argol, and sulphuric acid, and then submitted to the action of the logwood. C. F. CHANDLER.

Lohardaʹga, or **Lohardúʹgga**: a district of the lieutenant-governorship of Bengal, India; between lat. 22° 20′ and 24° 39′ N.; area, 12,044 sq. miles, with 1,610,000 inhabitants. The central and southern portion of the district is an elevated table-land with undulating surface, and the slopes between the ridges are cut into terraces covered with rice. The northern and western portion is a tangled mass of insulated peaks, presenting nowhere a level area of any extent. The principal rivers are the North and South Koel. The native Christians are more numerous in Lohardaga than in any other Bengalese district. At the last census 60 per cent. were Hindus, and 1 per cent. Christians. The two missions are the German Lutheran and the Church of England, which harmoniously and successfully work side by side. The principal town is Ranchi, on the Koel, with (1891) 20,306 inhabitants. Revised by M. W. HARRINGTON.

Löhe, lö′e, or **Loehe**, JOHN CONRAD WILLIAM: Lutheran clergyman and author; b. near Nuremberg, Germany, Feb. 21, 1808; d. at Neuendettelsau, Jan. 2, 1872. Educated at Erlangen, he became pastor of the Lutheran church at Neuendettelsau in 1837, where he founded an institution for the training of missionaries, with especial reference to the supply of German pastors for the U. S. In 1853 he founded a deaconess institute, followed by asylums and hospitals of various kinds. He was the author of *Drei Bücher von der Kirche* (1845), and of several volumes of sermons, but was especially distinguished as a liturgical writer. See his *Agende für christliche Gemeinden des luth. Bekenntnisses* (3d ed., revised by J. Deinzer, 1884). H. E. JACOBS.

Lohenstein, lō′en-stīn, DANIEL CASPAR, von: author; b. at Nimptsch, Silesia, Jan. 25, 1635; studied law at Leipzig and Tübingen; was appointed syndic of the city of Breslau, and imperial counselor; d. Apr. 28, 1683. Lohenstein is a representative of the utmost decay of German poetry in the seventeenth century, a member of the second Silesian school. He wrote many poems, a number of tragedies, and a novel, the contents of all of which are shamelessly immoral and rude, while their language can not be surpassed in bombast. See Konrad Müller, *Beiträge zum Leben und Dichten Daniel Caspar von Lohenstein's* (1882). JULIUS GOEBEL.

Löher, lö′er, FRANZ, von: historian and jurist; b. at Paderborn, Westphalia, Oct. 15, 1818; studied law, history, natural science, and art at Halle, Munich, Freiburg, and Berlin; made extensive travels in Europe, Canada, and the U. S. (1846–47); took an active part in the political movements in Germany in 1848; founded the *Westphalische Zeitung*; was imprisoned by the Prussian Government for political agitation, but shortly after acquitted by the court; became assessor at the court of appeal in Paderborn in 1849, professor at the University of Gottingen in 1853, and was called to Munich in 1855 as secretary of the academy and professor at the university. His writings are partly judicial—*Das System des preussischen Landrechts* (1852); partly historical—*Fürsten und Städte zur Zeit der Hohenstaufen* (1846), *Geschichte der Deutschen in Amerika* (1848), *Jakobæa von Baiern* (1861), and *Kulturgeschichte der Deutschen im Mittelalter* (1891); partly sketches of travel—*Land und Leute in der Alten und Neuen Welt* (3 vols., 1857–58) and *Neapel und Sicilien* (2 vols., 1864). D. Mar. 2, 1892.

Loir, lwäär [Fr. < Lat. *Lide'ricus*, the ancient name]: a river of France; rises in the hills of Eure-et-Loir, flows S. W., and joins the Sarthe, an affluent of the Loir, 5 miles N. of Angers, after a course of about 200 miles, of which about 75 are navigable. It is a river of springs, pure, deep, tranquil, and very winding. It gives its name to two departments, Eure-et-Loir and Loir-et-Cher. M. W. H.

Loire [Fr. < Lat. *Liger*, the ancient name]: the largest and longest river of France. It rises in the Cévennes, and flows in a northwestern and western direction through the center of France to the Bay of Biscay, receiving from the

right the Sarthe, and from the left the Allier, Cher, Indre, and Vienne rivers. It is 620 miles in length, and is navigable 450 miles from its mouth. It is connected by canals with the Seine, the Saône, and the harbor of Brest. The Loire is lined with high embankments, and has a lateral canal completed in 1838 along its lower course, as it is liable to rise considerably, occasioning destructive inundations. In the volume of its water there is almost the irregularity of a mountain-torrent. During the droughts of summer it shrinks into thin and feeble threads winding their way between the sandbanks of the channel, and for about six months of the year navigation is practically impossible. At other times, and often very suddenly, tremendous floods pour down and submerge large tracts of land. Attempts to control the river were made at a very early date. At the close of the Middle Ages the bed between Orleans and Angers was inclosed by dikes, from 10 to 13 feet high, and in 1783 a double line of dikes, 25 feet high, was completed from Bec d'Allier downward. So much sediment has been deposited by the Loire that the depth of water at its mouth at low tide is only 6½ feet. The basin of the Loire comprises one-fourth of the area of the republic, and is so fertile that it is called "the garden of France." In several wars carried on within the boundaries of France the river formed an important strategical element—e. g. in the wars with the English in the fifteenth century, in the wars of 1814, and in the war of 1870–71 against the Germans. In the last instance the Loire formed the boundary between the territory occupied by the Germans and those parts of France which remained unharmed by the invaders. The river is so broad that its passages become very important military positions. The towns of Nantes, Tours, Blois, Orleans, and Nevers are on its banks.

Loire: a department of France, comprising the old province of Forez and portions of Beaujolais and Lyonnais, including part of the basin of the upper Loire and spurs of the Cévennes and Forez Mountains. Area, 1,838 sq. miles. Iron is mined, marble, granite, porphyry, and flint are quarried, and there are extensive manufactures of silk, cotton, iron, steel, and flint glass. In the vicinity of St.-Étienne are rich coal-beds, which yield some 3,000,000 tons annually. Pop. (1896) 625,336. Capital, Montbrison.

Loire-Inférieure, lwăär′ăn′fā′ri-ėr′: a department of France; on both sides of the mouth of the Loire. Area, 2,654 sq. miles. The surface is low, containing extensive lagoons, but the soil is generally fertile. Wine and wheat are produced. Fine horses, good sheep, and many bees are reared. Salt, preserved meats, pickles, and sugar are exported. Capital, Nantes. St.-Nazaire is an important seaport. Pop. (1896) 646,172.

Loiret, lwăä′rā′: a department of France; situated between the Seine and the Loire; consisting of a low, sandy, and unproductive tract on both sides of the Loire, and a more elevated and fertile plain called the plateau of Orleans. Area, 2,614 sq. miles. The principal products are grain, wine, hemp, saffron, timber, and apples. Far more wheat and oats are raised than necessary for home consumption. Sheep and cattle, both of good breeds, poultry and bees, are reared. Pop. (1896) 371,019. Capital, Orleans.

Loir-et-Cher, lwăär′ā-shār′: a department of France; situated on both sides of the Loire, and traversed by several of its affluents, which form extensive lagoons. Area, 2,452 sq. miles. The surface is low and level, but the soil is generally fertile. Wheat, hemp, and vines are extensively cultivated; sheep, horses (the Percheron breed is celebrated both for strength and lightness), poultry, and bees are reared, and some woolens, cottons, leather, and glass are manufactured. Pop. (1896) 278,153. Capital, Blois.

Loja, or **Loxa**, lō′hăă: a southwestern city of Ecuador; on the plateau of the Andes, 5,064 feet above the sea (see map of South America, ref. 4–B). It is favorably situated for commerce, the Cordilleras at this point being lower than elsewhere, and offering a comparatively easy communication from the coast to the Amazon valley, while the Peruvian frontier is but a short distance away. Cinchona bark was first obtained in quantity from the forests E. of Loja, and for a long time the town had an active trade in this article; but little is now obtained, and communication with the Amazon has almost ceased. Loja was founded in 1546, and was long the center of an important gold-mining region. It is somewhat unhealthful, and has suffered severely from earthquakes. Pop. (1893) about 9,000. It is the capital of a province of the same name, having an area of 3,706 sq. miles and a population of about 66,000. HERBERT H. SMITH.

Loki: See DEVIL.

Lokman′: an Arabian fabulist of very early times, concerning whose real epoch and life the traditions are conflicting and untrustworthy. His fables were published at Leyden by Erpenius in 1615, with a Latin translation, and they have since been one of the commonest text-books for learning the Arabic language—a distinction they by no means merit on the score either of elegance or of originality, as most of them may be traced through the Syriac to a Greek original. Among modern editions those of Caussin de Perceval (Paris, 1818), Helot (Paris, 1847), and Derenbourg (Berlin, 1850) may be mentioned.

Loligin′idæ [Mod. Lat., named from *Loli′go*, the chief genus, from Lat. *loli′go*, cuttlefish]: a family of dibranchiate cephalopods of the sub-order *Sepiophora*, with the eyes covered by skin; the internal shell horny and lanceolate; the body oblong, and with a more or less pointed terminal fin; the head is free from the front of the mantle; and the teeth of the radula are in seven regular longitudinal rows, the median and inner lateral teeth being broad and fringed, and the outer long and fang-like. To it belong the most common "squids" of the eastern coast of the U. S. The gigantic cuttlefishes of the North Atlantic (*Architeuthis*) are nearly allied, but differ greatly in the teeth of the radula. Revised by D. S. JORDAN.

Lol′lards [probably from Germ. *lallen*, to sing in a murmuring strain + *-hard*, an affix, signifying one who sings the praises of God or funeral dirges and the like, and probably connected with Eng. *lullaby*]: a term of reproach applied at first to a half-monastic sect which originated in 1300 at Antwerp. The sect was designed to furnish ministrants for the care of the sick. In 1374 and 1377 its members were placed under the protection of Gregory XI. In 1472 Pope Sixtus IV. recognized them as a religious order. Their proper designation was *Cellites* or *Alexians*. A few Alexian houses still exist in Europe. The name was afterward applied especially to the English and Scottish followers of Wycliffe, who were sorely persecuted during the reigns of Henry IV. and Henry V. in England, and in the same and somewhat later times in Scotland, where they were called "Lollards of Kyle." The chief center of Wycliffe's teaching was the University of Oxford, and after the condemnation of his doctrine of the sacraments, in 1382, Archbishop Courtenay proceeded to silence the Wycliffite teachers in the university. There was a strong party in the university which tried to resist the archbishop's interference, but he was supported by the crown, and in the space of five months he succeeded in reducing to silence the Lollard party in Oxford and in securing the orthodoxy of the university. Wycliffe used to send out itinerant preachers, who met with considerable acceptance among the people; and in that field the contest threatened to become both more violent and more protracted. Nevertheless in the course of time the most famous of those itinerant preachers were compelled to recant or were driven into exile—a result which was largely due to a reaction against novelties which was produced by the peasants' rising under Wat Tyler, in 1381. From its beginning the Lollard movement always wore a political aspect, which weakened its religious significance. It was an opposition not only to the doctrinal system of the Church of Rome, but also to her organization. It culminated early in the fifteenth century. See Stubbs, *Constitutional History of England*, Oxford, vols. ii. and iii.; Lechler, *Johan von Wiclif* (Eng. trans. by Lorimer, ed. by S. G. Green, London, 1884); Matthew, *English Works of John Wyclif*.

Lomax, LINDSAY L.: See the Appendix.

Lombard, LOUIS: See the Appendix.

Lom′bard, PETER [*Petrus Lombardus*]: theologian; b. of humble parentage at Lugelogno, near Novara, in Lombardy about 1100; studied theology at Bologna and Rheims, and in Paris under Abelard; taught theology there with great success, and was appointed in 1159 Bishop of Paris, where he died July 20, 1163 (or 1164). He was one of the founders of the scholastic theology of the Middle Ages. His principal work, *Sententiarum Libri IV.*, from which he received the title of *Magister Sententiarum* (master of sentences), is a collection of passages from the Fathers, with accompanying commentaries, bearing on the various doctrines of Christianity. It was first printed in Venice (1477); an edition was pub-

lished in Paris (1841). His works are found in Migne, *Patrologia Latina*, cxci., cxcii. Until the Reformation it was the most common handbook used in all theological schools. See his *Life* by F. Protois (Paris, 1881).

Lombardini, lom-baär-dee'nĕe, Elia: hydrologist; b. Oct. 11, 1794; graduated at the University of Pavia, and devoted himself to the study of fluviatile hydrology; in 1847 was appointed director-general of the public works in Lombardy, and held that position for nine years; in 1860 was nominated senator of the kingdom. Among his numerous and highly important professional writings, most of which appeared in scientific journals, are: *Cenni Idrografici*; *Memoria sull' Importanza degli studii sulla Statistica dei Fiumi*; *Memoria sui cangiamenti nell' idraulica Condizione del Po*; *Sulle Inondazioni avvenute nella Francia*; *Dell' origine e del progresso della Scienza Idraulica in Italia*; *Saggio Idrologico sul Nilo*; *Studii sul grande estuario Adriatico*; several essays on the hydrology of the Po and the Tiber, and the very valuable *Guida allo Studio dell' Idrologia fluviale e dell' Idraulica pratica*, published separately in 1870.

Lombar'do, Pietro: architect and sculptor; b. about 1438, either at Venice or at Carona, near Lugano. His school predominated in Venice till Palladian architecture came into vogue. His first important work was the cloister of the monastery of the Benedictine monks of St. Justina in Padua, the now destroyed Church of St. Christopher in Venice, the statues of St. Anthony and St. John the Baptist, and St. Jerome in St. Stephen's church. At Treviso in the year 1474 he sculptured the lion at the door of St. Thomas's church, and with the help of his sons Anthony and Tullius, he enlarged the cathedral, which he enriched with several statues of saints. He also executed two lions for the Church of St. Nicholas, and designed the monument of the senator Agostino Onigo. On his return to Venice he began the building of St. Andrea alla Certosa, one of his finest works, of which no trace remains. In 1482 Lombardo, having already erected two columns on the public place of Ravenna, the lion of St. Mark of Venice on the one, St. Apollinaris on the other, received a commission for the monument to contain the ashes of Dante. In 1484, assisted by artists of his own family, he executed the splendid monument to the doge, Mocenigo, in the Church of SS. Giovanni and Paolo in Venice. His brother Martin co-operated with him in the building of the Scuola di San Marco (now a civil hospital). The masterpiece of Pietro Lombardo's skill is the Church of Santa Maria dei Miracoli, begun in 1481 and completed in 1489. He designed the Church of Sta. Maria Mater Domini which Sansovino completed; also the clock-tower of St. Mark's. In 1499 he became architect in chief of the Ducal Palace, and for twelve years directed all the architectural work of the republic. The Cathedral of Cividale in Friuli is his work. He also designed the Procuratie Vecchie which have been attributed to Buono, who superintended the building. The chapel in St. Giobbe is also considered Lombardo's work. One hears no more of him after the year 1511. He left three sons, a brother, and nephews, all belonging to his school, who continued working in the manner of their master Pietro. He is supposed to have died at Venice about 1511. W. J. Stillman.

Lombards [from O. Fr. *Lombards* < Lat. *Langobar'di*, apparently from the Teuton. name, meaning long-beard. Cf. Eng. *long-beard*]: a family of the Suevic or Suabian branch of the great Teutonic race. According to their own legends they had once dwelt in Scandinavia, but early emigrated to Northern Germany, and previous to the invasion of Italy were occupying the lands about the middle course of the Danube. Like most of the other Teutonic tribes they became Arian Christians, but in the middle of the sixth century were backward in civilization, having but recently come in contact with the Romans. In 552 5,000 of their warriors under their king, Audouin, joined Naeres in his war against the Ostrogoths in Italy, but at that time gained no foothold there for themselves, and for the next fifteen years the tribe was chiefly occupied in fighting the neighboring Gepidæ. Alboin, the son of Audouin, having conquered the Gepidæ and killed their king with his own hands, married his daughter Rosamond. He was thus free to undertake the conquest of Italy, and entered the Venetian plains at the head of the entire Lombard nation. Encountering but slight resistance, except in the city of Pavia, which he took after three years' siege, Alboin took possession of the valley of the Po, and founded the kingdom of Lombardy in 568. Ravenna under its exarch remained Greek, but the remainder of the country was divided into duchies. Alboin at the height of his power, while intoxicated at a grand orgy, compelled his wife to drink wine from her father's skull. She revenged herself by inducing two soldiers to murder him during his sleep. He was succeeded by Cleph (572), who during his short reign of eighteen months greatly extended his dominion. After ten years of anarchy, in which the Lombards under thirty-five dukes ravaged the greater part of Italy, they chose Authari for king. Under this leader the Lombard empire was extended, though during his reign the Franks made ravaging expeditions into his dominions. Freed from these invaders, Authari consolidated the kingdom. After his death (590) his widow, Theodelinda, married Agilulf, who became a Catholic and in the course of his reign was followed into the orthodox Church by most of his people. Adaloald, who succeeded him (615), was deposed by the dukes, or peers, who elected Ariovald of Turin, his brother-in-law. Rothari (636) crushed the turbulent aristocracy, which threatened the stability of the empire, extended his dominions, and became famous by the compilation of the great code of Lombard laws in 643, embodying the traditional usages of the nation. From the reign of Rothari the royal succession presents the usual scenes of murder, debauchery, intrigue, and dethronements common to all governments of the time under weak monarchs, until the accession of the great Luitprand (712). He united the kingdom by subduing the refractory aristocracy, and would have united Italy but for the intrigues of the Church of Rome, which then, as at all subsequent periods, opposed the union of Italy. He greatly weakened the power of the Eastern emperor in Italy, adding a large part of the exarchate to the Lombard territories. Ratchis, who succeeded Luitprand (744), was so far influenced by the pope as to become a monk. Aistulf, his brother, who became king in 749, endeavored to carry out the old Lombard ideas, but was checked by Pepin, who twice forced him to sue for peace, and on the second occasion seized the exarchate and transferred it to the pope. Desiderius or Didier, his successor, had for co-regent Ratchis, who was taken from the cloister. Getting rid of Ratchis, Desiderius ruled alone. His daughter married Charlemagne, but as soon as the latter was on the throne he divorced his wife and sent her back to her father. For revenge, Desiderius supported the claims of the heir of Carloman, Charlemagne's brother, and marched upon Rome, which had supported the outrage committed by Charlemagne, leaving his throne in charge of his son, Adelchis. Charlemagne invaded Italy (773) and conquered Adelchis, who fled to Constantinople. Desiderius, who was made prisoner, ended his days as a monk in the abbey of Corbeia. The Lombard government of dukes was replaced by that of the Franks, but in the south the duchy of Beneventum maintained a semi-independence. Thus perished the Lombard rule after a duration of over 200 years. The Lombard laws and architecture, art and culture, were of a high order, and no race of the Transition or Romanesque period developed greater energy or originality, or exercised a greater influence upon the Teutonic races of Europe.

The name *Lombards* also was given during the Middle Ages to a vast number of shrewd and intelligent Italians, principally from Lombardy, who abounded in London and Paris during the twelfth century. They were principally brokers, bankers, and usurers, who advanced money on all kinds of securities. Lombard Street in London derived its name from them, and there is in Paris another, once entirely occupied by Lombards, which bears the same designation. That of London still is to Great Britain what the Lombard Street of Paris was to France, the financial center of the country. Both in France and England the Lombards were regarded, though in less degree, like the Jews, as a despised race, and were accordingly oppressed by the sovereigns of those countries. Revised by F. M. Colby.

Lombard University: an institution which, as the Illinois Liberal Institute, was founded at Galesburg, Ill., by Universalists, and was incorporated in 1851. In 1855 Benjamin Lombard made a liberal donation to the institution, and its name was changed to Lombard University. It was the second college in the U. S. to admit young women into its classes on equal terms with young men, Oberlin College being the first. In its college of letters it offers students three courses of study, classical, scientific, and literary, leading respectively to the degrees of bachelor of arts, bachelor of science, and bachelor of literature. It maintains a pre-

paratory department for students preparing for college or for business. The Ryder Divinity School connected with the university, gives the degree of bachelor of divinity to students who complete the prescribed course of study. The university possesses spacious grounds in the southeastern part of the city of Galesburg. In 1900 it had 116 students in all departments. J. V. N. Standish.

Lom'bardy: a territory of Northern Italy; extending from the Alps to the Po, and from Lago Maggiore and the Ticino, which separate it from Piedmont, to Lago di Garda and the Mincio, which separate it from Venetia. It consists of an alpine region to the N. covered with picturesque mountain ranges and containing beautiful valleys, and a large and exceedingly fertile plain to the S., extending along the Po, and watered by the Ticino, Lambro, Adda, Oglio, and Mincio. This plain, with its rich soil and mild climate, is not only one of the most fertile, but also one of the best-cultivated and most prosperous parts of the kingdom of Italy. Large crops of wheat, maize, rice, and millet are raised. Melons, oranges, figs, citrons, peaches, olives, and mulberry-trees are extensively cultivated; also vines, though the wine produced is of inferior quality. The principal industry is dairy-farming, which annually produces about 50,000,000 lb. of excellent cheese. The principal manufacture is silk, which is produced in large quantities and of excellent quality; the annual value of this single product is estimated at $15,000,000. The hilly region is rich in beautiful marbles. The territory, comprising an area of 9,075 sq. miles, with a population of 3,957,261 (1890), does not form a political unit at present, but is divided into the provinces of Bergamo, Brescia, Como, Cremona, Milan, Pavia, and Sondrio. It received its name from the Lombards (*q. v.*), who in 568 conquered Northern and Central Italy and established an independent kingdom, which flourished till 774, at which time it was incorporated with the Carlovingian empire. By the treaty of Verdun in 843, Lombardy, together with a long but narrow strip of country situated between France and Germany, and inhabited by Frankish tribes, was formed into a kingdom under a ruler of the Carlovingian house, and it remained a Frankish possession till the death of Charles the Fat, in 888. After this time several independent duchies arose in the eastern portion of the old Lombardian dominions, and in 961 the western and central parts, Lombardy proper, fell under the feudal authority of the German empire. In the beginning of the eleventh century it succeeded in separating itself from Germany, and a number of small republics, generally consisting of one city only, with a dependent territory, were formed. This period of its history, which lasted to the middle of the sixteenth century, is the most interesting and prosperous. Twice united into powerful leagues, the Lombard cities defeated Frederic Barbarossa in 1176 and Frederick II. in 1225; and after the dissolution of the league Milan (*q. v.*) still remained a power which commanded some respect under the sway of the Viscontis and Sforzas (*qq. v.*). The duchy of Milan was the disputed prize in the long wars between Charles V. and Francis I. (1521–44), but Spain maintained her claim and held the country till 1706, when it fell to Austria. During the wars between France and Austria at the end of the eighteenth and the beginning of the nineteenth centuries, Lombardy successively belonged to the Cisalpine republic, the Italian republic, and the kingdom of Italy, but in 1815 it was restored to Austria, which ceded it to the King of Sardinia in 1859 by the treaty of Villafranca.

Lombok': one of the group of the Sunda islands; in the Malay Archipelago; situated between Bali and Sumbawa, and belonging to the Netherlands. Its area is 2,100 sq. miles; its population is estimated at 300,000, mostly indigenous Mohammedans. Its coasts are mountainous, containing several active volcanoes; the interior is a low and fertile plain. Rice and cotton are extensively cultivated. The capital is Mataram; the seaport Ampanam, much frequented to obtain provisions. Lombok marks the eastern limit of the Australian fauna, as Bali marks the western limit of the Asiatic, though they are separated only by a narrow strait.
Revised by M. W. Harrington.

Lom'briz [corruption of Span. *lombrici*, intestinal worms]: a term used in the southern and western parts of the U. S., including the Territories, meaning a disease of sheep and goats caused by the presence of a small worm (*Strongylus contortus*). This parasite is of a reddish color, about a tenth of an inch long, and attaches itself to the mucous membrane of the fourth stomach. When present in large numbers the worms cause diarrhœa, anæmia, weakness, and death. The eggs of the worm pass from the host with the fæces, fall upon the grass, and are eaten by the sheep or goats, which thus become infected. Prevention is best accomplished by keeping sheep away from infected pastures until after freezing weather, which destroys the egg. The most highly recommended treatment is to administer one or two drachms of turpentine with twenty times the volume of milk.
Leonard Pearson.

Lombroso, Cesar: criminologist and alienist; b. in Venice in Nov., 1836; from his early youth he was an ardent and versatile student, turning his energies first to literature and linguistics, and later to the study of Roman and religious antiquities, and to the subject of medicine; received degree of doctor of medicine from the University of Turin; entered the army in the campaign of 1859 as a soldier, but was soon made army-surgeon; took professorship in Diseases of the Mind in the University of Pavia (1862), and later became director of an establishment for the insane at Pesaro, from which place he went to the University of Turin as Professor of Medical Law and of Psychiatry. He has written a very large number of books and monographs, the most important of which are those upon criminology, to the study of which he has given a great impetus. His works are marked by originality and suggestiveness rather than by critical discernment or well-weighed conclusions. His theory of criminality is fatalistic, and regards the criminal as chiefly the result of atavism, or the result of heredity and climatic environment. Some of his most important works are *The Criminal, an Anthropological and Medico-legal Study* (vol. i., 1875; 4th ed. 1886; vol. ii., 1889); *The Man of Genius* (5th ed. 1888); *Anthrometry of Four Hundred Criminals* (1872); *Epileptic Insanity* (1863); *Psychiatrico-legal Investigations by Experimental Methods* (1867).

Lome, Enrique Dupuy, de: See the Appendix.

Loménie, lō'mā'nee', Louis Léonard, de: author; b. Dec. 3, 1815, at St.-Yrieix, Haute-Vienne, France. He studied at Avignon; then went to Paris, where, after writing for the *Revue des Deux Mondes* and *La Patrie*, he began in 1846 the publication of the *Galerie des Contemporains illustres, par un Homme de Rien* (10 vols., finished in 1847), which attracted much attention. He was appointed Professor in French Literature at the Collège de France in 1845, and at the École Polytechnique in 1864. Another series of biographies, *Hommes de '89*, was never finished. In 1855 he published *Beaumarchais et son Temps* (2 vols.; republished in the U. S.), rich in original researches. Besides this excellent work, he wrote *La Comtesse de Rochefort et ses amis*, *Études sur les mœurs en France au XVIII^e siècle* (1871); *Esquisses historiques et littéraires* (1878); *Les Mirabeau* (2 vols., 1879). He was elected to the French Academy in 1871. D. at Menton, Apr. 2, 1878.
Revised by A. R. Marsh.

Lomnický z Budče, lom'ñits-kĕez bood'che, Šimon (*Šimon Žebrák*): poet; b. at Lomnice, near Budweis, Bohemia, in 1552; was educated at Krumlov (Krummau); became head teacher at Kardašova Řečice in 1571; retired in 1585. He was a clever rhymester and a profuse writer, endowed, however, with but little talent. His first literary work, *Písně nové*, etc., a collection of Roman Catholic religious songs, was printed at Prague in 1580. Then followed his best work, *Krátké naučení mladému hospodáři* (Short Adviec to the Young Husbandman, Prague, 1586); *Hádání mezi knězem a zemanem* (A Priest's Quarrel with a Nobleman, 1589); several religious dramas; and the *Kupidova střela* (Cupid's Shot, 1590), in which he censured licentiousness and other evils of his times. The poem so pleased the Emperor Rudolph II. that he ennobled the poet and bestowed an annuity upon him. Governed by pecuniary considerations Lomnický usually dedicated his works to rich aristocrats, and though himself a Roman Catholic, praised in his songs the new Protestant king, Frederic (1618), in hope of securing royal favors. After Frederic's defeat he bitterly denounced him and his Protestant adherents, the Bohemian noblemen. In 1618 he removed to Prague, where he died in poverty about 1622. J. J. Král.

Lomond, Loch, lokh'lō'mond: the largest lake of Scotland; situated between the counties of Stirling, Perth, and Dumbarton. It is 21 miles long, and has an area of 45 sq. miles. It receives the Endrick, Luss, and Fruin, and sends its waters through the Leven to the Firth of Clyde, and is studded with islands and surrounded by grand and beautiful scenery.

Lomono'sov, Mikhail Vasilevich: surnamed the Peter the Great of Russian literature; son of a poor fisherman; b. on an island in the government of Archangel in 1711. He acquired the rudiments of an education, but having heard from the village priest that to be learned a man must know Latin, at the age of seventeen he ran away from home, joining a train of carts with fish bound for Moscow, nearly 1,000 miles away. After his arrival he found protectors, who put him to school, first in Moscow, then in St. Petersburg. In 1736 he was sent to Germany on a scholarship, studied in Marburg and Freiburg, married and fell into debt, and into habits of intemperance, which clung to him for the rest of his life. In 1741 he fled back to his native country. After this time his success was rapid, thanks to his tireless energy and his many-sided talents. He made a great reputation, but his violent temper involved him in perpetual feuds, especially with the Germans who then controlled the Russian Academy. He died June 28, 1762. The numerous works of Lomonosov cover many branches of science, on each of which he wrote works of considerable value. He was also the author of the beginnings of a history, several orations, two worthless tragedies, an unfinished epic, and a number of short poems. His greatest service to his country was as a reformer and purifier of the language and literature. He wrote a Russian grammar, and it was he that first drew the lines of the modern vocabulary, formed by the mixture of the old church Slavonic and of the popular dialect; besides which he introduced modern poetical forms, as his ode on the *Capture of Khotin* is usually regarded as the earliest example of tonic versification in Russian poetry. There have been seven editions of his works, the last in 1867. Some of his writings have been translated into German, and there are renderings of three of the best of his poems in Bowring's *Russian Poets* (2d vol., 1823). The best biographies of him are those of Aksakov and Pekarskiĭ. In English, see *Studies in Russian Literature*, by C. E. Turner (1882), and *The Peasant Poets of Russia*, by W. R. Morfill (1880). A. C. Coolidge.

Lom'za: town; in the government of Lomza, Russia; on the Narev, a tributary of the Vistula; is 80 miles N. E. of Warsaw (see map of Russia, ref. 7–A). It has a college, a gymnasium, and was formerly one of the most important towns of Poland, but was destroyed by the Swedes, and never recovered. In 1795 it became subject to Prussia; in 1807 to Russia. Pop. 15,000.

Revised by M. W. Harrington.

London [cf. Lat. *Londi"nium*, the ancient name, under which it is first mentioned in history]: the capital of England and of the British empire; situated on both banks of the Thames about 50 miles from its mouth, the center of the City proper being in lat. 51° 30′ 48″ N., and lon. 0° 5′ 48″ W. (see map of England, ref. 12–J). London is not only a city, but for administrative purposes a county, three-fourths of which are in Middlesex, with the remainder chiefly in Surrey, while a considerable portion is in Kent, and a small part in Essex. The straggling county of London extends from N. to S. about 10 miles, and from W. to E. about 14 miles. London stretches from N. to S. between two lines of heights, of which the southern range rises to 370 feet and the northern to 441 feet above sea-level. The surface of the whole London district is mainly one of clay, with here and there a superficial bed of sand or gravel.

Area and Population.—London proper and the City proper make up the statutory county of London. The county, which will be referred to as London simply, occupies, according to the census of 1891, generally followed in this article, an area of 75,442 statute acres, and contains 4,232,118 inhabitants, a population larger than that of Scotland, and nearly as large as that of Ireland. Its population in 1901 was 4,536,034. This area and population include those of the City proper, which has a government of its own, with an area of 671 acres and a population of 37,705. Of the population somewhat less than two-thirds were born within its boundaries. The immigrants include 53,390 natives of Scotland, 66,463 natives of Ireland, and 95,053 European foreigners. Of these last 26,920 are Germans and 10,360 natives of France, while 26,742, from Russia and Poland, are mostly Jews. The Jewish population is estimated at from 60,000 to 70,000. In 1891 there were 4,903 natives of the U. S., very evenly proportioned as regards sex. The death-rate in 1892 was 20·6 to 1,000 persons living, while in Paris it was 22·4, and in Vienna 24·3. In 1891 the annual ratable value of property was £31,819,412.

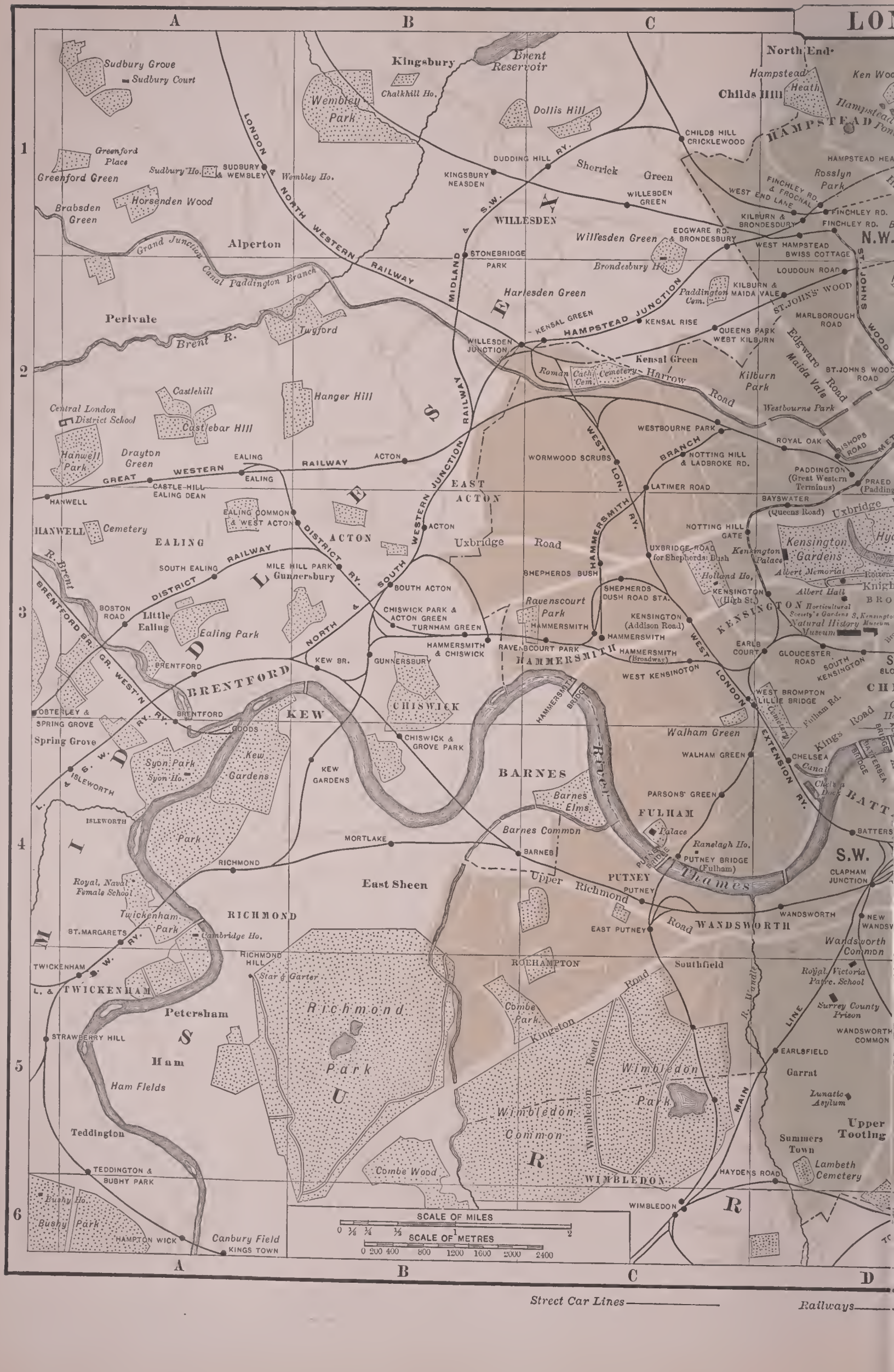
Parliamentary and other Divisions.—For parliamentary purposes London is divided into 27 metropolitan boroughs. The more populous of these are subdivided into electoral districts. Each undivided borough and each subdivision of a borough returns one member to the House of Commons, in which London is represented by 59 members or by 60 if the one member returned by London University is included. On account of its wealth and commercial importance the City proper returns 2 of these 60 members, although the undivided borough of Wandsworth, with three times the population of the City, returns only one member.

The Thames divides London into two unequal parts, North London on its left and South London on its right bank. In common parlance, North London is subdivided into three regions, the West End, the City, and the East End. At the West End, that part of London which lies W. of old Temple Bar, are the residences of the aristocratic, fashionable, business, and professional classes, with the shops and other establishments which minister to their wants. The City is the center of the mercantile, commercial, and financial activity of London. The East End is the home of vast masses of the industrial population of North London.

Government and Administration.—The City proper is governed by a corporation, consisting of its head, the lord mayor, the court of aldermen, 26 in number, and a court of common council, of which there are 206 members. The lord mayor is elected annually by the liverymen, that is, citizens free of the various City companies, themselves survivals of the trade-guilds of old London. He is chosen from among the aldermen elected by the 26 wards into which the City is divided, an alderman for each ward, the electors being citizens possessing the parliamentary franchise. The lord mayor is the chief magistrate and official representative of the City. He has a salary of £10,000, and an official residence, the Mansion House, where, and at the Guildhall, the great council hall of the citizens, he dispenses a hospitality for the cost of which his salary seldom or never suffices. While the court of aldermen is the House of Peers of the city, the court of common council is its House of Commons, and does most of the hard work of the corporation. It disposes of a revenue of nearly £800,000 a year, most of which is spent on public improvements. The whole of London outside of the City proper is governed by the county council, which in 1888 succeeded to the jurisdiction of the metropolitan board of works, the institution of which gave London for the first time a central and representative government. It was elected indirectly by the vestries, but the county council is elected directly and practically by the ratepayers. Women are allowed to vote, but their claim to be elected to the county council has been disallowed by the courts of law, after being sanctioned by the council itself. The area of the council's jurisdiction is, on the whole, coincident with that of the 27 metropolitan boroughs. Each sends 2 representatives to the council, and the City proper sends 4, as there are certain general funds to which both London and the City contribute. Apart from the administration of these funds the jurisdiction of the council and of the City corporation exclude each other. The county council has already done much for the improvement of London by the exercise of the very important powers intrusted to it by the imperial Parliament. Its revenue in 1893 was about £2,000,000.

Thoroughfares, Streets, and Squares.—Out of the thoroughfares which connect the West End proper with the City proper, two may be selected as the most frequented and the most interesting. The more northerly of the two, some 3 miles in length, starting near the Marble Arch, at the northeast corner of Hyde Park, begins with Oxford Street, which a mile or so eastward becomes New Oxford Street, and this merges into Holborn, whence by the Holborn Viaduct and Newgate Street Cheapside is reached. The other, shorter by more than a mile, leads from Charing Cross by those busy streets, the Strand and Fleet Street, and proceeding up Ludgate Hill and through St. Paul's Churchyard also reaches Cheapside. Thence by the Poultry is but a step to the very heart of the City proper, where the Royal Exchange faces on one side the Bank of England and on the other side the Mansion House. From the Bank eastward there are two principal thoroughfares to Aldgate. From Aldgate the Commercial Road leads to the West India Docks, and the Whitechapel Road to Mile End.

One of the most attractive thoroughfares of the West End proper is Piccadilly, running eastward from Hyde Park Corner to Piccadilly Circus. For a part of its course it is lined on one side by stately mansions and on the other it


A
B
C
D
1
2
3
4
5
6
LON
Sudbury Grove
Sudbury Court
Greenford Place
Greenford Green
Sudbury Ho.
SUDBURY & WEMBLEY
Wembley Ho.
Brabsden Green
Horsenden Wood
Alperton
Grand Junction Canal Paddington Branch
Perivale
Brent R.
Twyford
Castlehill
Central London District School
Castlebar Hill
Hanger Hill
Hanwell Park
Drayton Green
GREAT WESTERN RAILWAY
EALING
ACTON
CASTLE-HILL EALING DEAN
HANWELL
HANWELL Cemetery
EALING COMMON & WEST ACTON
EALING
DISTRICT RAILWAY
SOUTH EALING
MILE HILL PARK
Gunnersbury
R. Brent
BRENTFORD BR.
BOSTON ROAD
Little Ealing
Ealing Park
GR. WEST'N RY.
BRENTFORD
OBTERLEY & SPRING GROVE
Spring Grove
L. & S. W. RY.
ISLEWORTH
Syon Park
Syon Ho.
Kew Gardens
GOODS
KEW BR.
KEW
KEW GARDENS
CHISWICK
CHISWICK & GROVE PARK
NORTH & SOUTH WESTERN JUNCTION RAILWAY
BOUTH ACTON
CHISWICK PARK & ACTON GREEN
TURNHAM GREEN
HAMMERSMITH & CHISWICK
GUNNERSBURY
Kingsbury
Chalkhill Ho.
Wembley Park
Brent Reservoir
Dollis Hill
LONDON & NORTH WESTERN RAILWAY
MIDLAND & S.W. JUNCTION RY.
KINGSBURY NEASDEN
DUDDING HILL RY.
Sherrick Green
WILLESDEN
WILLESDEN GREEN
Willesden Green
EDGWARE RD. & BRONDESBURY
STONEBRIDGE PARK
Brondesbury Ho.
Harlesden Green
KENSAL GREEN
WILLESDEN JUNCTION
HAMPSTEAD JUNCTION
KENSAL RISE
Kensal Green
Roman Cath. Cemetery
Harrow Road
Paddington Cem.
KILBURN & MAIDA VALE
QUEENS PARK WEST KILBURN
Kilburn Park
Edgware Road
Maida Vale
WESTBOURNE PARK
WORMWOOD SCRUBS
WEST LON. BRANCH
NOTTING HILL & LADBROKE RD.
LATIMER ROAD
EAST ACTON
Uxbridge Road
SHEPHERDS BUSH
UXBRIDGE ROAD for Shepherds Bush
HAMMERSMITH RY.
Ravenscourt Park
HAMMERSMITH
SHEPHERDS BUSH ROAD STA.
KENSINGTON (Addison Road)
HAMMERSMITH (Broadway)
RAVENSCOURT PARK
WEST KENSINGTON
EARLS COURT
GLOUCESTER ROAD
SOUTH KENSINGTON
WEST BROMPTON LILLIE BRIDGE
LONDON & SOUTH WESTERN RY.
HAMMERSMITH BRIDGE
Walham Green
WALHAM GREEN
CHELSEA
Chelsea Canal
Chelsea Dock
BATTERSEA BRIDGE
Fulham Rd.
Kings Road
BATTERSEA
PARSONS GREEN
FULHAM
Palace
Ranelagh Ho.
PUTNEY BRIDGE (Fulham)
Thames
CLAPHAM JUNCTION
Barnes Elms
Barnes Common
BARNES
MORTLAKE
BARNES
RICHMOND
East Sheen
Upper Richmond Road
PUTNEY
EAST PUTNEY
WANDSWORTH
Wandsworth Common
Royal, Naval Female School
Twickenham Park
Cambridge Ho.
ST. MARGARETS
L. & S. W. RY.
TWICKENHAM
RICHMOND HILL
Star & Garter
ROEHAMPTON
Southfield
Royal Victoria Patric. School
Surrey County Prison
WANDSWORTH COMMON
Petersham
STRAWBERRY HILL
Ham
Ham Fields
Richmond Park
Combe Park
Kingston Road
Wimbledon Park
Wimbledon Common
Wimbledon Road
Combe Wood
Teddington
TEDDINGTON & BUSHY PARK
Bushy Ho.
Bushy Park
HAMPTON WICK
Canbury Field
KINGS TOWN
WIMBLEDON
HAYDENS ROAD
EARLSFIELD
Garrat
Lunatic Asylum
Upper Tooting
Summers Town
Lambeth Cemetery
Kensington Gardens
Kensington Palace
Albert Memorial
Albert Hall
Holland Ho.
KENSINGTON (High St.)
Horticultural Society's Gardens
S. Kensington Natural History Museum
Museum
PADDINGTON (Great Western Terminus)
BAYSWATER (Queens Road)
NOTTING HILL GATE
BISHOPS ROAD
ROYAL OAK
PRAED (Padding
Uxbridge
Hyde
Knigh
BRO
North End
Hampstead Heath
Childs Hill
CHILDS HILL CRICKLEWOOD
HAMPSTEAD
HAMPSTEAD HEA
Rosslyn Park
FINCHLEY RD. & FROGNAL
WEST END LANE
FINCHLEY RD.
KILBURN & BRONDESDURY
WEST HAMPSTEAD SWISS COTTAGE
LOUDOUN ROAD
ST. JOHN'S WOOD
MARLBOROUGH ROAD
ST. JOHN'S WOOD ROAD
Westbourne Park
N.W.
SCALE OF MILES
0 1/8 1/4 1/2 1 2
SCALE OF METRES
0 200 400 800 1200 1600 2000 2400
Street Car Lines
Railways

Underground Railways

looks on the Green Park. Three notable thoroughfares connect Oxford Street West with Piccadilly: Park Lane, skirting Hyde Park from the Marble Arch to Hyde Park Corner; New and Old Bond Streets, noted for their shops, and skirting the eastern boundary of the aristocratic region known as Mayfair; and last, not least, Regent Street, the most frequented shopping-ground of the dwellers at the West End. A continuation of Regent Street, Waterloo Place, leads from Piccadilly Circus to Pall Mall, which is also reached farther west in Piccadilly by St. James's Street. In Pall Mall and St. James's Street are the principal clubs. The road from Hyde Park Corner westward through Knightsbridge passes Sloane Street (which leads to Chelsea) and then divides into two, the more northerly conducting through Kensington to Hammersmith, and the other through Brompton to Fulham.

London is dotted with squares. At the West End are Grosvenor, Berkeley, St. James's, and Belgrave. The last-named square gives its name to the fashionable region known as Belgravia. These are S. of Oxford Street, N. of which are Portman, Manchester, Dorset, Cavendish, and Montagu Squares. Near the northwest corner of Regent Street is Hanover Square, and near the northeast corner of Oxford Street is Soho Square. Coventry Street, a continuation of Piccadilly, leads into Leicester Square, in the vicinity of which the foreign element is abundant. A little to the S., and close to Charing Cross, is treeless Trafalgar Square with its fountains and Nelson Monument. In the middle-class peopled region between Tottenham Court Road and Gray's Inn Road are Gordon, Bedford, Tavistock, Russell, Bloomsbury, Brunswick, and Mecklenburg Squares. Finsbury Square is one of the few in the City proper.

The Thames also is a thoroughfare, numerous passenger steamers plying its course. At high tide at London Bridge it is 800 feet wide. Below London Bridge is the Pool, crowded with vessels up to 400 tons. Below the Tower, at the great docks (see Docks), deep-sea navigation begins, while vessels of any tonnage can ascend to Deptford, 4 miles below London Bridge. Besides railway bridges, on one of which, Charing Cross, there is a footway for pedestrians, the Thames is spanned by more than twelve bridges, of which the Westminster, Waterloo, and London are the finest. A little below London Bridge there is a narrow subway for foot passengers. The huge new Tower Bridge for vehicles and foot passengers, formally opened by the Prince of Wales, June 30, 1894, has its central span filled with a bascule or drawbridge which can be raised to allow the passage of large vessels. Two miles below London Bridge is the Thames Tunnel, utilized by railway trains, which connects North and South London lines of railway. A new tunnel, to be both a carriage and footway between Blackwall and the vicinity of Greenwich and Woolwich, is in course of construction. Noble thoroughfares bordering the Thames are the Albert embankment, nearly a mile in length on the right bank of the river; on the left the Victoria embankment, extending for 1⅓ miles from Blackfriars Bridge to Westminster Bridge, continued farther westward by the Chelsea embankment.

The Parks.—Hyde Park (388 acres), the chief recreation-ground of the West End, stretches from Park Lane to Kensington Gardens. A road to these gardens from the main (southern) entrance of Hyde Park is the favorite drive of the upper classes. Another a little to the N. is Rotten Row, reserved for equestrians. N. of this again is a large sheet of water, the Serpentine. W. of Hyde Park are Kensington Gardens (210 acres), the largest and most beautiful pleasure-grounds in London. They were originally the pleasure-grounds of Kensington Palace. The Green Park (69 acres), the most open and least wooded of the West End parks, fronts the western section of Piccadilly. S. of it is the picturesque St. James's Park (91 acres). Its western boundary faces the front of Buckingham Palace. Regent's Park (472 acres) is the largest of the West End parks, but is also more broken up than any of them by public roads and private villas. It lies to the N. of Oxford Street, and to the N. W. of it rises Primrose Hill, laid out as a public ground. Victoria Park (300) is modern, and is the chief recreation-ground for the toiling masses of such densely populated regions of the East End as Bethnal Green and Spitalfields. It includes two picturesque sheets of water. There are several parks and commons in South London, of which Battersea Park (180), on the right bank of the Thames, opposite Chelsea Hospital, and also quite modern, is far the largest. The sub-tropical garden in this park has a remarkable collection. The northern heights of London are crowned by Hampstead Heath (240 acres), the park of all Londoners, and unlike other London parks, a natural one with picturesque undulations. It lies between 400 and 500 feet above the sea-level. Greenwich Park (174 acres), with its fine old chestnuts, is an ancient royal demesne. On the summit of a hill in its center, 180 feet high, is the famous Royal Observatory.

Palaces and Royal Residences.—Fronting the western end of St. James's Park is Buckingham Palace, an unattractive modern building, where the Queen resides when she spends more than a day in London, and where she always holds her drawing-rooms and gives her balls and concerts. St. James's Palace, an irregular brick building at the foot of St. James's Street, was a palace of the Tudors, among the few remains of which is the Chapel Royal where the Queen was married. Levees, at which gentlemen only are received, are held here, usually by the Prince of Wales. Marlborough House, built by Wren for the great Duke of Marlborough, is E. of St. James's Palace, and is separated from it only by a carriageway, in which is the entrance to Clarence House, the residence of the Duke of Edinburgh (now the Duke of Saxe-Coburg-Gotha). Kensington Palace, the birthplace and early home of the Queen, is now occupied by the Prince and Princess of Teck. Gloucester House, in Park Lane, is the residence of the Queen's uncle, the Duke of Cambridge. Lambeth Palace, on the south side of the Thames, nearly opposite the houses of Parliament, has been for five centuries the residence of the Archbishops of Canterbury. See Lambeth.

Public Buildings (secular).—The Tower, originally a royal palace, then a fortress, and afterward a prison with which are linked numerous historical associations, is a group of irregular buildings of many dates, on the northern bank of the Thames, a little below London Bridge. Since the time of the Conqueror its government has been intrusted to a high officer called the constable. The isolated square keep in the center, called the White Tower, was built by William the Conqueror about 1078. This is now surrounded by a rampart and moat, with inner wall (the Inner Bail), flanked by half-circle towers, each of which has a distinctive name, as the Bell Tower, the Beauchamp Tower, Wakefield Tower, Bloody Tower, Bowyer Tower. The most noticeable is the Bloody Tower, so called because it was supposed to have been the scene of the murder of the two infant princes, sons of Edward IV., at the instance of Richard III. On its upper floor is a splendid collection of old armor. In the Record or Wakefield Tower the public records of the realm were formerly kept, and the crown jewels, valued at three millions sterling, are now exhibited. The list of celebrated persons buried after execution in the Chapel of St. Peter ad Vincula and the little cemetery attached to it is a long one, ranging from Sir Thomas More (1535) to Simon Fraser, Lord Lovat (1747). So-called traitors were usually beheaded on Tower Hill, N. W. of the Tower. The houses of Parliament are on the northern bank of the Thames between Westminster Abbey and the river. The New Palace at Westminster, as it is sometimes called, covers an area of nearly 8 acres, and contains 11 courts, 100 staircases, more than 2 miles of corridors, and 1,100 apartments, with 18 distinct residences for high officials of the two houses. Of the three principal towers, the Clock Tower, on the north side, contains the clock known as Big Ben, by which London regulates its time. The Victoria Tower contains the royal entrance, and the Central Tower a grand octagon hall. From this corridors adorned with frescoes lead right and left to the lobbies of the houses of Lords and Commons respectively. The whole is so arranged that when the doors of both houses are opened the Queen, sitting on her throne in the House of Lords, can see in a direct line the speaker of the House of Commons in his chair. The House of Lords, one of the most richly decorated chambers in the world, 97 feet long, 45 wide, and 45 high, is adorned with frescoes and statues. The House of Commons, 70 feet long by 45 feet broad, is much more simple in character than the House of Lords. The public entrance to the central octagon hall is through St. Stephen's hall, which is lined with statues of distinguished parliamentary statesmen. Beneath it is the restored crypt of St. Stephen's chapel, which dates from the thirteenth century. The entrance to St. Stephen's hall is through Westminster hall, the old hall of the palace of the Kings of England, built originally in the reign of William Rufus. This noble hall is 290 feet long, 68 feet broad, and 92 feet high. With the exception of the Hall of Justice at Padua and of some railway stations, it is the largest covered space in the world not supported by pillars. The

chief Government offices are in the thoroughfare, Whitehall, continued as Parliament Street, which leads from Charing Cross to the houses of Parliament. Among them are the Admiralty, the headquarters of naval administration, the Horse Guards, the headquarters of the commander-in-chief, the Treasury, with the education and privy council offices. Then intervenes Downing Street, in which are the official residences of the First Lord of the Treasury (who until later days was generally Prime Minister) and the Chancellor of the Exchequer. Beyond Downing Street is a vast group of modern buildings, comprising the India, Foreign, Home, Colonial, and Local Government offices. The War Office, the headquarters of the Secretary of State for War, is in Pall Mall. At Somerset House, in the Strand, are the offices of the Inland Revenue and of the registrar-general of births, deaths, and marriages, with the wills office, the general depository of testamentary writings, where they may be inspected by the public. The Patent Office, with its fine library of technical and scientific works, is in Southampton Buildings, Chancery Lane. In the city, besides the Mansion House and the Guildhall, are the General Post-office at St. Martin's-le-Grand, the Bank of England, and the new St. Paul's Royal Exchange. The Bank of England is an isolated building, with only one story above ground, covering an area of nearly 4 acres. The Royal Exchange is a quadrangular covered court surrounded by colonnades. Just above London Bridge, on the left bank of the Thames, is the custom-house, fronting the river, with a façade 490 feet in length. The Royal Mint, where the coinage of the United Kingdom is produced, is on Tower Hill.

National and Public Institutions.—The Imperial Institute, at South Kensington, projected as a memorial of the Queen's Jubilee and opened by the Queen in 1893, is a vast building, the prevailing style of which is a free rendering of the Renaissance. Its contents are mainly intended to exhibit the natural and industrial products of the British colonies and foreign possessions and of the Indian empire. The Record Office, between Chancery and Fetter Lanes, is a great fire-proof edifice containing the public records and state papers of the kingdom. The British Museum, fronting on Great Russell Street, has been described under British Museum (*q. v.*). Its great circular reading-room, with accommodation for nearly 600 readers, is surmounted by a dome 140 feet in diameter and 106 feet above the floor, being slightly larger than the dome of St. Peter's at Rome. The Natural History Museum, at South Kensington, is a branch of the British Museum, and contains the whole of the collections illustrative of natural history and natural science. The South Kensington Museum covers 12 acres, and comprises costly collections of art and art manufacture, with art and educational libraries. The Soane Museum, in Lincoln's Inn Fields, includes a collection of Egyptian antiquities. The Museum of Practical Geology in Jermyn Street, Piccadilly, has large collections, with concrete illustrations, of all the apparatus used in the working of mines. The Guildhall Library, belonging to the corporation of London, contains 80,000 volumes, including a unique collection of books on London, and in the Guildhall Museum are exhibited Roman, Saxon, and mediæval remains found in the city proper. The Bethnal Green Museum was instituted for the benefit of the toilers of the East End, and from time to time there are lent to it, by public bodies and private individuals, collections of various kinds. Of public art collections, the chief is the National Gallery, in Trafalgar Square, a magnificent collection of paintings arranged according to schools in twenty-one rooms, five of which are devoted to British art. For the contents of the National Portrait Gallery, a collection of portraits of royal personages and distinguished natives of the United Kingdom, a suitable edifice has been built by the side of the National Gallery. The Royal Academy is domiciled in Burlington House, Piccadilly, in salons where are held annual exhibitions of the works of contemporary painters and sculptors. In Burlington House are also located several societies of high reputation, among them the Royal Society, the most important and one of the oldest scientific societies of the kingdom, with the still older Society of Antiquaries. The Royal Institution, in Albemarle Street, combines the encouragement of scientific research with the popularization of science. The Society of Arts, in the Adelphi, established in 1753, holds meetings at which lectures are given and papers read and discussed on subjects relating to arts, manufactures, and commerce. At the meetings of the United Service Institute, the members of which are naval and military men, papers are read on subjects of interest to both services. Its museum contains memorials of British military achievements on sea and land, and interesting relics.

Churches.—There are some 850 places of worship belonging to the Church of England in the London districts, and more than 600 Nonconformist, of which 240 are Congregational (or Independent), 130 Baptist, 150 Wesleyan, and 50 Roman Catholic. Westminster Abbey (*q. v.*), the architectural glory of ecclesiastical London, has been called "English history in stone" from its numerous monuments to and memorials of distinguished personages. It stands probably on the site of a church built by Edward the Confessor. The oldest portions of the present abbey church, the choir and transepts, were built by Henry VII. and are Early Pointed in style, while the additions by Edward I. are Early Decorated. Henry VII.'s chapel is Late Perpendicular, and the ill-conceived western towers designed by Wren are in a debased style of Grecian and Gothic. The abbey is in the form of a Latin cross, the length 416 feet, of transepts 203 feet, of choir 155 feet, height of roof from pavement 101 feet, height of towers 225. A few yards N. of Westminster Abbey is St. Margaret's church, the church of the House of Commons, in which were interred Caxton and Sir Walter Raleigh. The beautiful west window was subscribed for by citizens of the U. S. as a memorial of Raleigh, the founder, among other achievements, of the State of Virginia. St. James's, Piccadilly, the fine interior of which contrasts agreeably with its unattractive exterior, is the only West End church designed by Wren. The Chapel Royal, Whitehall, built by Inigo Jones, formerly the banqueting-hall of the royal palace of Whitehall, is now the museum of the United Service Institution. St. Paul's, Covent Garden, where Butler, the author of *Hudibras*, was buried, is said to have been designed by Inigo Jones. St. Bartholomew's, Smithfield, or a portion of it, dates from the twelfth century; opposite was the stake at which many Protestant martyrs suffered during Marian persecution, and near it are a church and tablet to their memory. St. Clement Danes, in the Strand, Dr. Johnson's church, was designed by Wren. The Chapel of the Savoy, between the Strand and the Thames, belongs to the crown, and its walls date from the thirteenth century. The Temple church, very much altered since it was built for the Knights Templars, contains fine specimens of Early English architecture; in its burial-ground Oliver Goldsmith was interred. St. Bride's, Fleet Street, is one of Wren's architectural triumphs. Further eastward his colossal masterpiece, St. Paul's Cathedral, towers over the city. It is in the form of a Latin cross, 500 feet in length, 118 feet broad, and the transept is 250 feet long. The upper part of the exterior is of the Composite, the lower of the Corinthian order. The vast interior is surmounted by a double dome; the inner dome is 225 feet, the outer one from the pavement to the top of the cross 364 feet in height. Nelson, the Duke of Wellington, and Sir Joshua Reynolds, with Wren himself, were buried in St. Paul's, and a large number of the statues and monuments which it contains are memorials of distinguished men. Among Wren's city churches are such masterpieces as St. Mary-le-Church, commonly called Bow church, in the belfry of which are the proverbial "Bow Bells"; St. Michael's, Cornhill; St. Stephen's, Wallbrook; St. Swithin's, Cannon Street, in which Dryden was married, and into the street walls of which the famous London stone is built. In St. Giles's, Cripplegate, one of the oldest London churches, Milton was buried and Oliver Cromwell married. On the southwest side of London Bridge is St. Saviour's, Southwark, which next to Westminster contains the finest specimens of Early English architecture to be found in London. In it were buried Edmund Shakspeare, the dramatist's younger brother, John Fletcher, the dramatist, and Philip Massinger. St. George's (Roman Catholic) Cathedral is in Southwark, opposite Bethlehem Hospital.

Courts of Justice, Inns of Courts, etc.—For a period of about 800 years the higher administration of civil justice was centered at Westminster Hall; in 1882 new law courts in the Strand were opened. Their architecture is Gothic. The building is a square of about 500 feet each way. The great central hall is 230 feet long, 47 feet wide, and 80 feet high. On three sides of it are grouped the eighteen law courts. The Strand front has a massive clock-tower with a projecting clock and gable summit, and at the west side another tower of different design 160 feet high. There are four Inns of Court, Inner Temple, Middle Temple, Lincoln's Inn, and Gray's Inn. To have been entered as a stu-

dent at one of the Inns and to have dined a certain number of times "in hall" are conditions that must be performed before a student of law can be called to the bar. They contain numerous "chambers," chiefly tenanted by barristers, some of whom reside in them. They are governed by benchers, who are chosen from the most distinguished members of the bar. The Temple lies on the south side of Fleet Street. The Temple church, the Temple library, and the Temple gardens, which look on the Thames embankment, belong to the Middle and Inner Temple alike. Both have fine halls, used as dining-rooms. Lincoln's Inn has a very old gate-house, giving entrance to and from Chancery Lane, in which there are many firms of solicitors. The hall and library of Lincoln's Inn form a noble structure in the Gothic style. The chapel was built by Inigo Jones. Lincoln's Inn Fields is a long garden surrounded by houses. Gray's Inn was Lord Bacon's inn. Its Elizabethan hall was built in 1560. (See INNS OF COURT.) The central criminal court, in the Old Bailey adjoining Newgate, is the chief court for trial by jury of offenses commited within 10 miles of St. Paul's. For summary treatment of accused persons there are twenty-two police courts in London proper. The City has police courts at the Mansion House and at the Guildhall, the lord mayor generally presiding at the former and one of the aldermen at the latter.

Educational Institutions.—The University of London, which has its headquarters in Burlington House, is not a teaching body, but grants degrees to all who pass its rigorous examinations. The universities of London which teach while not empowered to grant degrees are King's College, Somerset House, affiliated to the Church of England, and University College, Gower Street, a purely secular institution. To both of these day-schools are attached. The chief public schools are Westminster, founded by Queen Elizabeth; Christ's Hospital, Newgate Street, commonly called the Bluecoat School, founded by Edward VI.; St. Paul's, now at West Kensington, founded in 1512 by Dean Colet; Merchant Taylors' School, founded in 1561 by the Merchant Taylors' Company, and now at the Charterhouse (the school at which, founded in 1612 by Thomas Sutton, has been removed to Godalming, Surrey); and the City of London School on the Thames embankment, founded in 1835 by the City corporation. To most of these schools exhibitions to the universities are attached. Various technical schools are affiliated to the City and Guilds of London Institute at South Kensington. Of educational institutions for the working classes the chief are the London Workingmen's College in Great Ormond Street, and the People's Palace in the Mile End Road, opened in 1887. The latter, besides furnishing rational recreation to the artisan class at the East End, has classes for technical, scientific, and other education, attended by some 3,000 scholars. There are some twenty free public libraries, all having reading-rooms.

The London School Board.—Up to 1870 primary education in London, as elsewhere, was left to voluntary effort, chiefly that of the Church of England and other religious denominations, assisted by parliamentary grants. The consequence was that in London and everywhere there was an enormous deficiency of school accommodation. The Elementary Education Act of 1870 created school boards throughout the country to provide elementary schools, which were to be established and supported mainly by local rates, and from which dogmatic religious instruction was to be excluded. The school boards are chosen by the ratepayers, women being allowed both to vote and to become members of boards, in the election of which cumulative voting was sanctioned. The only difference between the election of the London school board and of other boards is that in the City proper the electors are those who elect the common council. School fees have been abolished, and the education given in board schools has by legislative enactment become gratuitous. Since the passing of the act in 1870, accommodation in permanent schools has been provided by the school board for 448,749 children. In 1892–93 the income of the school board was £2,718,789.

Hospitals and Charitable Institutions.—The number of charities of all kinds is not less than 2,000, and their total annual revenue from subscriptions, donations, and bequests is estimated at five millions sterling. Of non-medical hospitals, two are national: (1) Chelsea Hospital, nominally founded by Charles II., and built by Wren, for old and disabled soldiers. It has 540 indoor and nearly 70,000 outdoor pensioners. (2) Greenwich Hospital (on the site of an old royal palace) was from 1694 until comparatively recent years a home for aged and disabled seamen, who had served in the navy. They now receive outdoor pensions, and the hospital has been converted into the Royal Naval College for the instruction of naval officers. In and about London there are a number of asylums for the aged, in connection with the City companies and other bodies, such as the Licensed Victualers and the Freemasons. In the Charterhouse, at the upper end of Aldersgate Street, there are domiciled eighty "poor brethren." The Foundling Hospital, in Guildford Street, founded by Captain Coram in 1769, maintains and educates about 500 children. The chief general medical hospitals are St. Thomas's, founded by Edward VI. and now on the south bank of the Thames, opposite the houses of Parliament; St. George's, Hyde Park Corner, which dates from 1723; St. Bartholomew's, Smithfield, founded by Prior Rahere in 1102; Guy's Hospital, in Southwark, founded in 1721 by Thomas Guy, a wealthy London bookseller; and the London Hospital, in Whitechapel, which dates from 1746, and ministers to the medical and surgical wants of the East End. Bethlehem Hospital, in Lambeth, so well known as Bedlam, has been a hospital for the insane since 1547.

Places of Amusement and Recreation.—There are some forty theaters, and perhaps four hundred music halls. It is symptomatic of great changes of taste that, of two of the largest and oldest of these theaters with a traditional reputation as the homes of the legitimate drama, Drury Lane is now devoted to pantomime and sensational melodrama, while Covent Garden, which when rebuilt in 1858 was designed for Italian opera, has become an arena for variety entertainments and promenade concerts. Italian opera, once so fashionable, is without a domicile in London. Except when Shakspeare is revived at the Lyceum, with a certain success greatly due to the *mise-en-scène* and spectacular effects, the legitimate drama has almost vanished from the London stage. Not only has London become unable to support a single Italian opera-house, but a very handsome and well-appointed theater, built for the performance of English opera, has from want of support been transformed into a music hall. Though of quite modern growth the music hall is the most strictly popular of all places of amusement. The so-called popular concerts at St. James's Hall, Piccadilly, are very well attended, though the music heard at them is of a much higher class than their title would indicate. Oratorios never fail to attract, whether given at St. James's Hall or at the magnificent Albert Hall, South Kensington, which easily holds 8,000 people, or at the Crystal Palace, Sydenham. The grounds of this last, which with the palace cover 200 acres, are a famous resort, and indoors it offers besides permanent attractions, concerts, dramatic entertainments, with flower shows and shows of live stock. The Zoölogical Gardens, in Regent's Park, contain the largest and most complete collection of living animals in the world. During the London season Lord's cricket-ground, W. of Regent's Park, draws crowds on the occasion of such stirring matches as those between Oxford and Cambridge Universities and Eton and Harrow Schools. Kennington Oval, in the South of London, is another important cricket-ground.

Markets.—The Metropolitan Cattle Market, Copenhagen Fields, from which is obtained most of the live stock required for the consumption of London, is the largest of the kind in the world. More than 4,000,000 cattle, sheep, and pigs are sold in it yearly. From the London Central Meat Market, N. of Smithfield, 250,000 tons of meat are delivered yearly. By its side are the Central Markets for poultry, vegetables, and fruit. Leadenhall Market, Leadenhall Street, is one of the chief marts for poultry, game, and hides. Billingsgate, a little E. of London Bridge, is the great fish-market, as Covent Garden Market is for fruit, vegetables, flowers, and herbs. The largest horse-market is Tattersall's, Knightsbridge Green, the headquarters of the racing and betting world.

Cemeteries.—For the great majority of the 90,000 or so persons who die yearly in London numerous cemeteries are provided. The principal are Highgate Cemetery, where Coleridge and George Eliot are buried, from which there is a fine view of London; Kensal Green Cemetery, Harrow Road; Brompton Cemetery; and S. of the Thames, Norwood and Nunhead Cemeteries. There is a crematorium at Woking, in Surrey.

Communications by Road and Rail.—In 1892 there were upward of 11,000 cabs. The hansoms (two-wheeled vehicles) were to the four-wheeled vehicles in the proportion of about 7 to 4. There were about 200 omnibus lines in all

directions, traversed by 1,100 omnibuses, of which 1,000 were owned by two companies, and carried more than 150,000,000 passengers during the year. Some 80 miles of tramways were traversed by some 750 cars, carrying during the year more than 70,000,000 passengers. The pressure in accommodation is lightened by railways, chief among them the Metropolitan and Metropolitan District Railways, which mainly run in tunnels under the street or through cuttings behind stone walls. Thus a complete belt of railway is formed round the inner part of London, while various branch lines from them run to the suburbs. Some of the great railway companies with termini in London also run suburban trains in connection with the metropolitan lines. The whole number of passengers by railway in and about London annually may be computed at 520,000,000.

Police.—The metropolitan police district extends within 15 miles of Charing Cross. Exclusive of the City, its area, 442,750 acres, and its population, 5,596,101, are larger than those of the county of London. The metropolitan police, alone in the kingdom, is controlled by the Home Secretary, who appoints for its government a chief commissioner responsible to him solely. In 1892 the total force of all grades numbered 15,044, whose pay absorbed £1,280,130. The number of the City police, which is under the control of the corporation of London, is 903, and its total annual cost is about £320,000.

Banks and Banking.—The Bank of England is a proprietary institution, but some of the functions which it discharges are of a national kind. It is divided into an issue department and a banking department. It is the only bank of issue in London, and the only bank of issue in the kingdom the notes of which are a legal tender. As a bank proper it receives the Government balances, pays the dividends on the Government stocks, and makes advances to the Government when needed. The issue of notes which are payable in gold on demand, and none of which are of less value than £5, is strictly regulated by the Bank Charter Act of 1844. Against securities held by the bank nearly to the amount of £16,450,000, of which the larger part is a debt due to it by the Government, it may issue notes without a metallic basis, but for every note issued above that sum it must have in its coffers an exact equivalent in gold coin or bullion. For its management of the public debt it receives from the Government an allowance proportionate to the amount of the national debt on which it has to pay the dividends. It is administered by a governor, a deputy-governor, and twenty-four directors, who are chosen from commercial men of high standing in the city, without any admixture of professional bankers. Apart from its issue departments, it performs all the functions of an ordinary bank, receives deposits and discounts bills. Its practice differs, however, from that of most other banks, inasmuch as it discounts only short-dated bills and allows no interest on deposits of any kind. The majority of the London joint-stock banks allow interest on deposits at short notice, and therefore the amount of deposits of all kinds held by each of several of the greater London joint-stock banks is larger than the private as distinguished from the public deposits of the Bank of England. In Oct., 1893, the private deposits of that bank were £32,092,000, while those of one London joint-stock bank were £34,405,116, and of another £41,838,276. The Bank of England rate of discount varies from time to time according to circumstances, and changes are announced publicly. These changes are much influenced by the amount of the reserves in its banking department. When bullion is flowing out of the country, a rise in the Bank rate checks the flow. The London joint-stock banks, having to pay interest on large deposits, while the Bank of England pays none, are forced, as it were, to discount more freely than the Bank of England, and this, with the keen competition among themselves, makes the rate of discount in the London market generally lower than the Bank rate. Therefore the greatest among them do a larger discount business than the Bank of England, and their profits are in some cases larger. In 1893 the dividend of the Bank of England was 10 per cent., while one of the two London joint-stock banks already referred to paid a dividend of 18 per cent., and the other 20 per cent. The Bank of England remains at the head of the banking establishments of the nation, partly because the reserves of the other London banks are directly, and through them the reserves of the provincial banks are indirectly, deposited with it. It has thus become the one holder of the banking reserves of the kingdom. The importance of this position is enhanced by the statutory obligation imposed on it to issue weekly an account of its assets and liabilities. The amount and character of its assets are keenly scrutinized as the barometer of the money market, and the smallness, even at the best of times, of its reserves is a subject which has led to a great deal of discussion. Thus on Jan. 3, 1894, while its private deposits were £34,152,556, it had in hand a cash reserve of £15,351,479, of which only £1,966,869 was in gold and silver coin, the rest being its own notes. It has happened on several occasions that during a monetary crisis its reserve has been so depleted that the Bank of England has had to appeal to the Government, which has restored confidence by sanctioning an infraction of the Bank Charter Act, and allowing the Bank of England to issue an adequate number of notes without a metallic basis. The mere permission, whether acted on or not, has always had the effect of putting an end to panic.

Of the London joint-stock banks there are nine which are purely metropolitan and nine others which, while also metropolitan, have country branches. All of them have adopted the system of limited liability. These eighteen principal banks, with five or six others, which from being private banks have also adopted limited liability, constitute the body of clearing banks, that is, those which are admitted to the clearing-house, a modern and most useful institution. Formerly a bank holding checks and bills payable by another bank presented them for payment to that bank, an operation which caused a vast multiplicity of transactions. Now all such checks and bills are daily settled at the clearing-house, where the difference between each bank is received or paid by a single check on the Bank of England. The total amount thus settled in 1893 was £6,478,013,000.

The Stock Exchange.—This "ready-money market of the world" is held in a building in Capel Court, close to the Bank of England. Its members buy and sell all stocks and shares, dealings in which are sanctioned by the committee of management, elected by the members annually. The number of members is nearly 3,000. Each pays an entrance-fee of 300 guineas (reduced to 150 guineas in the case of those who have for four years been clerks to members, and such clerks need to be recommended by only two members guaranteeing £300 each), with an annual subscription ranging from 20 to 30 guineas, according to the date of admission. No stranger enters except at his personal peril the room in which the members transact their business, but the clerks of members are admitted.

Commerce and Shipping.—The commerce of London is the largest of any city or port of the United Kingdom. London has the lion's share of the trade with France, British India, Australasia, China, Japan, and the West Indies. The total value in 1892 of both the exports from and imports into Liverpool, the commerce of which ranks next after that of London, was £212,662,149, and of London £226,749,916. In the same year the amount of customs duties levied on imports into London was £9,138,767, on imports into Liverpool £2,958,408. The figures would tell still more in favor of London if there were taken into account the value of the imports into Southampton, New Haven, Folkestone, and Dover, as most of the foreign and colonial produce received at these ports is consigned to London. In 1892 the imports at these four ports were valued at £35,441,813. As London, besides supplying the demands of its own consumption, is a great emporium for distribution, while Liverpool receives and ships the products of vast manufacturing and otherwise industrial districts, the imports of London are larger and her exports smaller. In 1892 the direct imports of London were valued at £144,273,415, those of Liverpool at £109,347,354. On the other hand, in 1892 London's exports were valued at £82,476,501, those of Liverpool at £103,314,845. Some of these exports from London indicate the use made of her as an emporium. Nearly all the tea and cocoa exported from the United Kingdom in 1892 was shipped from London. Of cotton-manufactures London exported to the value of £5,401,870; of woolen-manufactures, £3,532,756; of machinery, mill-work, steel rails, etc., £4,598,074.

The commerce of London employs great fleets of merchantmen, and the figures are largely in favor of the capital. The coasting trade, in which naturally London far exceeds Liverpool, being excepted, in 1892 the number of British and foreign vessels which entered the port of London with cargoes and in ballast from foreign countries and British possessions was 10,350, with a tonnage of 7,866,946; there cleared from it for foreign countries and British pos-

sessions 7,850 vessels, with a tonnage of 6,049,503. The figures for Liverpool were: Entered, 4,272 vessels, with a tonnage of 5,913,866, and cleared, 3,709, with a tonnage of 5,206,116. Liverpool employs more vessels than London in the British commerce with the U. S.; in 1892, however, there entered the port of London from the U. S. 609 vessels, tonnage 1,135,438, and there cleared to the U. S. from London 463 vessels, tonnage 948,449. For shipping in the Thames there is provided, chiefly on the north side, a magnificent series of docks, mostly with extensive bonded warehouses attached, where goods can be stored free of customs duties until removed. These docks stretch eastward from the Tower, beginning with St. Katharine's Docks (24 acres); then come London Docks (120 acres), the West India Docks (300 acres), the Millwall Docks (100 acres), the smaller East India Docks (27 acres), and at Blackwall the noble Albert and Victoria Docks, 2¾ miles in length, receiving vessels of the largest size. To save miles of navigation on the Thames large docks, chiefly for ocean steamers, have been constructed at Tilbury, nearly opposite Gravesend. On the south side of the Thames, E. of the Thames Tunnel, are the large basins of the Surrey and Commercial docks (350 acres), chiefly used for timber and corn. Lloyd's subscription-rooms (generally known as Lloyd's) occupy a first floor at the east end of the Royal Exchange, and are the great center for all interested in shipping, especially for the underwriters who insure vessels against casualties. The members form a corporation, in which some 460 are underwriters and about 160 non-underwriters, besides annual subscribers. (See LLOYD'S.). A separate society domiciled in a court off Cornhill is known as Lloyd's Register. It employs more than 100 surveyors at home and abroad, among whose duties it is to classify ships in course of building or when leaving the yards.

Trade and Industry.—Publishing and bookselling are very important factors in London's industry. According to the census of 1891 there were in London 4,682 publishers, booksellers, and librarians, 2,147 authors, editors, and journalists, and 35,009 persons engaged in the printing-trade. In the same year there were published 5,706 separate works, of which 1,271 were new editions, and 1,216 were novels. The publishers are located chiefly in Paternoster Row and its immediate neighborhood, but several of the most important firms belong to the West End. The number of newspapers published in London can not be much less than 700, upward of thirty of which are issued daily. Of other periodicals of all classes the name is legion. A very great industry is that of the brewers, of whom there are about 170 scattered throughout London. Of the beer and ale, valued at £1,651,486, exported from the United Kingdom in 1892, quantities valued at £730,460 were shipped from London. The necessaries of life are dispensed by 14,365 butchers and 15,613 bakers. The innkeepers, hotel-keepers, and publicans number 6,688, and the coffee-house and eating-house keepers 4,605. The building, fitting, and furnishing of houses occupy 600,000 of the population, coach and carriage 9,000, watch-making and philosophical-instrument making upward of 12,000, goldsmith work and jewelry more than 7,000. An enormous industry is the cheap and second-hand clothing, the trade of which is mainly in the hands of the Jews in Whitechapel. Of the "apparel" exported from the United Kingdom to the value of £4,874,091 in 1891, £3,096,152 was derived from London. Whitechapel, too, is one of the principal seats of the cigar-making industry. At Bermondsey, on the south bank of the Thames, are tanneries and what are said to be the largest leather-factory and the largest hat-manufactory in the world. At Battersea are candle and chemical works, while Lambeth is famous chiefly for its potteries. In machinery, engine, and boiler making, mainly by the river-side on both banks of the Thames, 20,665 persons are engaged. How vast is the demand for female labor in London is indicated by the fact that, besides some 250,000 women servants, there are upward of 120,000 women employed in millinery, shirt-making, and tailoring.

History.—The name London was derived, it is supposed, from the Celtic Llyn-din, the Lake-fort, erected by the Britons when the Thames at London was a great lagoon. The Latinized form, *Londinium*, the name given it by the Romans, is first distinctly mentioned by Tacitus, who says that in A. D. 61 traders and their merchandise abounded in it. During a brief period of the Roman occupation it was called *Augusta*. In 809 it was in the possession of the East Saxons, who had made it their capital. At the Conquest (1066) London was the capital of England. William the Conqueror gave London a special charter, and another, giving the citizens the right to elect their principal officials, was granted by Henry I. in 1101, and the first mayor was chosen in 1189; but for centuries there was a struggle between London and the sovereigns of England for the free exercise of rights nominally conceded to the citizens. All along the citizens of London have proved themselves champions of public liberty as well as of their own privileges. They adhered to the Reformation when Queen Mary was persecuting the Protestants. They sided with the Parliament against Charles I., and they powerfully aided William III.'s accession to the throne. Though in the reign of Elizabeth the population of London did not, it is probable, exceed 150,000, she and afterward Charles I. endeavored but fruitlessly to arrest its growth. The migration of great noblemen as far W. as Piccadilly had begun before the great fire of London in 1666 led to the substitution of brick for wood in the general rebuilding of the city. During the eighteenth century London was greatly extended, but it was reserved for the nineteenth century to see it absorbing distant suburban hamlets and open spaces, covering with houses what were fields from Bloomsbury to Hampstead and Highgate, and making integral parts of itself—Sydenham and Dulwich on the south side of the Thames, and on the north side Chelsea, Kensington, Hammersmith, and Fulham. So great an extension of London has been partly caused by the migration of large numbers of the upper middle class to domiciles in the suburbs. This migration is strikingly exhibited in the statistics of the inhabitants of the city which swarms by day with a busy population of 1,000,000, while its residents, who even as late as 1861 were 112,069, had sunk in 1891 to 37,705.

BIBLIOGRAPHY.—Books about London form a library in themselves. Of those published up to 1881 a list is given in the *Book of British Topography*, by J. P. Anderson, which was issued in that year. The best modern account of London and its growth from the earliest to recent times is W. J. Loftie's *History of London* (1883), the historical part of which is abridged in his *London City, its History, Streets, Traffic, Buildings, and People* (1891). Walter Besant's *London* (1892) and smaller *History of London* (1893) are full of picturesque writing about the past of the great city. Extremely copious and in popular style is Thornbury and Walford's *Old and New London*, with maps (6 vols., illustrated, 1879–85). Timbs's *Curiosities of London* is interesting and instructive. Peter Cunningham's invaluable *Handbook of London*, alphabetically arranged and therefore very convenient for consultation, has been excellently edited and brought up to date of issue in M. H. B. Wheatley's *London, Past and Present* (3 vols., 1891). Augustus C. Hare's *Walks in London* (2 vols., 1878) is very pleasing and trustworthy. Since 1879 there has unfortunately been no edition of P. Cunningham's useful *Handbook of London as it Is* (one of the John Murray series), so that for contemporary London the recent issue of Baedeker is to be recommended, with Herbert Fry's *London in 1893*. The *Dictionary of London*, by Charles Dickens, a son of the novelist, issued annually, is less satisfactory than its title would indicate, but has some good points. The article *London* in the ninth edition of the *Encyclopædia Britannica* contains an immense mass of facts and figures. Great light is thrown on the economic condition of the industrial classes of London in Charles Booth's various works on the subject, especially his *Life and Labor of the People in London* (4 vols., 1892).

F. ESPINASSE.

London: city, port of entry, and capital of Middlesex co., Ont., Canada; at the junction of the north and south branches of the Thames river; on the Canadian Pac., the Grand Trunk, and the Mich. Cent. railways; 61 miles E. of Sarnia (see map of Ontario, ref. 5–C). The site was selected in 1793 by Gov. Simcoe for a city to become the capital of Canada, but the home Government never recognized the choice, and no attempt was made to improve it till 1826, when the first building was erected. The city is in a fertile, cultivated region, is laid out with wide intersecting streets, and many of its public buildings, bridges, streets, squares, and markets, and its public park (Hyde Park) are named after those in London, England. It is the seat of the Anglican Bishopric of Huron and of a Roman Catholic bishopric, and contains two cathedrals, Hellmuth College, Hellmuth Ladies' College, Huron College, a mercantile college, orphan asylum, hospital, insane asylum, 6 banks, 3 libraries (Middlesex Law Association, Mechanics' Institute, and Western

University) containing over 10,000 volumes, and 3 daily, 6 weekly, 4 monthly, and 2 other periodicals. The industries include the manufacture of furniture, agricultural implements, engines, machinery, railway cars, oil, chemicals, boots and shoes, cigars, tobacco, stoves, and pottery. The city elects one member of the Dominion Parliament. Pop. (1881) 19,763; (1891) 31,977. NEIL MACDONALD.

London: city; capital of Madison co., O. (for location of county, see map of Ohio, ref. 5–E); on the Cleve., Cin., Chi. and St. L., and the Pitts., Cin., Chi. and St. L. railways; 20 miles E. of Springfield, 25 miles W. S. W. of Columbus. It is in an agricultural region, has been an important live-stock market for years, and has a daily, a semi-weekly, and three weekly newspapers. Pop. (1890) 3,313; (1900) 3,511.

Londonderry: county of Ireland, in the province of Ulster, bordering on the Atlantic. Area, 816 sq. miles. The surface is mostly hilly and rugged, with fertile tracts along the rivers Bann, Foyle, Faughan, Roe, and Mayola, with their numerous affluents. Oats, barley, potatoes, and flax are the common crops; linen is the principal manufacture. A great part of the ground is held by the inhabitants by lease under the Irish Society and the twelve London companies. Pop. (1891) 151,666.

Londonderry: city; capital of the county of Londonderry, Ireland; on the Foyle, which is crossed by an iron bridge 1,200 feet long (see map of Ireland, ref. 3–G). The city is built on a hill, on whose top stands the cathedral of Derry, and was formerly fortified, has many breweries and distilleries, and considerable manufactures of linen and ropes. The salmon-fisheries of Lough Foyle are very productive. Derry was the old name of the city, but in the reign of James I. the resistance of its inhabitants to the royal authority caused the forfeiture of the land on which it stood to the crown, and its government was then administered by the Irish Society in London, which rebuilt the city and gave it its present name. In the revolution of 1688 it sided with William of Orange, and sustained a memorable defense against the forces of James II. Under its governor, George Walker, it held out against the besiegers for 105 days, enduring the extremes of privation until a man-of-war brought relief and the siege was raised. Pop. (1891) 32,893.

Londonderry, SECOND MARQUIS OF: See CASTLEREAGH, ROBERT STEWART.

Londonderry, CHARLES WILLIAM STEWART VANE, Third Marquis of: soldier and statesman; b. in Dublin, Ireland, May 18, 1778; served on the Continent both as a soldier and a diplomatist during the wars of the French Revolution; aided in suppressing the Irish rebellion of 1798; accompanied Abercrombie to Egypt in 1801, in which year he entered Parliament; became colonel, aide-de-camp to the king, and under secretary for the war department in 1803; distinguished himself at the head of a brigade of hussars under Sir John Moore in Spain (1808–09); was adjutant-general to Sir Arthur Wellesley (1809–13), distinguishing himself at Talavera and other battles, for which he received the thanks of Parliament and the order of the Bath; went as ambassador to Berlin in 1813, to Austria in 1814, and was a member of the Congress of Vienna in 1815; was made privy councilor, lieutenant-general, and Baron Stewart in 1814; assumed the surname of Vane in 1819 on his marriage with the heiress of that title; succeeded his half-brother Robert as Marquis of Londonderry in 1822; was made Earl Vane and Viscount Seaham in 1823, general in 1837, colonel of Life Guards in 1843, Knight of the Garter in 1852. D. in London, Mar. 6, 1854. Under his original name of Stewart he was author of a *History of the Peninsular War* (1808–13), and as Marquis of Londonderry he edited the *Correspondence* of his brother, Lord Castlereagh (1850). In developing the vast estates of his wife in Durham he constructed at his own expense the harbor of Seaham.

London, University of: an institution which owes its origin to an agitation started in 1825 by the poet Thomas Campbell for a university of equal rank with Oxford and Cambridge, which should be free from denominational control. The university was incorporated in 1826, and the corner-stone of University College was laid in 1827, but the fact that the new institution made no provision for instruction in religion caused serious thought, which resulted in King's College, founded 1829, opened 1831, in which provision was made for teaching religion according to the forms of the Church of England. The agitation continued; finally in 1837 the University of London was incorporated by royal letters patent as an examining body pure and simple, with which King's and University Colleges were affiliated. The corporate body of the university includes the chancellor, vice-chancellor, fellows, and graduates. The university proper consists of a senate and a board of examiners. It does not instruct, but examines, confers degrees, certificates, and prizes, and sends one member to Parliament. There are now several colleges and schools in various parts of the kingdom affiliated with the university. The chancellor is (1894) Lord Herschell. C. H. THURBER.

Long, CRAWFORD W., M. D.: discoverer of anæsthesia; b. Nov. 1, 1815, in Danielsville, Madison co., Ga.; educated at the University of Georgia, graduating with honor in 1835; graduated at the medical department of the University of Pennsylvania in 1839; soon after began to practice medicine in Jefferson, Ga. In 1842 he performed the first operation on a patient fully etherized that the world has any account of. His discovery of anæsthesia in surgery antedates the claims of Horace Wells two years and eight months, and those of Morton four years and six months. In 1790 Priestley discovered nitrous oxide gas. In 1799 Sir Humphry Davy experimented with it, and in 1800 he published his *Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide Gas and its Respiration*, in which he distinctly announced his belief that it might be used as an anæsthetic in surgical operations. It is well known that sulphuric ether was used sportively ever since the beginning of the nineteenth century by the students in New England colleges; and in certain sections of the South its use as an excitant was at one time very common. In 1842 Dr. Crawford W. Long had four students—viz., P. A. Wilhite, D. I. Long, H. R. P. Long, and John S. Groves. They all occasionally indulged in "ether frolics." On several occasions Dr. Long became furiously excited under the influence of ether, and could not be controlled. After recovering from the intoxication he often noticed that his arms were badly bruised, and he was not conscious of having felt any pain at the time. From this fact he inferred that it might be used as an anæsthetic in surgery. Accordingly, for this purpose he administered the ether to a young man named Venable, putting him profoundly under its influence, and then exsected a tumor from his neck. The operation, entirely painless, was witnessed by the four medical students above named and by others. His operations were known to medical men in the neighborhood; but Dr. Long did not communicate his discovery to any scientific body, nor did he write it out for any medical journal till the year 1849, when he sent it to *The Southern Medical and Surgical Journal*, which was long after the labors of Wells, Morton, Jackson, and Simpson in this direction were fully recognized. In a communication by Dr. Charles T. Jackson to *The Boston Medical Journal*, Apr. 11, 1861, he says: "From the documents shown me by Dr. Long it appears that he employed sulphuric ether as an anæsthetic agent—first, on Mar. 30, 1842, when he extirpated a small glandular tumor from the neck of James W. Venable, a boy [Mr. Venable was just twenty years old when the operation was performed], in Jefferson, Ga., now dead. Second, on July 3, 1842, in the amputation of the toe of a Negro boy belonging to Mrs. Hemphill, of Jackson, Ga. Third, on Sept. 9, 1843, in the extirpation of a tumor from the head of Mary Vincent, of Jackson, Ga. Fourth, on Jan. 8, 1845, in the amputation of a finger of a Negro boy belonging to Ralph Bailey, of Jackson, Ga. Copies of the letters and depositions proving these operations with ether were all shown me by Dr. Long. He also referred me to physicians in Jefferson who knew of the operations at the time." Revised by S. T. ARMSTRONG.

Long, GEORGE: classical scholar; b. at Poulton, Lancashire, England, in 1800; educated at Macclesfield School and at Trinity College, Cambridge. In 1824 he was appointed Professor of Ancient Languages in the University of Virginia, then being organized by the care of Thomas Jefferson. Returning to England in 1826, he was Professor of Greek in London University until 1831, when he devoted himself to the literary enterprises of the Society for the Diffusion of Useful Knowledge, editing for that association *The Penny Cyclopædia* (1833–46), the work by which he will be best remembered. He was called to the bar at the Inner Temple in 1837, became Professor of Latin at University College, London (1842–46), lecturer on Jurisprudence and Civil Law at the Middle Temple (1846–49), and Professor of Classical Literature in the Proprietary College at Brighton from 1849 to 1871. He was general editor of a *Bibliotheca*

Classica. Among his publications are an edition of Cæsar's *Gallic War*, of *Sallust*, and orations of Cicero; translations of *Select Lives from Plutarch*, *The Thoughts of the Emperor Marcus Aurelius*, and *Epictetus*. D. Aug. 10, 1879.

Long, John Davis: See the Appendix.

Long, Stephen Harriman: officer and engineer; b. in Hopkinton, N. H., Dec. 30, 1784; graduated at Dartmouth College 1809; was appointed second lieutenant of engineers Dec., 1814, and in the spring of 1815 was placed on duty at the Military Academy as Assistant Professor of Mathematics. In the following year he was appointed topographical engineer, and explored the Illinois and Arkansas rivers in a flatboat or canoe. This led to his subsequent expedition to the Rocky Mountains, which extended over a period of nearly five years, and embraced the country between the Mississippi river and the Rocky Mountains, one of the loftiest peaks of which great chain still bears his name. An account of this expedition was published in 1823 by E. James, and in 1824 W. H. Keating published in two volumes the history of Long's exploration of the sources of the Mississippi, both works being largely from notes of Col. Long. He had charge of the surveys and construction of the Baltimore and Ohio Railroad, and introduced great improvements in the construction of Bridges (*q. v.*). In the improvement of Western rivers and harbors he had a long experience, and devised valuable plans for the removal of obstructions. After serving on a board for the improvement of the lower Mississippi, he was in 1856 placed in charge of that work, and under his supervision the contracts for deepening the mouths of this river were conducted prior to the civil war. Col. Long was retired (June, 1863) from active service, but continued charged with important duties until his death, Sept. 4, 1864.

Long Branch: town; Monmouth co., N. J. (for location, see map of New Jersey, ref. 4–E); on the Atlantic Ocean, a branch of the South Shrewsbury river, and the Cent. of N. J., the N. J. South., and the Penn. railways; 11 miles S. of Sandy Hook, 30 miles S. of New York. It was formerly a fishery for the Indians and a resort for wreckers, but has become one of the most noted summering-places in the U. S. It is easy of access from New York and Philadelphia, and during the summer has almost hourly communication with the former by rail and water and with the latter by rail. The town is famous for its magnificent beach, which extends nearly 5 miles within corporate limits, and is overlooked by a bluff averaging 20 feet in height. The main thoroughfare is Ocean Avenue, which skirts the bluff for about 4 miles, and is kept in excellent condition. Some distance back from the ocean is the great Hollywood estate, laid out by John Hoey, and kept open to the public. The town is divided into several small places, such as North Long Branch, West Long Branch, West End, and Elberon, and has many fine driveways, leading to quaint suburban villages. The famous Monmouth Park race-course is about 4 miles inland. Long Branch contains nine first-class hotels, many boarding-houses, and a large number of beautiful private cottages. There are several churches, a U. S. life-saving station, a national bank with capital of $50,000, a State bank with capital of $90,000, a public library and reading-room, and a monthly and three daily periodicals. A street-railway connects the town with Pleasure Bay on the Shrewsbury river, a popular resort for fishing and yachting. Resident pop. (1880) 3,833; (1890) 7,231; (1900) 8,872.

Editor of "News."

Longet, lōn′zhā′, François Achille: physician and physiologist; b. at St.-Germain-en-Laye, department of Seine-et-Oise, France, in 1811; studied medicine, and especially physiology; gained twice the Montyon prize of physiology at the Academy of Sciences; was Professor of Physiology in the Faculty of Medicine at Paris; member of the Academy of Medicine, and consulting physician to Napoleon III. His principal works are *Traité d'Anatomie et de Physiologie du Système nerveux* (1842) and *Traité complet de Physiologie* (1850–59). D. at Bourdeaux in 1871.

Longevity [from Lat. *longæ′vitas*, length of life, deriv. of *longæ′vus*, long-lived; *lon′gus*, long (: Eng. *long*) + *ævum*, period of time, age, life (whence Lat. deriv. *æ′tas*, for **æ′vitas*, age, whence Eng. *age*)]: the length of time during which an individual lives. The term is also often used to express the more than usual prolongation of life, especially of human life. The average longevity of a particular group of individuals is the average duration of life of all the individuals in that group; this is what is called the expectation of life at birth, and is usually considered in connection with the subject of mortality. In speaking of the longevity of different species of living beings, we usually mean the potential longevity—that is, the greatest length of life attained by any individual of the particular group. This again is divided by Ray Lankester into "normal potential longevity," or that which belongs to the species in its normal conditions, and "absolute potential longevity," or that which can be obtained for a few individuals under special and unusual conditions. This distinction is useful as applied to plants and the lower animals, but is not of much importance as applied to man. The longevity, whether average or potential, of different species of living beings varies greatly, the range being from a few hours or days for certain minute plants or complete forms of insects to 2,000 years and more for a few individual yews and baobabs.

For the majority of animals, accurate information as to longevity is wanting. Pike and carp have been known to live 150 years; tortoises about the same. Eagles, ravens, and parrots, 100 years and over. The elephant lives from 100 to 150 years. The rhinoceros, 70 years; the camel, 50 to 80 years; the horse, 20 to 40 years; the ox, 15 to 20 years; the sheep, 12 years; lion, 20 to 40 years; dog, 12 to 34 years; cat, 10 to 18 years. From the number of layers of whalebone found in the jaws of certain large whales, it is computed that the longevity of this animal is at least 400 years. In mammals there appears to be some relation between the duration of gestation and longevity, but to this there are many exceptions. A more constant relation exists between the period required for completion of growth and the longevity. Buffon supposed that the ratio of length of growth to length of life was 1 to 7. Flourens gave it as 1 to 5, and defined the end of the period of growth as being that when the epiphyses form a bony union with the bones throughout the skeleton. The most interesting questions in longevity relate to man, and may be stated as follows: 1. What is the greatest age that any human being has ever attained? 2. Upon what does the great longevity of different individuals depend? 3. What is the average longevity of different groups of men? 4. How can this average longevity be increased?

The greatest age ever attained by a human being in an authenticated case is that of a man named Rives, who was living at Tarbes, France, in June, 1888, and whose baptismal certificate stated that he was born in Aug., 1770, thus making him out to be 118 years old. The claims that Thomas Parr reached the age of 152, the Countess of Desmond 145, and other similar cases, are unsupported by satisfactory evidence, and there is no proof that any one in England or the U. S. has ever reached the age of 110 years. The longevity of man is usually given as 100 years, but there are several well-authenticated cases in which it has been between 100 and 108 years. There is no reason to suppose that the potential longevity of man has diminished since he first appeared upon the earth. Several investigations have been made to determine the characteristics, habits, and modes of life of persons attaining a great age, one of the most complete of which is that made by the collective investigation committee of the British Medical Association, the results of which—including data from nearly 900 persons, of whom 74 were centenarians—have been published by Sir George Humphrey in his treatise on old age. The general result of this, as of similar inquiries undertaken in the U. S. and elsewhere, is that the chief requisite for individual longevity is a special constitution of the body, often inherited, including sound and well proportioned organs, and sufficient and persistent powers of reparative force and of resistance to disturbing agencies. The fact that each individual has his own potential longevity implies that there is something in his structure which is an inherent and necessary cause of death. The common idea is that each fertilized ovum possesses a fixed and definite amount of a peculiar kind of energy, or source of energy, known as vital force or as the physical basis of life; that this may be wasted by excessive use in a given time, or may be partially or wholly destroyed by accident or disease, but that it can not be added to. If this be stated in the terms of modern biology it would be that each essential unit of nuclear tissue has a certain definite capacity for metabolism, growth, and multiplication, and no more; that this is true of the germinal nuclear substance of each organ and tissue; that in most men this capacity is less in some organs and parts than the amount required to keep those parts alive for the same length of time, as certain other parts which have a normal

or perhaps an exeessive capaeity; and that in sueh eases death oecurs by failure of the weak part before the vitality of all the parts is exhausted—the ehain snaps in its weakest link. In this statement, nuclear substanee is distinguished from what is commonly called protoplasm. Aecording to Minot, the amount of protoplasm inereases in proportion to that of nuelear substanee as age advances, so that the possession of a large relative quantity of protoplasm is a sign of age. His observations on guinea-pigs show that from the period of birth there is a steady loss of vitality as indieated by the rate of growth; that is, that as the animal grows older, the time it takes to add 10 per cent. to its weight eonstantly inereases. It would be a more aecurate statement from the faets observed to say that there is a loss of vitality for a given weight of tissue, but there is no doubt that there is an absolute progressive loss of vitality after the period of reproduetion sets in, if not from birth. In the eentenarian all the parts had at birth a properly proportioned amount of vitality, or at all events an amount not below the normal, and unless a man begins life with this sort of physical structure he can not attain extreme old age; but the possession of such a structure at birth, or in growth, does not guarantee longevity; it is also necessary that the life of the individual be sueh that he is not exposed to aeeidents or to eertain eauses of disease. The greater longevity of women than of men is probably due, in part at least, to the faet that after fifty-five years of age they are less exposed to causes of disease or injury than men. The great majority of centenarians have been persons of regular habits, not large eaters, with good appetite and digestion, and good sleepers; their arteries are usually eomparatively soft, the sostal eartilages are not ossified, and the joints of their hands show no traee of gouty or rheumatic disease. Some of them have used alcoholic drinks and tobaeco freely, but the majority have been temperate or abstainers. They are usually of medium height; the average pulse in the man over eighty is 73, in the woman 78.

There is no definite evidence that there is any greater tendency in one race or community than another to produce persons capable of becoming centenarians if different liabilities to accidents or exposures to causes of disease be put aside, yet there may be differences in such tendency, since they appear to exist in certain families and to be hereditary.

As regards average longevity or duration of life, it varies considerably in different places and at different times. It appears to have increased in most civilized countries since the beginning of the nineteenth century, but the positive proof of this is in most cases wanting, owing to the absence of data from which it can be aeeurately calculated. According to the table of Ulpian in the *Pandec's* of Justinian, it was about 30 years among the Romans at the beginning of the third century A. D. In Geneva during the first half of the eighteenth century it was about 28 years. In England from 1838 to 1854 it was, for males, 35·9 years, and from 1871 to 1880 it was 41·35 years; for females it was, in the first period, 41·85, and in the second 44·62 years. It is noteworthy, however, that this increase in the average duration of life was due to the fact that more children survived to live lives of from 15 to 20 years' duration, but after the age of 19 in the male and 45 in the female the average expectation of life was, if anything, less in the latter period.

The following table shows the expectation of life in Massachusetts as derived from the statistics of the years 1883–87, inclusive:

AGES.	Persons.	Males.	Females.
0	40·87	39·72	42·03
1	49·77	49·43	50·12
2	52·67	52·36	52·98
3	53·02	52·73	53·31
4	52·96	52·70	53·23
5	52·70	52·43	52·97
10	49·61	49·27	49·95
15	45·53	45·13	45·94
20	41·93	41·41	42·45
25	38·76	38·24	39·28
30	35·54	34·94	36·15
35	32·33	31·65	33·02
40	28·98	28·26	29·71
45	25·64	24·88	26·41
50	22·29	21·55	23·04
55	18·95	18·23	19·68
60	15·98	15·32	16·64
65	13·01	12·42	13·60
70	10·74	10·27	11·21
75	8·47	8·12	8·83
80	7·24	7·03	7·45
85	6·00	5·94	6·07

The expeetation of life is greater in Jews than it is in the Anglo-Germanic races, and is less in the colored people of the U. S. than it is in the whites. For males it is in Massachusetts 39·7, in New York eity 33·3, in the Society of Friends of England 45·3, in the colored people in Baltimore 21.

If we take a large number of normal individuals who have eseaped the special dangers of infancy, sueh, for instanee, as those whose lives are insured in various companies, we find that the tendency to death at different ages can be fairly represented by mathematical formulas, which may be said to represent the law of mortality. The basis of this law, as established by the investigations of Gompertz and Makeham, is that the liability to death at any age is a result of two factors, one being liability to aeeident, the other a progressive neeessary deterioration expressed by the statement that eaeh person loses an equal proportion of his vital foree in equal times, and that the proportion of vital force so lost by eaeh is always the same. The result of this is that if we know the death-rate for two or three age-groups, we ean calculate the death-rates for other age-groups with great accuracy. For further considerations upon average death-rates, see VITAL STATISTICS.

The methods of inereasing the average longevity in a eommunity are discussed under the head of HYGIENE. They consist mainly in the prevention or removal of what may be called aeeidental eauses of death, for while it is theoretically possible by careful seleetion in marriage to produee children who will have few weak points, and will be better able to resist causes of disease, yet sueh selection is impossible for any considerable proportion of a eommunity, and, if made, probably it would be necessary to combine with it an artifieial limitation of the birth-rate to secure any marked results. Whether the potential longevity of man could be thus inereased we do not know, and probably it would not be desirable to do this if we could.

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J. S. BILLINGS.

Longfellow, HENRY WADSWORTH: poet; b. at Portland, Me., Feb. 27, 1807; graduated at Bowdoin College in 1825 in a class which included Nathaniel Hawthorne and John S. C. Abbott. During his college days he distinguished himself in modern languages, and wrote several short poems, published chiefly in *The United States Literary Gazette*, at Boston; one of these was the well-known *Hymn of the Moravian Nuns*. After graduation he entered the law offiee of his father, but in the following year accepted the professorship of Modern Languages at Bowdoin, with the privilege of spending three years in Europe in preparation for that post. After studying in France, Spain, Italy, and Germany, he entered upon his professorship in 1829, and began to publish the results of his careful researches into European languages and literature, both mediæval and modern. His first volume was a small *Essay on the Moral and Devotional Poetry of Spain* (1833), which included translations of the *Coplas de Manrique* and of several sonnets of Lope de Vega. A volume of prose sketches of travel appeared in 1835 under the title *Outre Mer, a Pilgrimage beyond the Sea*, and numerous essays and critiques on literary topies were contributed to *The North American Review*. In 1835 he was elected to the chair of Modern Languages and Literature in Harvard College, as successor to George Ticknor, and spent a year in European travel and study, especially in Denmark, Sweden, and Switzerland, cultivating a knowledge of early Scandinavian literature. Entering upon his professorship in 1836, he soon beeame a resident in the historic Craigie House (Washington's headquarters), which he afterward purchased and made his home. In 1839 he published *Hyperion, a Romance*, and *Voices of the Night*, his first volume of original verse, comprising the selected productions of nearly twenty years; it procured him immediate recognition as a poet, and the *Psalm of Life* took rank as a popular favorite. *Ballads and Other Poems* and a small volume of *Poems on Slavery* appeared in 1842: *The Spanish Stu-*

dent, a drama in three acts, in 1843; *The Belfry of Bruges* in 1846; *Evangeline, a Tale of Acadie*, in 1847, the latter being a spirited introduction of hexameter verse, and generally considered as Longfellow's masterpiece. In 1845 he published a large volume of *The Poets and Poetry of Europe*; in 1849 *Kavanagh, a Tale* (in idyllic prose); in 1850 *The Seaside and the Fireside*; in 1851 *The Golden Legend*; in 1855 *The Song of Hiawatha*; in 1858 *The Courtship of Miles Standish*; in 1863 *Tales of a Wayside Inn*; in 1866 *Flower de Luce*; in 1867–70 a masterly poetical translation of *Dante*; in 1869 *New England Tragedies*; in 1871 *The Divine Tragedy*; in 1872 *Three Books of Song*; in 1874 *Aftermath*; in 1875 *The Masque of Pandora*; in 1878 *Keramos*; in 1880 *Ultima Thule*; in 1882 *In the Harbor*; in 1883 *Michael Angelo* (posthumous). Prof. Longfellow resigned his chair at Harvard in 1854, but continued to reside at Cambridge; he traveled in Europe in 1841–42 and 1868–69, on which latter occasion he received the degree of D. C. L. from the University of Oxford, and in 1874 received a large complimentary vote for the lord rectorship of the University of Edinburgh. Some of his poetical works have been translated into many languages; complete editions have enjoyed wide circulation, not only in the U. S., but in an equal degree in England, where their popularity rivals that of the best modern English poetry. D. at Cambridge, Mar. 24, 1882. See *Life* of the poet, edited by his brother Samuel, and published in Boston 1886–87, and *Final Memorials*.

Revised by H. A. Beers.

Longfellow, Samuel: clergyman and author; b. at Portland, Me., June 18, 1819; brother of Henry W. Longfellow; graduated at Harvard College 1839, and Divinity School 1846; was first settled in Fall River in 1848; in 1853 became pastor of the Second Unitarian church in Brooklyn, N. Y.; resigned his pulpit in 1860, and went abroad. He did not settle again till 1878, when he went to Germantown, Pa., and remained there five years. After that his residence was in Cambridge, Mass. In 1848, in association with Rev. Samuel Johnson, he compiled *A Book of Hymns*, which was afterward revised and called *Hymns of the Spirit*; and in 1859 he published a book of *Hymns and Tunes for Congregational Use*, and a small volume for the vesper service which he instituted. His best essays were printed in *The Radical* 1866–71. He edited in 1883 *Lectures, Essays, and Sermons of Samuel Johnson, with a Memoir*, and in 1886 a *Life* of his brother Henry, in two volumes, to which a volume of *Final Memorials* was added in 1887, and in the same year he published *A Few Verses of Many Years*. A complete collection of his hymns and other poems is (1894) being made by his niece, Alice M. Longfellow. No other hymnist among Unitarians has written so many favorite hymns. He died in Portland, Me., Oct. 3, 1892. See his *Memoir and Letters* and *Essays and Sermons*, edited by Joseph May (Boston, 1894).

Revised by J. W. Chadwick.

Longford: county; in the province of Leinster, Ireland; bounded by the counties of Leitrim, Westmeath, and Roscommon. Area, 421 sq. miles, with a level or slightly hilly surface, and a fertile soil suited both for tillage and grazing. Some linens and coarse woolens are manufactured. Longford is the county-town. Pop. (1891) 52,553.

Longhi, lon'gĕe, Alessandro: painter; b. in Venice in 1733. His work, chiefly portraits, is only to be seen in Venice. He was distinguished also as an etcher. He published the *Lives of Venetian Painters* of his own century, with steel engravings of their portraits. He was one of the original members of the Venetian Academy. D. in Venice in 1813.

W. J. S.

Longhi, Giuseppe: engraver; b. at Monza, Italy, in 1766. He studied for the priesthood, but as soon as he left the seminary he devoted himself to art, and soon became very successful as a miniature-painter, but at the age of twenty-five chose engraving as his specialty, and studied this art in Milan and Rome. The plate of Galatea and a portrait of Bonaparte established his fame, and at the death of Vangelisti, the school of engraving at Milan was intrusted to him. He was a most industrious engraver, and worked after Rembrandt, Rubens, Crespi, Gherardo dalle Notti, Raphael, Correggio. Among his most famous plates are *Jesus in the Arms of St. Joseph*, the *Marriage of the Virgin*, a *Holy Family* after Raphael, and portraits of Napoleon, Michaelangelo, the Doge Dandolo, George Washington, and the artist's brother. Bonaparte commissioned him to engrave certain pictures by Appiani of Napoleonic ceremonials while he was at Milan, of which he executed five. He was also an excellent writer on the fine arts, and was elected member of all the European academies. When about to begin a plate of Michelangelo's *Last Judgment*, he was stricken with apoplexy, and died at Milan in 1831.

W. J. Stillman.

Longhi, Luca: painter; b. at Ravenna, Italy, in 1507. He was successful with portraits and historical subjects. His works are chiefly to be seen at Ravenna. He also painted at St. Benedict's in Ferrara, and in Milan at the Abbey (*abbazia*). His son and daughter were painters, but did not equal their father in merit. D. at Ravenna in 1580.

W. J. S.

Longinus, Cassius (in Gr. Λογγῖνος): one of the most highly esteemed Greek rhetoricians of the third century after Christ, called by Eunapius "a living library and a walking museum." Alike distinguished as a philosopher and as a rhetorician, he counted Porphyry, the Neo-Platonist, among his pupils, and his school at Athens enjoyed great reputation. An intimate and a partisan of Zenobia's, he was involved in her revolt, and was executed by Aurelian in 273. There are extant under his name sundry fragments on meter and rhetoric, of value disproportionate to his great repute, and a famous treatise, *On the Sublime* (περὶ ὕψους), which belongs to an earlier period, and is evidently intended to supplement and correct a celebrated work on the same subject by Cæcilius of Calacte, the contemporary of Dionysius of Halicarnassus. This treatise is a most valuable document of antique æsthetic criticism, and is interesting not only by reason of its remarkable insight, but because of the wide range of its illustrative quotations. The author compares Cicero and Demosthenes, and draws upon Genesis for an illustration of the sublime. No trustworthy conclusion has been reached as to authorship, and the book is generally assigned to the first century A. D. Editions: Weiske (1820), *cum notis variorum*; Egger (1837), with valuable commentary; critical ed. by Jahn (1867), re-edited by Vahlen (1887).

B. L. Gildersleeve.

Longipen'nes [Mod. Lat.; Lat. *lon'gus*, long + *pen'na*, feather, wing]: a group (sometimes called an order) of swimming birds, including the gulls, terns, albatrosses, and petrels. They are remarkable for their long and often very narrow wings, and their great powers of flight. They are also good swimmers, are usually pelagic, but as a rule do not dive under water. The group is not a natural one, and is now usually divided into two, *Gaviæ*, including the gulls and terns, and *Tubinares*, containing the albatrosses and petrels.

F. A. L.

Long Island: the extreme southeastern portion of the State of New York; bounded on the N. by Long Island Sound, E. and S. by the Atlantic Ocean, W. and N. W. by the Narrows, New York Bay, and the East river, an estuary connecting New York Bay with Long Island Sound. It lies between parallels 40° 34′ and 41° 10′ N. lat., and 71° 51′ to 74° 02′ lon. W. from Greenwich, and on the line of greatest length measures 118½ miles. In shape it resembles a fish with its head opposite New York city; gradually broadening from the west end eastward for 40 miles to its greatest width of about 23 miles, and then gradually narrowing for about 70 miles to its point of smallest width of 12 miles, opposite the head of Peconic Bay it again spreads in two peninsulas, the northerly one terminating in Orient Point and the southerly one in Montauk Point. Area, 1,682 sq. miles.

Topography.—A range of hills called "the back-bone of the island" extends for some 60 miles lengthwise of the island, varying in height from 150 to 384 feet, and from 3 to 7 miles S. of its north shore-line. From these hills the island slopes gently southward toward the ocean, while toward the north it is elevated, undulating and very broken, ending abruptly in bold precipitous bluffs at the shores of Long Island Sound. A series of fiords, eight in number, of great natural beauty, penetrates this north shore to the central hills flanked on either side by highlands covered with fine growths of oaks and pines, and affording with their deep waters excellent harbors for fishermen and coasting vessels, and producing shellfish in great quantities. The central part of the island is a vast nearly level plain where for miles the roads pass over great prairie-like reaches covered with forests of cedar and pine. Along the south side of the island for nearly its entire length there is a series of remarkable lagoons separated from the ocean by a broad belt of sand broken through, here and there, by inlets. These are navigable by small craft and abound in fish. Along the inner shore of these bays are inlets, bays, and coves; into them

run numerous streams, and along them, in one almost continuous chain, are villages, once the quiet homes of farmers and fishermen, now grown into prosperous seaside resorts filled with handsome villas and great hotels. The beaches shutting them off from the ocean are magnificent and are unsurpassed by any in the world; they, too, are dotted with great hotels and attractive cottages, and some of these, as Coney Island, Rockaway, and Long Beach, are visited daily during warm weather by large numbers of people. The surf bathing is excellent nearly the whole length of the island. The city of Brooklyn occupies the greater part of the west end of the island, the east end of which is bifurcated, so that it resembles the tail of a fish, by an inlet of irregular shape extending from the ocean westward into the island about 22 miles. Across the east end lies Gardiner's island, 7 miles long, varying in width from 3 miles to a few rods. It has been owned by the Gardiner family since 1640. Several miles westward from this island lies Shelter island, across the mouth of Peconic Bay, dividing it from Gardiner's Bay, irregular in outline, with high cliffs and promontories, its shore broken into small bays and coves. The southerly arm of the island terminates in Montauk Point, a hilly peninsula containing about 9,000 acres. Its bluffs, ranging from 50 to 100 feet in height, are exceedingly bold and picturesque. At Fort Pond Bay is a magnificent harbor, and on the extreme point of the island stands Montauk light. On this peninsula Wyandance, chief of the thirteen tribes of the island, resided at the time it was first settled by whites.

Geology.—Long Island is part of the terminal moraine of the great North American glacier that in the ice age extended downward from the arctic regions, burying a part of the continent under 4,000 or 5,000 feet of ice; its geological structure is glacial drift, the detritus brought by the ice in its downward movement, and filled with materials brought from afar. The bed rock, a dark micaceous gneiss, is visible only at Astoria, and is the same as that of the opposite shore. Common rocks like granite, trap, slate, schist, sandstone, limestone, and conglomerate, are abundant in different parts of the island, and also many kinds of minerals are found. The collection of minerals and rocks in the museum of the Long Island Historical Society has 500 specimens gathered from all parts of the island. Along the north side the drift is underlaid by deep beds of clay and kaolin. Among the drift many bowlders are found, some of them very large, one, for instance, near Manhasset, being 54 feet long by 40 broad and 16 high. These all have worn surfaces without sharp angles or edges, and are many of them covered with glacial scratches. A peculiarity of the formation is the many bowl-shaped depressions which occur upon the surface at different parts of the island, filled with clear water, forming beautiful lakes and ponds.

Soil and Productions.—The soil of Long Island along the slope S. from the hills is for the most part modified drift, sandy, easily cultivated, very productive. Portions of it, as that called Hempstead Plains covering about 60,000 acres, are nearly level, and have a dark rich soil with a deep sub-soil, underlaid with hard gravel or sand. The ridge and northern part has a rich and fertile loam. The island has many small lakes, and across it run many shallow streams, while underneath the hard-pan which forms the main body of the island, especially in the middle and at the west end, is found an inexhaustible supply of clear, fresh water. From these sources Brooklyn and many of the larger towns get their water-supply. Long Island is virtually a large market garden to New York city, furnishing its markets and the summer hotels and villas along its shores with great quantities of fresh produce. Its farms cover an area of 485,000 acres, valued at over $45,000,000, and have a yearly product aggregating about $7,500,000. Queens County leads in market stuff, producing nearly double that of Kings and ten times as much as Suffolk; this county produces about one-half of the potatoes raised on the island, and also leads in quantity of rye, buckwheat, and milk. Suffolk County leads in hay and other farm crops. Large quantities of apples, grapes, and other fruits, also of poultry, eggs, and dressed meat, come from the island; it is also noted for its fruit, flower, and tree nurseries.

Fisheries.—The fisheries of the island have always been an important part of its industries. At one time Sag Harbor sent out from her docks seventy whaling-vessels, and in 1847 the whale oil and bone it marketed was valued at $996,500. This industry came to an end in 1862. The menhaden fishing employs 35 steam and sail vessels and about 700 men. The annual catch is about 150,000,000, valued at $1,250,000. The shell-fishery gives work to upward of 2,000 men and about 350 vessels. About 785,000 bush. of oysters, 200,000 bush. of hard-shell and 300,000 bush. of soft-shell clams are taken annually. The most complete and best-fitted fish-hatching station of the Fish Commission of New York State is at Cold Spring harbor, on the north shore of the island. It has planted on the island over 35,000,000 fishes, including trout of various kinds, salmon, shad, smelts, whitefish, lobsters, etc.

Political Divisions, Population, etc.—Long Island is divided into three counties. Kings County, with an area of 48,800 acres, occupies the west end; Suffolk, with an area of 626,000 acres, the east end; and Queens, with 253,100 acres, the section between. The population and its growth is shown by the following table.

COUNTY.	1810.	1830.	1850.	1870.	1880.	1890.	1900.
Kings...	8,303	20,535	138,882	419,921	599,495	838,547	1,166,582
Queens.	19,336	22,460	36,833	73,803	90,574	128,059	152,999
Suffolk.	21,752	26,780	36,922	46,924	53,888	62,491	77,582
Totals.	48,752	69,775	212,837	540,648	743,957	1,029,097	1,397,163

Kings and Queens counties comprise Brooklyn and Queens boroughs respectively of New York city. The larger villages with their populations in 1900 are: Patchogue, 2,926; Greenport, 2,366; Southampton, 2,289; Babylon, 2,157; Amityville, 2,038; and Sag Harbor, 1,969.

History.—The Dutch name of the island was Lange Eylandt, converted into Long Island by the English, who in 1693 changed it to the Island of Nassau, but this name never came into popular use. Its Indian names were Panmaneke, Sewanhacky, Wamponomon, and Matouwacks. The island was visited in 1609 by Hendrick Hudson, who probably touched at Coney Island. It was included in the grant in 1620 by James I. to the Plymouth Company of all the land between 40° and 48° N. lat. between the Atlantic and Pacific Oceans. The company granted a patent of the island to Earl Stirling, who died in 1640, and the same year his son surrendered the patent to the Duke of York. Settlements began at the east and west ends about the same time—at Gowanus (Brooklyn) in 1636; Gardiner's island, Southold, and Southampton in 1639–40; Hempstead, in Queens County, in 1643. The island was at that time occupied by thirteen tribes of Indians, all having the same general characteristics and habits. They belonged to the Algonquin nation and were of the Lenni-Lenape subdivision of that nation. But little is known of their language or customs. They lived mainly on fish and shell-fish, and by hunting. The island Indians in their pristine character are long extinct. A few individuals remain, who show some traces of aboriginal blood. About 100, called Shinnecocks, occupy a reservation on Shinnecock Neck about 2 miles from Southampton, and the State supports a school among them. In the vicinity of Forge are also a few families descended from the Poosepatuck Indians, a sub-tribe of the Patchogues. There are some evidences in remains discovered near Aquebogue that another and different race had occupied the island earlier.

The first purchase of land on the island was of 930 acres in the southern part of Brooklyn in 1636 by Jacques Bentyn and Adrianse Bennet, the latter of whom erected the first house known to have been built. The first female child born in Suffolk County was Elizabeth, daughter of Lyon Gardiner, on Gardiner's island, Sept. 14, 1641. Many of the farms at the east end keep their original boundaries and the greater part of Queens and Suffolk Counties remain in the possession of descendants of the early settlers.

The battle of Long Island was fought over the ground now occupied by Brooklyn Aug. 26, 27, and 28, 1776, and the island suffered greatly by incursions from the mainland, from British vessels, and by its occupation by foreign troops. In the war of 1812 preparations were made in anticipation of an attack on New York, and in the civil war Long Island did her full duty. Revised by GERRIT SMITH.

Long Island, or **Outer Hebrides**: a name given to a group of the Hebrides, Scotland, embracing Lewis, Harris, North and South Uist, Benbecula, Barra, and a number of small islands, all of which are supposed to have been formerly united. Length, about 130 miles.

Long Island City: city (incorporated in 1870), now a part of the borough of Queens, New York city, on the East river, and the Long Island and the N. Y. and Rockaway Beach railways. It is opposite that part of New York

city which extends from Thirty-second Street to Mott Haven, Blackwell's island lying between; is separated from the city of Brooklyn by Newtown creek; has a water-front of over 10 miles and an area of about 8 sq. miles, and comprises the former villages of Hunter's Point, Ravenswood, Dutch Kills, Blissville, and Astoria. The census returns of 1890 showed that 313 manufacturing establishments (representing 49 industries) reported. These had a combined capital of $6,871,629; employed 3,344 persons; paid $2,313,889 for wages and $3,233,296 for materials; and had products valued at $7,694,369. The principal industries are oil-refining, terra-cotta work, and the manufacture of pianos, carpets and rugs, asphalt, and chemicals. The city has water-works, gas and electric light plants, 3 hospitals, a children's home, 13 public schools, with an enrollment of 6,000 pupils, 10 principals, and 126 teachers; 3 parochial schools, and a daily and 6 weekly newspapers. The annual revenue and expenditure are about $570,000; annual expenditure for educational purposes, $120,000; property valuation, $60,000,000; and bonded indebtedness, $1,600,000. Both Jamaica (*q. v.*) and Long Island City claim to be the capital of Queens County. In 1894 Jamaica had the offices of county clerk and the surrogate, while Long Island City had the court-house and jail, and the offices of sheriff and district attorney. Pop. (1880) 17,129; (1890) 30,506.

Horatio S. Sanford.

Long Island Sound: an arm of the Atlantic Ocean between Long Island and the State of Connecticut, 115 miles long and generally 20 or 25 miles wide. A chain of small islands extends N. E. from Long Island across the Sound to the S. W. of Rhode Island. The Sound is an important thoroughfare for steamers and coasting vessels, and when the channel of the East river at Hell Gate has been sufficiently improved the largest ships will be able to reach New York harbor through the Sound, thus saving many hours' travel, and in heavy weather some danger. It has important fisheries.

Longitude, Terrestrial [liter., length of the earth, from Lat. *longitu'do*, length, deriv. of *lon'gus*, long, and *terres'tris*, pertaining to the earth, deriv. of *ter'ra*, earth]: The longitude of a point on the earth is the angle between the meridian plane through that point and the meridian plane through some other point, taken for the origin of longitudes. This angle is measured by the part of the equator intercepted by the meridians, and may be expressed in angular measure or in time, as we suppose the equator divided into 360° or into twenty-four hours. The origin oftenest used by English-speaking peoples is the Greenwich Observatory. Any plane through the earth's polar axis cuts out of the celestial vault (supposed spherical and very distant) an hour-circle. If it passes through a point on the earth's surface, it is the meridian plane of that point, and cuts the earth's surface and the celestial vault in the terrestrial and celestial meridians. The latter, moving with the earth's rotation, sweeps from W. to E. over the heavens every twenty-four hours. The angle included at any instant between the plane of the meridian at a place and the plane of an hour-circle through any point of the heavens is the hour-angle of that point. If the point be the vernal equinox, its hour-angle measured toward the W. expressed in time at any place at a given instant is the local sidereal time; while if the point were one called the mean sun (which starts from the vernal equinox with the true sun, and moves in the equator with his mean motion), its hour-angle is the local mean solar time.

From these definitions it follows that at any instant the difference of local times at two places is their difference of longitudes, since each difference is the angle between the meridian planes of the two places. The problem of terrestrial longitudes is then to find at any instant of absolute time the difference of the local times of two places. It requires, first, the determination of the local time at each place; second, the comparison of those local times at some instant.

There are many methods of determining local time, but, as they will be considered elsewhere, only the one which is theoretically simplest will be mentioned here. As already indicated, it is 0h. 0m. 0s. sidereal time when the vernal equinox crosses the meridian, and a clock so adjusted as to mark 0h. 0m. 0s. at that instant, and to count twenty-four hours between two such crossings, is a sidereal clock. Such a clock will at any instant give the hour-angle of the vernal equinox Now, the angle between an hour-circle through any point in the heavens and the hour-circle through the vernal equinox counted eastward from the equinox is called the right ascension of the point. Hence, if the sidereal clock is perfectly correct, when a star crosses the meridian the clock-time will be its right ascension, since the latter is then equal to the hour-angle of the vernal equinox. *The Nautical Almanac* gives for every tenth day in the year the right ascensions of a number of stars. If the instant by the sidereal clock at which one of these stars crosses the meridian be noted, the difference between that time and the star's tabular right ascension is the error of the clock.

The local time or error of a clock being found at each station, the problem proper of terrestrial longitudes reduces itself to that of finding the difference between the clocks.

A. If observers at different places note by their clocks the occurrence of some instantaneous phenomenon visible at the same instant to both, the difference of the clock-times corrected for clock-errors is the difference of longitude. (*a*) Thus two observers many miles apart may determine with precision by star transits the errors of their timepieces, and then observe repeatedly at night the instant some powder is flashed on a hill visible to both. From many flashes the difference of longitude can be obtained with great accuracy. In the work of the U. S. Lake Survey flashes made with a pound of powder have been observed for longitude at a distance of 100 miles. (*b*) When in a lunar eclipse the moon passes into the earth's conical shadow and again emerges, the phenomena are seen at the same time by all persons to whom they are visible. Unfortunately, it is difficult to fix the instant when the moon enters or leaves the shadow, as the earth's shadow is not sharply defined on the moon, and the errors in estimating the time may amount to a minute. The eclipses of Jupiter's satellites are seen by all observers at the same instant, and that of the first, which has a rapid motion, is best fitted for precise observation; but the gradual disappearance of the satellite makes it difficult to observe the time of disappearance with precision. That time varies with the power of the telescope used. The Washington times of immersion and emersion are given in *The American Nautical Almanac*. Shooting stars have also been proposed as signals to be observed for difference of longitude.

B. There are several methods of determining differences of longitude, depending on the fact that the moon has a relatively rapid motion among the stars. If observers at two points determine some co-ordinate of the moon's position as seen from the center of the earth, and also their local times, the change in this co-ordinate in passing from one meridian to the other is determined; and from this change and the known rate of change the time required for so much change can be computed. This time is the difference of longitude. It may be said here that while two observers are constantly spoken of, in practice one observer, supposed to be stationed at a fixed observatory, is replaced by a nautical almanac, giving the results he should obtain in all cases save those in which the highest accuracy is required. (*a*) If at two places observers note the sidereal time of the moon's transit, thus determining the moon's right ascension at those transits, then from the difference of the right ascensions and the moon's known rate of change in right ascension the time required for so much change, which is the difference of longitude, can at once be found. This is the method of moon culminations. The moon's average change of right ascension is about one second of time in twenty-seven seconds, so that an error of 0·1s. in its observed right ascension would give 2·7s. error in the resulting longitude. Instead of determining the moon's right ascension by meridian transits, it may be obtained from transits across a near vertical circle, or by observing its altitude or azimuth. (*b*) Another method is that of lunar distances. *The Nautical Almanac* gives for every three hours Greenwich time the distance of the moon from several fixed stars, some of the planets, or the sun as seen from the earth's center. If an observer at any point measures one of these angular distances with a sextant, and also the altitudes of the two bodies, he can compute their distance at the moment of observation as seen from the center of the earth. Should this corrected distance agree with one in *The Nautical Almanac*, the corresponding time in the *Almanac* is the Greenwich time of his observation, and the difference of that time from his local time is the longitude. Should his observed distance fall between two tabular distances, he can find the corresponding Greenwich time by interpolation.

C. If at any place on the earth whose position is approximately known the phases of a solar eclipse be observed, the corresponding time at a known meridian can be computed, thus giving the difference of longitude. The same is true of occultations of stars by the moon. The data for both are given in *The Nautical Almanac*. Occultations of Jupiter's satellites by the planet, their transits across his disk, and the transits of their shadows are similar phenomena, and may be used in determining longitudes.

D. Another method of determining differences of longitude is that by transportation of chronometers. If a perfect timekeeper were compared with the true time at Greenwich, and then taken to any other part of the world, from its error and rate at Greenwich before starting the true Greenwich time at any instant could be computed, and its difference from the local time of the traveler's position would be the difference of longitude. So important is this method to sailors that the English Parliament gave £20,000 to Harrison, who first made chronometers with a tolerably steady rate; but as no rate is perfectly constant, and as a traveling rate usually differs from the rate when at rest, when the greatest accuracy is required the chronometer is carried back to the starting-point, so that its traveling rate becomes known. By using many chronometers and making many trips accuracy can be obtained if the distance is not too great. Struve found the difference of longitude of Pulkova and Altona to be 1h. 21m. 32·52s., with a probable error of only 0·04s. by seventeen trips of 81 chronometers. Bond determined (1849) the difference of longitude of Liverpool and Cambridge, Mass., from 175 chronometers, and again (1855) from 52. The results differed by 1·23s.

E. Of all methods of determining differences of longitude, that by telegraphic signals, especially over long lines, is the most precise. The following is the simplest form of the method. If the local time of pressing on the key at the first station and of the click at the second station (supposed to be produced instantly) be observed, the difference of those local times is the difference of longitude. It takes a few thousandths of a second for the signal to travel to a distant station, and a few thousandths of a second to make the click, so that if the second station is W. of the first the resulting difference of longitude is too small by these small quantities; but if, retaining the same adjustments and equal battery strength, signals be sent from W. to E., the resulting longitude will be as much too large, and the mean of the two values will be correct. This simple method, requiring, first, the precise determination of local times, second, their comparison (which should be repeated several times) by the telegraph line, gives a higher precision over long lines than any of the preceding. Still higher precision is reached by causing the timepiece to make or break the circuit at each beat, instead of requiring the observer's finger to do it. The method becomes perfect when in addition each timepiece is made to write its own record of time on a chronograph, thus avoiding the necessity of noting signals received by the ear. By the telegraphic method differences of longitude can be determined so precisely that their probable errors do not exceed a few hundredths of a second.

To show the errors which may still remain in longitudes determined from many observations and with great care by other methods than the telegraphic one, the following values of the longitude of the Naval Observatory, Washington, are given. The telegraphic value is undoubtedly very nearly correct, having been obtained by the Coast Survey by three routes, whose results agree closely:

Longitude of Washington.

Telegraphic		5h. 08m. 12·09s.
Moon culminations	1846–60,	5h. 08m. 11·6s.
" "	1862–63,	5h. 08m. 9·8s.
Bond, 175 chronometers	1849,	5h. 08m. 12·26s.
" 52 "	1855,	5h. 08m. 13·49s.
Occultations of Pleiades,	1856–61,	5h. 08m. 13·13s.

Revised by S. Newcomb.

Longmont: town (laid out 1871); Boulder co., Col. (for location of county, see map of Colorado, ref. 2–E); on the St. Vrain river, and the Burl. and the Union Pac. railways; 35 miles N. of Denver. It is in an agricultural region; manufactures flour and canned goods; and has 6 churches, 2 public school buildings, an academy, water-works, electric lights, public library and free reading-room, 2 national banks with combined capital of $110,000, a private bank, and 3 weekly newspapers. Pop. (1880) 773; (1890) 1,543; (1900) 2,201. Editor of "Ledger."

Longobards: See Lombards.

Long Parliament: the name given to the fifth Parliament of Charles I.'s reign in England, summoned Nov. 3, 1640, and continued throughout the period of the Civil War. The so-called Short Parliament had been dissolved after a three weeks' session, and Charles's attempt during the next few months to govern without a parliament had failed on account of the war with the Scots. The body that met in November began at once to remove the accumulated abuses of the king's personal government, abolishing the Court of High Commission, the Star Chamber, and the Council of the North, checking the illegal exactions of the court, and impeaching Strafford, who was finally brought to the block by a bill of attainder. Starting out with legitimate reforms, it soon became in effect a revolutionary body, while, on the other hand, tyranny and duplicity continued to mark the course of the king, who at length by his violation of privilege in the attempted seizure of the five members in Jan., 1642, made war inevitable. With the defeat of the king power passed into the hands of the army, which by the lawless act known as "Pride's Purge" cleared the Parliament of all members displeasing to the military. The remnant, called in derision the "Rump" Parliament, organized the High Court of Justice, which condemned the king. It remained in session till turned out by Cromwell, Apr. 20, 1653. As the only body in the state having anything like legal authority after the death of Cromwell, it reassembled, issued writs for a new election, and dissolved itself Mar. 16, 1660, after an existence of nearly twenty years. F. M. Colby.

Longstreet, Augustus Baldwin: lawyer, clergyman, educator, and author; b. in Augusta, Ga., Sept. 22, 1790; graduated at Yale College in 1813. He studied law at Litchfield, Conn., and was admitted to the bar in Georgia in 1815. He was in 1821 elected to the General Assembly of the State, and promoted to the bench in the Ocmulgee judicial circuit in 1822, a position which he soon resigned, removing to Augusta; continued the practice of the law and established the Augusta *Sentinel*, consolidated in 1838 with the Augusta *Chronicle*. In 1838 he entered the Methodist Episcopal ministry, and in 1839 was elected to the presidency of Emory College at Oxford, Ga., which position he filled with great ability until 1848, when he accepted a similar post in Centenary College, La., and shortly afterward in Mississippi University at Oxford, Miss. He became president of the South Carolina College in 1857, and just before the war returned to the presidency of the University of Mississippi. The best known of Judge Longstreet's writings was his *Georgia Scenes* (1840), a series of humorous sketches which gained a wide popularity. D. at Oxford, Miss., Sept., 9, 1870. Revised by H. A. Beers.

Longstreet, James: general; b. in Edgefield district, S. C., Jan. 8, 1821; removed at an early age with his parents to Alabama, from which State he was appointed to the U. S. Military Academy in 1838; graduated in 1842, entering the army as lieutenant of infantry; served in the war with Mexico; in 1847–52 was on frontier duty in Texas; in 1858 was transferred to the staff as paymaster, with the rank of major. In June, 1861, Longstreet resigned to enter the Confederate army, and commanded a brigade at Bull Run the following month. Promoted to be major-general in 1862, he thereafter bore a conspicuous part and rendered valuable service to the Confederate cause. In command of the rear guard of the army falling back from Yorktown, he had passed through Williamsburg May 5, 1862, when he was called back to oppose the hastily advancing Union forces, a battle lasting nearly nine hours resulting, thus allowing the escape of the main army to Richmond, himself following rapidly under cover of night. At Seven Pines he directed the main attack, and in the subsequent fighting at Gaines's Mill, Frazier's Farm, Malvern Hill, etc., his division fought bravely, losing nearly one-half its numbers in killed and wounded. At the second battle of Bull Run he skillfully made the passage of the Thoroughfare Gap, and on the second day held the right of the line and contributed largely to the success of the day. At Antietam he commanded the right wing, and at Fredericksburg the left wing and center, where the assault was so fatal to the Federal army. After the latter battle he was temporarily detached with three divisions of his corps to operate below the James, and in April attacked Gen. Peck at Suffolk, Va., which place he invested until recalled by Gen. Lee after the battle of Chancellorsville. In the organization of the army with which it was designed to invade the North, Longstreet was

assigned to the command of one of its three corps, with the rank of lieutenant-general, and in the ensuing battle of Gettysburg commanded the right of the line during the second and third days of the fight. The importance of impending operations in the West caused Lee, who felt seeure against attaek, to detaeh Longstreet again, and on this occasion the change was timely and precious. for he arrived with his corps in time to decide the fortunes of the day at Chiekamauga. The following month Bragg assigned Longstreet to lead a movement against Burnside in East Tennessee, and in November he compelled that officer to seek the intrenchments of Knoxville with his army, which place Longstreet beleaguered, but was compelled to abandon the siege upon Grant's victory at Chattanooga, and hastily moved eastward to Virginia, where he rejoined the army of Gen. Lee. In the ensuing campaign he was severely wounded by his own troops in the Wilderness battle (May 6), and disabled for months. Returning to duty in Oetober, he commanded the defenses of Riehmond N. of the James, and was partially engaged in the action around Petersburg the day of evacuation. The war ended, Gen. Longstreet aeeepted the result, and, having renewed his allegiance to the general Government, labored earnestly to promote an era of good feeling between all seetions of the country. Taking up his residence in New Orleans, he was appointed (in 1869) surveyor of the port, resigned in 1871; was appointed commissioner of engineers for Louisiana, and served four years. In 1875 he settled in Georgia, where he became inspeetor of internal revenue; was U. S. minister to Turkey 1880–81, and U. S. marshal of Georgia 1881–84.

Longstreet, William: inventor; b. in New Jersey in 1760; in early life moved to Augusta, Ga. As early as Sept. 26, 1790, he addressed a letter to Thomas Telfair, Governor of Georgia, stating that his plan of applying steam to vessels was completed, and expressing his "thorough confidence in its suecess" if he had means to perfeet it. These he asked of the Governor or the Legislature, to which the matter was submitted. No action, however, was taken. This was three years before Fulton's letter to the Earl of Stanhope announeing his ideas "respecting the moving of ships by the means of steam." Longstreet's plan was very different from Fulton's. Failing to obtain public aid at the time, several years afterward he proeured funds from private sources which enabled him in 1807 to put his boat in operation on the Savannah river, and it moved against the current of the stream at the rate of 5 miles an hour a few days after Fulton's like sueeess on the Hudson. He also invented and patented the "breast roller" of cotton-gins, whieh was of very great value to the growers of the long staple or sea-island cotton. D. in Georgia in 1814.

Longueuil, lōn′gŏl′: a town of Chambly co., Quebec, Canada; on the right bank of the St. Lawrence, 4 miles below and opposite Montreal (see map of Quebec, ref. 5–B). It contains many summer villas of the residents of Montreal. Permanent population 4,000, mostly French-Canadians.

Longueville, lōn′gvĕl′, Anne Geneviève de Bourbon-Condé, Duchess of: one of the leaders of the Fronde in France; b. at Vineennes, 1619, and married the Duc de Longueville 1642. Her beauty and charm of manner won her many admirers; but her favorite was the Duc de la Rochefoucauld, the author of the *Maximes*, whose influenee drew her into the political strife of the time. Sharing in the hatred of Mazarin, she sided with the Parliament, and during the insurrection in Paris held the Hôtel de Ville, whence she aided the movement by her direction and advice. She consented to the peace with Mazarin, but on the imprisonment of her husband and brother, fled to Stenay, induced Turenne to turn traitor to the court, and forced the Government to release the prisoners. After a brief interval of apparent reconciliation, she was again in revolt, aiding aetively in the defense of Bordeaux, but her party was hopelessly divided in its counsels and was soon overthrown. After peace was made in 1659 she eeased to meddle in polities, and became a religious devotee, spending much of her time at the cloister of Port Royal des Champs. Strongly sympathizing with Jansenism herself, she saved this institution from perseeution by the orthodox Church. Her last years, saddened by the death of her son, were passed at the convent of the Carmelites, where she died Apr. 15, 1679. See Cousin, *Madame de Longueville* (Paris, 1859). F. M. Colby.

Longus (in Gr. Λόγγος): author of the Greek pastoral romance *The Story of Daphnis and Chloë* in four books, one of the most popular among the productions of the *scriptores erotici Græci*. His time is uneertain except that he must have belonged to the pagan world; his very name has been disputed, and his home can only be divined from his familiarity with the island of Lesbos, which is the scene of his romance. Longus is the last of the bucolic poets, for he is essentially a poet in spite of the prose form, and his pictures of pastoral life, in the Freneh translation of Amyot (*q. v.*), are largely responsible for the revival of that species of literature in modern times. Unfortunately, the idyllic sweetness of his narrative is a manufactured sweetness, and the simplicity of his style is a manufactured simplicity. The trail of the sophist is over it all, and the enjoyment of his pastoral scenes is marred by passages of unmitigated sensuality.

Editions.—Villoison, with a rich eommentary (1778); Courier, a famous edition (1810); Seiler, *cum notis variorum* (1843); Hercher, in the first volume of the *Erotici Scriptores Græci* (Teubner Library). There is an English translation by Rev. Rowland Smith (*The Greek Romances*) in the Bohn Library. See Rohde, *Der griechische Roman*, p. 502 fol. B. L. Gildersleeve.

Longview: town (incorporated in 1871); capital of Gregg co., Tex. (for location of county, see map of Texas, ref. 2–J); on Sabine river and the Int. and Gt. N., the Tex. and Pac., and the Tex., Sab. Val. and N. W. railways; 60 miles W. of Sabine. It is in a cotton and lumbering region, has numerous sawmills in its vicinity, and has beeome an important shipping-point. Pop. (1880) 1,525; (1890) 2,034; (1900) 3,591.

Lönn′rot, Elias: Finnish scholar; b. at Sammatti, in Nyland, Apr. 9, 1802; d. there Mar. 19, 1884. Apprentieed first to a tailor, then to a druggist, in 1822 he began the study of philology and natural scienee at the University of Åbo. In 1827 he took up the study of medicine at the University of Helsingfors, and in 1832 he obtained a doetor's degree. In 1833 he began to practiee as a physieian at Kajana. He had already, however, become deeply interested in the language and popular poetry of his native land, and had published his *Kantele, etc.* (The Lyre, or Runes and Songs, Ancient and Modern, of the Finnish People, 4 parts, Helsingfors, 1829–31). The passion for eolleeting these songs constantly grew upon him, and he traveled extensively on foot throughout Finland, writing down whatever he could get the popular poets (*runojat*) to recite to him. The most important result of these labors was the Finnish epic, the Kalevala (*q. v.*). In the composition of this out of the great mass of Finnish popular songs, Lönnrot was inspired first by the similar attempt of von Bekker; then by the example of the runoja, Vassili, whom he heard at Vuonninen (Russian Cavelia) in 1833; and finally by the theories in regard to epie poetry then generally aeeepted on the authority of Wolf and Laehmann. The first version of the *Kalevala* was submitted to the Society of Finnish Literature, and published by it in 1835. Subsequently Lönnrot made use of extensive further colleetions of his own and of others, and in 1849 brought out the second and final edition of the poem, containing fifty runes and 22,800 verses. In the meantime he had published several other collections of popular verse. From 1836 to 1840 he edited a little periodical, *Mehiläinen* (The Bee), devoted to sueh matters. In 1840 he issued his *Kanteletar, etc.* (Lyric Art), eontaining a large number of lyric and epic-lyrie songs (3d ed. 1887; Germ. trans. of the most interesting songs by H. Paul, *Kanteletar, die Folkslyrik der Finnen ins Deutsche übertragen*, Helsingfors, 1882). In 1842 appeared *Suomen Kansan sananlaskuja* (Proverbs of the Finnish People), containing over 7,000 proverbs. In 1844 was printed *Suomen Kansan arwoituksia, etc.* (Riddles of the Finnish People; 2d enlarged ed., with 2,224 riddles, 1851). In 1853 he was appointed Professor of the Finnish Language and Literature at Helsingfors, but gave up the place in 1862 and devoted himself to studies and the preparation of his great *Finskt-Svenskt Lexikon* (Finnish-Swedish Dictionary, 2 vols., 1874–80; suppl. 1886). In 1880 he issued his important collection of Finnish magic songs, *Suomen Kansan loitsurunoja*. (See English trans. of many of these by Abercromby, in *Folk-lore*, i., 1890.) For Lönnrot's biography, see A. Ahlquist, *Elias Lönnrot biografiskt uttkast* (Helsingfors, 1884). A. R. Marsh.

Lons-le-Saulnier, lōn′le-sō′ni-ā′: town; in the department of Jura, France; beautifully situated among vine-clad hills at the confluence of the Seille, Vallière, and Solman (see map of France, ref. 5–H). Its famous salt-works have been converted into mineral baths. An important industry is the manufacture of sparkling wines. The town was the

birthplace of Rouget de Lisle, the composer of the *Marseillaise*. Pop. (1896) 12,116.

Lonyay, lawn′yī, Meinhard, Count: statesman; b. in Hungary, Jan. 6, 1822; descended from an old Magyar family; was elected a member of the Diet in 1843, and afterward appointed a secretary in the Ministry of Finance; fled in 1849 when the Hungarian rebellion was put down, and lived in London and Paris; returned in 1850 in consequence of a general amnesty, and devoted himself to questions of political economy and the relations of the Church to the schools in Hungary. He was one of the most prominent members of the Diet of 1865; was very active in 1866 and 1867 for the settlement between Hungary and Austria accomplished by Beust, and accepted the Ministry of Finance in the Hungarian cabinet which Andrássy formed in 1867. He was very successful in his financial policy, but disagreeing with Andrássy, retired in May, 1870, and entered then the imperial cabinet as Minister of Finance. When Andrássy became president of the imperial cabinet instead of Beust (Nov. 16, 1871), Lonyay was appointed president of the Hungarian cabinet, but (Nov. 18, 1872) he was accused by his adversaries in the lower house, especially by Deputy Csernatony, of having misused his official position for personal purposes, in consequence of which he resigned Dec. 2, 1872. He published *Recent Works on Political Economy* (1863); *Survey of the Finances of Hungary* (1873); *The Banking Question* (1875); a collection of his speeches, etc. D. Nov. 3, 1884.

Loochoo Islands: known to the Japanese as Riu-Kiu, and pronounced Doochoo by the natives; a chain of small islands, of coral formation, lying between 127° and 130° E. lon. and 26° 30′ N. lat. They form the Okinawa-Ken of Japan, and consist of four groups—the Linshoten islands, ten in number (frequently considered as an independent group); the Northern Loochoo, nine islands; the middle Loochoo, twenty-five islands; and the Southern Loochoo, fifteen islands, separated from the foregoing by a broad strait and situated near Northern Formosa; total area about 940 sq. miles. The climate is singularly mild and equable, though typhoons are frequent; the soil so fertile as to produce two crops of rice yearly. In the twelfth century Japan, according to its annals, had a Loochooan ruler, Shunten, son of a famous Japanese archer. The Loochooans owed a nominal subjection to the Princes of Satsuma, and sent presents to the Shogun of Japan; but at the same time paid tribute to the Chinese court, and received investiture for their rulers at Peking. When Japan in 1868 was restored to a centralized imperialism, her rights to the islands became a burning question. In 1879 the king was brought captive to Tokio, and the islands were thereafter organized into the Japanese prefecture of Okinawa, an action which threatened to prove a *casus belli* between China and Japan. The inhabitants, akin in race to the Japanese, wear their hair in a top-knot, fastened by a pin with a star-shaped head, distinctive of their rank. Dr. Guillemard characterized them as "a short race, better proportioned than the Japanese, with, as a rule, extremely well-developed chests. The face is less flattened, the eyes are more deeply set, the nose is more prominent in its origin. The forehead is high, the cheek bones are somewhat less marked than the Japanese; the eyebrows are arched and thiek." In character they are extremely gentle, and in manners particularly courteous, so as to have earned for their country the name of "The Land of Propriety." They have long excluded foreigners. The people are Buddhists in religion. Their mode of burial is peculiar, the massive white funeral vaults scattered everywhere being the feature of the islands. Here the dead are allowed to repose two years, when they are taken out and the bones washed by the nearest of kin, who deposits them in earthenware urns. The urns are ranged round the interior of the vault on shelves. The marriage customs also are peculiar. Looehooan ladies keep themselves in the strictest privacy; women of the lower classes, however, go about freely and transact business. Pigs are extensively reared, and pork is a favorite article of diet. The islands are infested with deadly snakes of the genus *Trimeresurus*. The language is allied to Japanese closely enough to allow of the Japanese syllabary being employed. Okinawa, the largest island, has a population of 125,000. It contains the capital, Shuri, to which a road 3 miles long leads from Nafa, its port. The total population of the islands, 373,146, shows an excess of 288 females, while the returns for the whole Japanese empire show an excess of males. J. M. Dixon.

Loofs, (Armin) Friedrich: See the Appendix.

Loom [M. Eng. *lome* < O. Eng. *gelōma*, tool, implement, instrument]: a machine for weaving textile fabrics. The two sets of threads or fibers of which a fabric may be composed are known as warp and filling; the set running throughout the length is the warp, and those threads extending from side to side, and interlacing with it, the filling, or weft. The interlacing of these two sets of threads is called Weaving (*q. v.*). This art is so ancient that its beginning can not be traced.

To Dr. Edmund Cartwright, of Manchester, England, belongs the merit and honor of originating and producing the first practical power-loom, from which the present looms have developed. This invention, the patents for which were issued Apr. 4, 1785, and Nov. 13, 1788, has proved one of the greatest in textile manufacture. Cartwright recognized that there were "three movements which were to follow each other in succession," and he arranged his power-loom to produce these movements in proper order and time.

Three Movements.—The first separates the threads of the warp longitudinally into two sets, leaving a space through which to pass the weft; the second passes this filling through that space; the third presses the thread of filling up against the one preceding it.

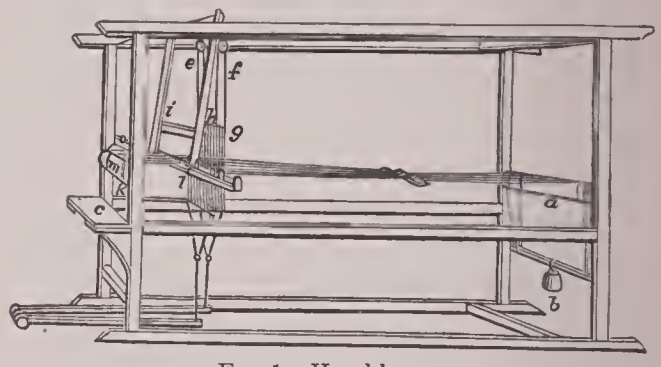

Fig. 1.—Hand-loom.

Plain Loom.—The plain loom is built for producing the simplest fabrics, and is capable of but two movements for the warp-threads; it may be for weaving with but one color of filling, or for as many as six colors. Fig. 1 gives a representation of a hand-loom for plain weaving. Fig. 2 is the

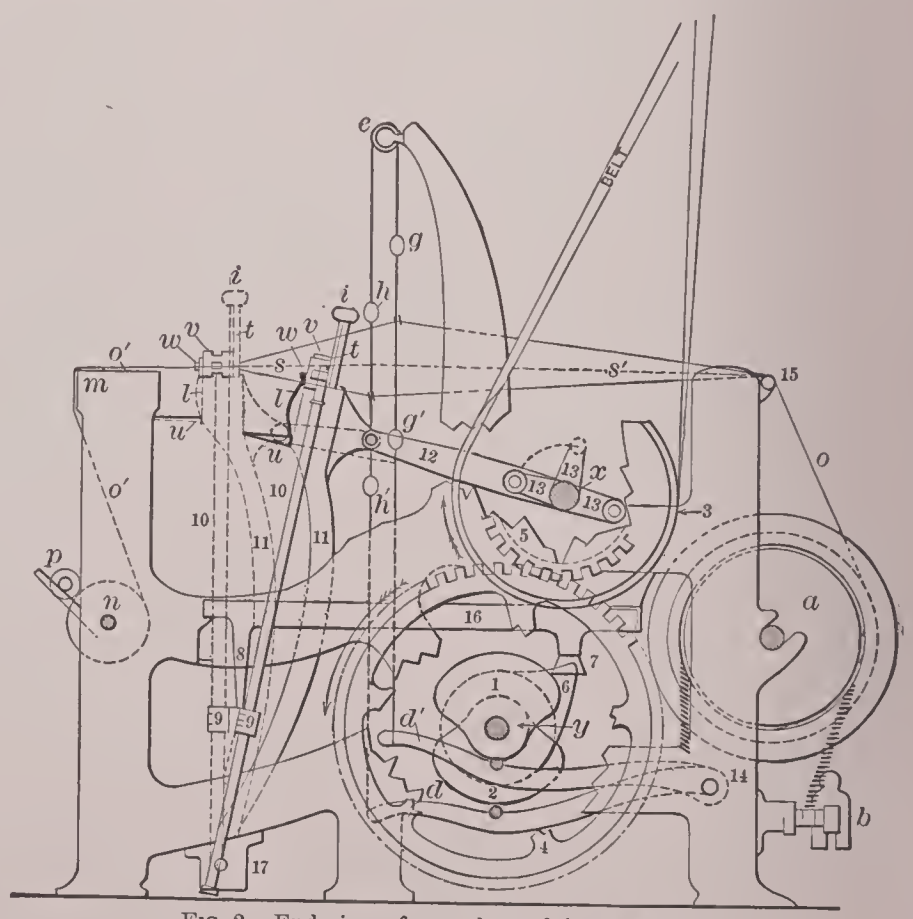

Fig. 2.—End view of a modern plain power-loom.

end view of a modern plain power-loom. A comparison of the two designs will show similarity in the essential movements.

Construction and Operation.—The plain power-loom is usually built with two parallel horizontal shafts extending across the loom-frame from end to end, one above, *x*, and a little back of the other, *y*. The upper shaft is in most cases the driving-shaft, and has a pulley, 3, at one end. This shaft is geared, 4–5, to the lower shaft in such a manner that two revolutions of the former must be made to one of the latter. The threads of the warp *o* are arranged, wound upon the warp-beam *a*, and passed through the eyes of the harness *h h' g g'*, also through the reed *t*, before coming to the loom. Each harness, after the warp has been placed in the loom, is fastened to certain straps which pass over an elevated roller, *e*; also connected with one of two levers below, *d d'*; these levers are each in contact with revolving cams, 1, 2, so placed on the lower shaft that, as the shaft revolves, one cam depresses the lever in contact with it, and the lever in contact with the other is allowed to rise. These cams, as aforesaid, being connected directly with the loom-harness, and indirectly with each other by the straps passing over the top roller *e*, cause the harness which they control to work simultaneously and in the same direction with them. The threads of the warp, being some on one harness and some on the other, usually alternating, are separated as the harnesses are brought into different relative positions, and a space formed between the two sets of warp-threads; this space, *s*, is called the shed, and is produced by the first of the three recognized movements. Through this shed the shuttle containing the weft is passed, leaving a strand of the weft in its path, and the second movement is complete. In most power-looms the shuttle is thrown across the loom, through the shed, on the shuttle-race, from a shuttle-box at one end to one at the opposite end by a lever, 10, hinged at or near the floor, 17, and called a picker-stick. This picker-stick is usually propelled by the quick stroke of a cam, 6, on the lower shaft against the arm, 7, of a short rocker-shaft, 16, placed at right angles to the cam-shaft and in a horizontal plane several inches above it; a second arm, 8, on this rocker-shaft is connected by a short rod and strap, 9, to the picker-stick. The action of the cam on the rocker-shaft throws the picker-stick toward the fabric, and at the same time the shuttle through the shed previously formed.

The third movement, the beating up of the filling-thread, is accomplished by the quick stroke of the lathe, *l*—that part of the loom which holds the reed—which is connected with a crank, 13, on the driving or the upper of the two shafts; as the shaft revolves the lathe receives a reciprocating motion, and, being connected with and movable on a rocker-arm, 17, at the lower part of the loom-frame, swings in a small arc, the chord of which would be twice the length of the crank before mentioned. As the lathe is propelled forward the filling-thread is beaten up against that part of the fabric already produced.

The continued repetition of these three movements is the process of weaving complete.

Hand-loom.—The hand-loom (Fig. 1) in principle is the same as the power-looms, but the harnesses are controlled by the action of the weaver's feet on the treadles; the shuttle is propelled by the hand, and the stroke of the lathe or batten, usually hung from an elevated stand, is also made by hand. Great skill is required with such a machine to produce fine textures, yet some of the most delicate fabrics are manufactured by hand-loom weavers.

Fancy Loom.—Looms which may have more harness capacity than a cam-loom would allow of, used for weaving fancy patterns, are called fancy looms. The cam-loom may be used with a limited number of harnesses—from two to five, and occasionally with more. The fancy loom has often as many as thirty-six harnesses, the twenty to twenty-four harness looms being most in use aside from the plain looms. The looms have a "head-motion," so called, or a "head," which is composed of a revolving shaft over which passes a pattern-chain, so built that each bar of the chain will control the harness for one entrance of the filling; also certain lifting or vibrating bars which raise or lower the harness, the harness being connected to certain pieces of the mechanism which are brought into contact with one or the other of the bars by rolls on the pattern-chain. These rolls may be so placed on the bar of chain that any of the individual harnesses may be raised; wherever no roll is placed on the chain the harness will lower. Thus the chains may be built to raise or lower any of the harnesses and in any order.

Box-motion.—The shuttle-boxes of the power-loom are placed at each end of the lathe, and may be one box at each end, one box at one end with from two to six at the opposite, or with from two to four boxes at each end. For one color of filling one box at each end is used; with several colors, each is placed in a different box, which may be called when needed by the action of rolls placed on a chain similar to the pattern-chain, on certain fingers which in turn engage the mechanism for raising or lowering the boxes.

Jacquard Machine.—This machine is used for such designs as are so extensive that a sufficient number of harnesses could not be placed in the loom to produce the patterns. It is simply a "head," which controls the shed, and may be applied to almost any make of loom. The machine consists of a set of knives, *a*, *a'* (Fig. 3), called a "griffe,"

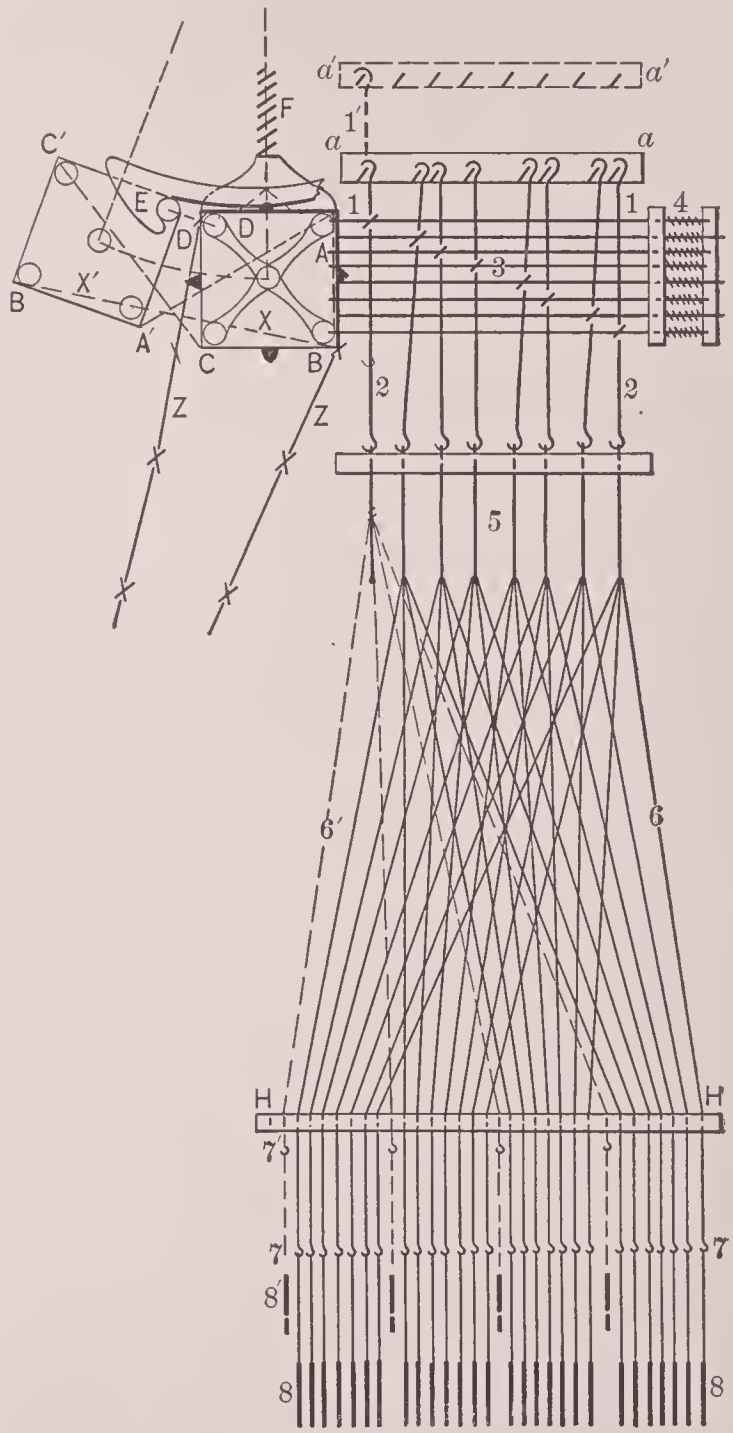

Fig. 3.—Jacquard machine.

capable of being raised and lowered; a set of perpendicular hooks, 1–2, in connection with and governed by a set of horizontal needles, 3, these hooks having attached to them the leash-strings 6, 6', mail 7, 7', and lingo 8, 8'—the mail being the eye through which the warp-thread is passed, the lingo the weight which draws down the leash. The pattern is controlled by a set of pattern-cards, Z, Z, fastened together, which pass over an intermittently revolving, perforated cylinder, X, X. This cylinder swings in a small arc, and presses against the needles, 3. Whenever a hook is to be raised a hole cut in the pattern-card allows the needle to enter the perforation in the cylinder, also the hook 1 to be engaged by the knives as they lift. The card, when no hole is cut, will press against the needle, throwing the hook which it

governs back until the knives lift. The raising of a hook raises also all the leash-strings connected with it, which may be from one to half a dozen. A machine may have from 100 to 1,200 hooks, and each hook may be worked independently of the others.

This machine was originated by Joseph Marie Jacquard, a native of Lyons, France, born in July, 1752. He first came into prominence by perfecting a machine for making fish-nets, for which he received 3,000 francs and a gold medal offered by the Society of Arts, London, and with this came an engagement in the Conservatoire des Arts, Paris. Here he had opportunity to study the inventions for weaving-machinery already made. Bouchon in 1725, Falcon in 1728, and Vaucanson in 1745 had each improved on the looms then in use, but none of their inventions, while in some respects similar to what Jacquard produced, proved practical. "He was an experienced workman, combining the best parts of the machines of his predecessors in the same line, and succeeded as the first person to obtain an arrangement sufficiently practical to be employed." There was great opposition to the introduction of his machine as a labor-saving device, and many of them were broken up. The model from which the others were made was destroyed in the square where his statue has since been erected. It is said that 30,000 Jacquard machines were in operation in his native city at the time of his death, 1834.

Draw-loom.—This was the nearest approach to the Jacquard up to the nineteenth century, but required two persons to attend it. The pattern was governed by a boy, who raised the warp-threads by "drawing" certain strings attached to the various groups of leash-cords. William Cheape patented a mechanical "draw-boy" in 1779, but the loom was superseded by Jacquard's invention.

Loom-harness.—This is usually a skeleton frame, on which are placed wire heddles with eyes at the center for the warp-threads. Cotton-harness, used mostly on the plain or cam looms, consist of two parallel rods on which is a series of cotton heddles. The frame or rods, with the attached heddles, constitute a harness.

Loom-reed.—The reeds are two parallel strips, into which are inserted at right angles thin strips of flattened wire; these are spaced equally, and the reed is numbered according to the number of spaces per inch. The reed not only beats up the filling, but keeps the warp-threads of the various textures at the required number to the inch.

See Ashenhurst, *Weaving and Designing for Textile Fabrics*; Alexander Brown, *Practical Treatise of the Construction of the Power-loom*; Porselt's *Jacquard Machine Analyzed and Explained*; also Patent Office reports.

LOUIS W. CLARK.

Loomis, ALFRED LEBBEUS, M. D., LL. D.: clinician; b. at Bennington, Vt., June 10, 1831; entered Union College, from which he graduated in 1851, and received the degree A. M. in 1856; graduated M. D. from the College of Physicians and Surgeons, New York, in 1852; served two years in hospitals before commencing general practice in New York city; in 1859 was appointed visiting physician to Bellevue Hospital; in 1862 was appointed lecturer on Physical Diagnosis in the College of Physicians and Surgeons; in 1866 was appointed Adjunct Professor of Theory and Practice of Medicine in the University of the City of New York, and was promoted professor in 1868; in 1874 was appointed visiting physician to Mt. Sinai Hospital; was president of New York Academy of Medicine 1889–90 and 1891–92, and president of the congress of American physicians and surgeons 1894; received LL. D. from the University of the City of New York 1886. D. Jan. 23, 1895. He was recognized as one of the foremost clinicians and teachers in the U. S. Among his works are *Lessons in Physical Diagnosis* (New York, 1870); *Lectures on Fevers* (New York, 1877); *A Text-book of Practical Medicine* (New York, 1884); and he edited *An American System of Medicine* (Philadelphia, 1894). S. T. A.

Loomis, ELIAS, LL. D.: astronomer; b. in Tolland co., Conn., Aug. 7, 1811; graduated at Yale College in 1830; was for several years tutor in that institution (1833–36); made important researches in astronomy, magnetism, and meteorology, both in the U. S. and in Paris, where he resided in 1836–37, attending lectures; became Professor of Natural Philosophy in Western Reserve College 1837; was called to the University of the City of New York 1844, and to Yale College 1860. He has made many contributions to the exact sciences, most of which were communicated to the American Philosophical Society and to *The American Journal of Science*. The most important work of his later years was his series of *Meteorological Researches*, published in the last-named journal. He also published mathematical text-books, and a genealogical work, *The Descendants of Joseph Loomis* (1870). D. in New Haven, Aug. 16, 1889.

Loomis, SILAS LAURENCE: See the Appendix.

Loon, or **Great Northern Diver**: popular name of a swimming bird of the family *Urinatoridæ*, found in both hemispheres. Its scientific name is *Urinator imber* or *Eudytes torquatus*. It is a large, solitary bird, 32 inches long, very difficult to shoot. It is a fine diver, perfectly at home in air or water, but by no means so on the land, its feet being set so far back that it can not walk at all, but scrambles along scraping its breast on the ground.

Loos, lōs, CHARLES LOUIS: educator; b. at Woerth-sur-Sauer, in the department of Basse-Alsace, France, Dec. 22, 1823. In 1834 he removed to the U. S. and settled at New Franklin, O., where he studied English, and in 1840–42 taught in the common schools. He became identified with the Disciples of Christ in 1838, and began to preach at the age of seventeen. In 1842 he entered Bethany College where he graduated in 1846. He remained three years after graduation as teacher in the primary department. After serving as pastor at Wellsburg, Va., Somerset, Pa. (where he also conducted an academy and edited *The Disciple* for two years), and at Cincinnati, O., he removed to Eureka, Ill., to take the presidency of the college. In the following year he was elected to the chair of Ancient Languages and Literature in Bethany College. He filled this position until 1880, when he became president of Kentucky University. He was for seven years co-editor of *The Millennial Harbinger*; is a contributor to the leading publications of the Disciples; has been for many years president of the Foreign Christian Missionary Society. J. H. GARRISON.

Loosjes, lōs'yes, ADRIAAN PIETERSZOON: novelist; b. in 1761 on the island of Texel, Holland. He was a bookseller, thoroughly middle class in tastes and sympathies. His reputation as a writer also was mainly of the same kind. He strove to render historical subjects in a way to appeal to the sentiment and patriotism of the average reader. He began with historical sketches in dialogue, or, as he said, dramatic form: *Frank van Borselen en Jacoba van Beijeren* (1790–91); *Charlotte van Bourbon* (1792); *Louise de Coligny* (1803); *Johan de Witt* (1805), etc. Other sketches of a more independent kind appeared in 1804–05 under the title *Zedelijke Verhalen*. He now attempted a longer flight, and adopting the English Richardson as his model wrote in epistolary form his *Historie van Mejufvrouw Susanna Bronkhorst* (6 vols., 1806–07). This was followed in 1808 by his greatest success, *Maurits Lijnslager*, an attempt to reproduce the life of a patriotic Dutch burgher of the seventeenth century in detail. Subsequent novels failed to meet with the favor of this: *Hillegonda Buisman* (1808); *Lotgevallen van den Heere R. J. van Golstein* (1809–10); *Leven van Robbert Hellemans* (1815); *Johan Wonter Blommesteyn* (1816). Loosjes wrote also in his youth love-songs, *Minnezangen* (1783); an epic, *De Ruyter* (1784); and several plays. He died at Haarlem in 1818.

A. R. MARSH.

Lope de Aguirre, lō'pā-de-ăă-gee'rā: an adventurer; b. at Oñate, Asturias, Spain, about 1508. He early went to Panama, and thence to Peru, where he led so scandalous a life that he was known as Aguirre the Madman. It appears that he was once publicly whipped, and that he murdered the official who had punished him. After engaging in several rebellions he was outlawed and, like many other wild characters, he joined the expedition of Pedro de Orsua, which was to search for El Dorado in the region watered by the upper Amazon (1559). Descending the Huallaga in boats they reached the Amazon, where, near the present site of Tabatinga, Orsua was murdered by Aguirre and others (Jan. 1, 1561). Fernando de Guzman was then made general, with Aguirre as his lieutenant; the band declared themselves rebels and pirates, and proceeded down the river, plundering Indian villages, quarreling with each other, and committing every possible crime. Near the mouth of the Rio Negro Aguirre murdered Guzman and made himself chief; he killed many others whom he suspected, or from mere caprice. The course taken after Guzman's death is a matter of dispute, some authors supposing that the band ascended the Negro to the Cassiquiare, and thence descended the Orinoco; but it is more probable that they continued down the Amazon. Finally reaching the island of Margarita, off the coast of Venezuela, Aguirre murdered the gov-

ernor and others and robbed the royal treasury; thence, passing to the mainland, he wrote, from Valencia, a letter to King Philip II., which has been preserved, in which he tells the story of his own crimes and declares himself a rebel until death. The authorities of the coast, in great alarm, gathered a force, which finally encountered him near Barquisimeto; many of his men at once deserted him, and Aguirre, in despair, killed his own daughter "that she might not be called the child of a traitor." He was captured the same day, and shot (Oct. 27, 1561). Aguirre's band was the second company of Spaniards which descended the Amazon, the first having been that commanded by Orellana. See Markham, *Expedition of Pedro de Ursua* (1861); Southey, *The Expedition of Orsua and the Crimes of Aguirre* (1821).

HERBERT H. SMITH.

Lope Felix de Vega Carpio: See VEGA CARPIO, LOPE FELIX, DE.

Lo'pes, or **Lopez**, FERNÃO: historian; b. in Portugal about 1380; was made chief archivist of the kingdom by King Dom João I. in 1434, and devoted his life to the collection and study of materials for the history of his country and the composition of chronicles of several of her kings. Like Froissart, he personally visited the scenes of battles and of other important events, and conferred much with eminent soldiers and statesmen who had participated in the wars and other public affairs of Portugal. He died after 1459. The chronicles of Lopes possess great literary and critical value, and are probably surpassed in merit by no historical works of the century in which they were written. The field of action and the period of time embraced by the narratives of Lopes are narrower than those covered by the immortal work of Froissart; and doubtless this is one of the reasons for the much greater accuracy of Lopes in point of date, detail, and attending circumstances. The style of Lopes is generally less picturesque than that of Froissart, but in some cases—as, for instance, in the description of the battle of Aljubarota, known in Portuguese history as *the* battle, fought in the year 1386—the Portuguese writer has a decided superiority over the French chronicler. Lopes is always animated with a patriotism which much enlivens his annals. The works of Lopes are *Chronica do Senhor Rei Dom Pedro I.*; *Chronica do Senhor Rei Dom Fernando*, both printed in vol. iv. of the *Collecção de Livros Ineditos de Historia Portugueza* (Lisbon, 1816), and the very rare and important *Chronica del Rey Dom João I.* (Lisbon, 1644, 2 parts, folio), with a third part or continuation by Gomes Eannes d'Azurara.

Lopez, CARLOS ANTONIO: president of Paraguay; b. near Asuncion about 1795 (the exact date is apparently unknown). He studied at the schools of Asuncion, and acquired a reputation for learning, especially in law. After the death of Francia (Sept. 20, 1840) an irregular junta seized the government; this was deposed after three months by another junta, of which Lopez was nominally secretary, but really the leading spirit. A congress elected him first consul and Roque Alonzo second consul, Mar. 12, 1841; the latter was a cipher in the administration, and from this time Lopez was practically dictator of Paraguay, though he never took that title; the successive congresses simply obeyed his directions. In Mar., 1844, the congress adopted a constitution which he had written, giving unlimited powers to the executive; it then elected him president for ten years, and he was re-elected for three years in 1854, and for seven years, with the right of naming his successor, in 1857. In the main he continued Francia's policy of isolation, though he permitted a restricted foreign commerce, and allowed a few foreigners to enter the country. Less cruel or more timid than Francia, he generally banished suspected or obnoxious persons instead of imprisoning or executing them; but there was practically no law except his will. Some improvements were initiated, and a short railway was started; but much of the trade of the conntry was kept in his own hands. He greatly strengthened the army, fortified the river Paraguay at Humaitá, and formed a small navy. His ill-treatment of foreigners and insults to envoys and consuls brought about quarrels with Great Britain, France, and the U. S., only the isolated position of Paraguay saving him from punishment. In 1859 the U. S. sent a squadron to the Plata to enforce claims against him. He consented to submit the matter to arbitration, but subsequently evaded it. Lopez declared war on the dictator Rosas of Buenos Ayres, but there was little actual fighting. D. at Asuncion, Sept. 19, 1862.

HERBERT H. SMITH.

Lopez, FRANCISCO SOLANO: eldest son and successor of Carlos Antonio Lopez; b. at Asuncion, July 24, 1827. His early education was almost entirely neglected; but after his father attained power he was successively intrusted with the most important offices. When only nineteen years old he was made commander-in-chief of the Paraguayan army, then engaged against Rosas; and though he saw little actual fighting, he doubtless obtained some ideas of the art of war through association with the Argentine general Paz, in Corrientes. Later (1853–54) he spent eighteen months in Europe as special minister to the courts of London, Paris, and Turin. During this time he purchased large quantities of arms and materials of war, with several steamers, contracted for the building of a railway, and engaged the services of engineers; he even sent a colony of French emigrants to Paraguay, giving them promises which were shamefully broken. At Paris he met Madame Lynch, an Irish adventuress, who followed him to Paraguay as his mistress, and had great influence on his future career. In 1855 he was made Minister of War, a position which greatly stimulated his desire to make Paraguay a military power. On the death of his father (Sept. 19, 1862) he assumed the executive by virtue of a will in which he had been nominated vice-president, this strange power having been granted to the elder Lopez by his subservient congress. Having convoked another congress, Lopez was duly elected by it president for ten years (Oct. 16). Ambition to be a military leader was, from the first, the motive-power of his rule. Large stores of arms and ammunition were secretly imported, and the fortifications which he had built when Minister of War were greatly strengthened. Having thus prepared himself, Lopez took advantage of the Brazilian intervention in the civil war of Uruguay to make his power felt. In Sept., 1864, he summoned Brazil to withdraw her troops from Uruguay; and before an answer to this demand could reach him, he began hostilities by seizing at Asuncion a Brazilian mail and passenger steamer which was ascending the river Paraguay to Matto Grosso. Following this a powerful squadron was sent to Matto Grosso, easily taking Coimbra and Corumbá, where the invasion came as a complete surprise. Another force was sent into the Brazilian province of Rio Grande do Sul, and as this had to pass across Argentine territory, it provoked a vigorous protest from the government at Buenos Ayres. On this Lopez summoned his obedient congress (the members nominated by himself) and caused it to make a formal declaration of war against Brazil and Argentina, receiving at the same time the title of marshal (Mar., 1865). Before this declaration could be known in Buenos Ayres Lopez seized several Argentine vessels, including two men-of-war, and occupied Corrientes (Apr. 14). On May 1 the representatives of Brazil, the Argentine Republic, and Uruguay signed, at Buenos Ayres, a treaty of alliance against Paraguay. The struggle which followed (the war of the Triple Alliance, or simply Paraguayan war) lasted for five years, and was one of the most important in South American history. The Paraguayans who had invaded Rio Grande do Sul were speedily cut off, and 6,000 of them finally surrendered to the Emperor of Brazil at Uruguayana (Sept. 18, 1865). The forces of Lopez were driven from Corrientes, which then became the base of operations of the allies, but the isolated position of Paraguay, surrounded as it is by wide stretches of forest or unsettled land, made its invasion almost impossible except by the rivers, and Lopez had prepared for this by greatly strengthening his fortifications at Humaitá and Curupaity, on the Paraguay, just above its junction with the Paraná. These were the objective points of the allied operations and of a long series of battles, until July, 1868, when they were captured. The Paraguayans then established other lines of defense farther N., which were successively taken after much hard fighting. Beaten at all points Lopez fled into Northern Paraguay; but at the river Aquidaban he was overtaken by a Brazilian force, and in the *mêlée* was killed, with his eldest son (Apr. 1, 1870). Madame Lynch was allowed to retire to Europe. During the war she had acquired, by forced purchase or confiscation, a large amount of property, much of which was never recovered. See Washburn, *History of Paraguay* (2 vols., 1871); Thompson, *The War in Paraguay* (1869); Masterman, *Seven Eventful Years in Paraguay* (1869); Schneider, *Der Krieg der Triple-Allianz* (3 vols., 1872–75); *A guerra da Triplice Alliança* (Portuguese translation of Schneider's work, with notes by J. M. da Silva Paranhos, 1875–76); Burton, *Letters from the Battle-fields of Paraguay* (1871).

HERBERT H. SMITH.

Lopez, Narciso: soldier and filibuster; b. in Venezuela, 1798 or 1799. He fought with the Spanish troops against the patriots of Venezuela, and when that country achieved its independence (1823) went to Spain, where he served with distinction against the Carlists. In 1839 he was made *mariscal de campo* and governor of Valencia; in 1840 he was one of the principal leaders of the *Progresista* party, which then came into power, and he was promoted to the rank of general. The next year he went to Cuba, where, for a time, he held important military offices, but subsequently was neglected by the government, and, undertaking private speculations, became bankrupt. About 1848 he engaged in revolutionary plots, which were discovered, and in 1849 he fled to the U. S. The same year he organized a filibustering expedition, which was stopped by order of President Taylor. In May, 1850, he left New Orleans in the steamer Creole, with 610 men, and made a descent on Cuba, but met with no support, and was speedily forced to retire. A third attempt was made from New Orleans, Aug., 1851, in the steamer Pampero, with 600 men; among these was a nephew of the U. S. Attorney-General, and the Hungarian general Pragay. The expedition resulted disastrously; a large number of the participants were captured, and as the U. S. Government had outlawed them, they were executed by the Cuban authorities; Lopez was shot at Havana, Sept. 1, 1851.

Herbert H. Smith.

Lophi'odon [Mod. Lat.; Gr. λόφιον, dimin. of λόφος, crest + ὀδούς, ὀδόντος, tooth]: a genus of Tertiary mammals, first described by Cuvier from remains occurring in the Eocene of France. These animals were allied to the tapir. They derive their name from the structure of the true molars or grinding teeth, which have their crowns crossed transversely by two crests or ridges of dentine covered with a layer of enamel. The last lower molar has also a small posterior lobe. The premolars are more simple in structure, and compressed, resembling the first premolar of the tapir. The upper molars also resemble those of the tapir, but approach in some respects those of the rhinoceros. The diastema or toothless interval beween the canine and molar teeth was much shorter than in the tapir. Several species of *Lophiodon* have been found in the Eocene of France and Great Britain, but very little is really known of the skull or skeleton. The species of tapiroid mammals formerly referred to this genus from the early Tertiary deposits of the U. S. are now regarded as belonging to other genera.

O. C. Marsh.

Lophi'omys: scientific name of a very rare and remarkable rodent (*Lophiomys imhausi*) from Northeast Africa, the sole member of the family *Lophiomyidæ*. Lophiomys is unique among mammals from the fact that the temporal fossa is roofed over by bony plates, as in the turtles. The thumb is opposable, and the animal climbs well. The general color is blackish brown; the forehead, a streak under each eye, and the tip of the tail are white. The hairs down the center of the back and tail are about 3 inches long, and can be erected into a crest. The animal is about the size of a large North American muskrat. F. A. Lucas.

Lophobran'chii [Mod. Lat., from Gr. λόφος, tuft + βράγχια, gills]: an order of fishes distinguished by the fibrocartilaginous skeleton, the development of the bones of the head, and especially by the presence of but a single large operculum on each side, and by the production of the snout and lower jaw into a tube, at the end of which is the mouth. The name refers to the tuft-like form of the gills, which are contracted to a brush-like form. The order contains the sea-horses, pipe-fishes, and their allies.

Revised by D. S. Jordan.

Lo'quat [Chin., a corruption of Cantonese *lukwat* = Mandarin *luh kiuh*, rush orange]: a handsome fruit-bearing shrub (*Eriobotrya japonica*) of the order *Rosaceæ*, a native of China and Japan, cultivated in parts of the U. S. and other warm temperate regions. Its fruit is very early, has a yellow color, and resembles a very small apple.

Lorain: village; Lorain co., O. (for location of county, see map of Ohio, ref. 2–G); on Lake Erie, at the mouth of the Black river, and on the N. Y., Chi. and St. L., and the Cleve., Lorain and Wheel. railways; 26 miles W. of Cleveland. It has an excellent harbor, is in a natural-gas region, has considerable general trade and manufactures of brass goods, and is an important shipping-point for the coal of Central Ohio. Has 2 daily and 4 weekly newspapers. Pop. (1880) 1,595; (1890) 4,863; (1900) 16,028. Editor of "Times."

Lor'ca (anc. *Eliocroca*, or *Ilorcum*): city; in the province of Murcia, Spain; on the Sangonero—which is here called the Guadalentin—36 miles S. W. of Murcia (see map of Spain, ref. 18–H). It is an old but well-built and prospering place, and has large manufactures of soap, dyestuffs, leather, paper, cloth, and gunpowder. In the vicinity are lead and sulphur mines. Pop. (1887) 58,327.

Lord, John: See the Appendix.

Lord Howe Island: a small isolated island under the supervision of New South Wales; in lat. 31° 30′ S., lon. 159° E., 400 miles E. of the Australian coast. Area, 3 sq. miles. Pop. (1891) 55; in 1859 the population was 300. It is volcanic and very fertile. Its flora and fauna are Australian.

Lord's Day: a name for the first day of the week, derived from Rev. i. 10. The rendering "Lord's Day" is Wycliffe's (1380). In all of the editions of Luther's New Testament previous to his revision of 1541 he renders *Am Sontage*, and Tyndale (1526–34), Coverdale (1534), Cranmer (1539) follow him, and translate "on a Sondaye." The Æthiopic renders it "the first day." The word κυριακός is found also in 1 Cor. xi. 20; "*the Lord's* supper." The day of our Lord's resurrection was observed in the apostolic times, and the title "Lord's Day" is applied in Ignatius, Irenæus, the Clementine Constitutions, and Tertullian, and at a later period universally. (Suicer, *Thesaurus Ecclesiast. Ed. Sec.*, 1728, ii., 184.) See Sabbath and Sunday.

Lord's Supper: See Eucharist.

Lorelei, lō′re-lī, **The**: an imposing cliff on the eastern bank of the Rhine, half a mile above St. Goar. It is 447 feet high, and is now penetrated by a railway tunnel. At its foot is a whirlpool and a famous salmon-basin. The tradition is that a cave in the rock is the abode of the Lorelei, a wicked siren, whose beauty and sweet song distracted the boatmen upon the river and caused them, through their negligence, to be wrecked in the whirlpool. The scenery at this point is regarded as the most attractive on the Rhine.

Lorenzet'ti, Ambrogio: painter; b. at Siena, Italy; the year is unknown. He studied painting with his father, a painter known as *Lorenzo*. Ambrogio Lorenzetti was the founder of the Sienese school as distinguished from the Florentine. An important work of this artist is in the town-hall at Siena. His frescoes and pictures are mostly to be studied in his native city. The smaller ones are marvelously beautiful, and seem to be precursors in sweetness and feeling of the works of Fra Angelico. Lorenzetti was already aged when the Florentines commissioned him to paint for the Church of St. Procolo some stories from the life of St. Nicholas, which have been transferred to the abbey in Florence. Pietro, his brother, also a painter, helped him in the fresco of the *Marriage of the Virgin* in the hospital of Siena. Vasari mistakenly declares him to have been a pupil of Giotto's, and calls him *Laurati*. In the Campo Santo at Pisa there are frescoes by him formerly attributed to Orcagna. Pietro was still painting in 1355, but the date of his death is unknown. His son Lorenzo was a sculptor who studied and worked in Pisa. W. J. Stillman.

Loreta, lō-rā′tăă, Pietro, M. D., Count: surgeon; b. in Ravenna, Italy; studied medicine in the University of Bologna in 1847, but the Austro-Italian war interrupted his studies, and he did not graduate until 1858; practiced in the country until 1861, when he became anatomical prosector for Prof. Calori in Bologna; in 1865 took charge of the surgical clinic in Bologna University, but his work was interrupted by Garibaldi's campaign; in 1868 became Professor of Surgery in the university. He was a surgeon of great skill and originality, and the method of dilatation of the pylorus for cancer was invented by him. Among his published writings are *Conferenze cliniche sulle lussazioni traumatiche* (Milan, 1884); *La divulsione digitale del piloro* (Bologna, 1884). D. July 23, 1889. S. T. Armstrong.

Loreto: city of Italy; in the province of Ancona; 15 miles by rail S. W. from the town of Ancona and 3 from the sea (see map of Italy, ref. 4–E). It contains a small church called the Holy House, which for centuries has been the resort of pilgrims, amounting to about 800,000 annually. This building, according to a legend, is the house in which the Virgin Mary was born and brought up. It is said that, after having been consecrated by the apostles, it was transferred by the ministry of angels from the power of the Turks—first to Dalmatia in 1291, and then to Loreto in 1294. The sole industry of the city itself is the manufacture of rosaries, crucifixes, etc., which are sold to the pilgrims.

Loreto, lō-rā′to: a department of Peru, occupying all the northeastern part of the republic. On the W., S. W., and S. it borders on the departments of Amazonas, Libertad, Ancachs, Huanuco, Junin, and Cuzco; to the E. it is separated from Brazil and Bolivia by the river Javary and a line of uncertain position (see JAVARY and PERU): to the N. it includes all the territory to the Marañon or Amazon, and beyond that river claims a large region which is disputed by Ecuador, Colombia, and Brazil. With all these uncertainties it is impossible to calculate the area, even approximately, but probably it is not less than 225,000 sq. miles, or more than half of Peru. Portions of this vast territory are sometimes ascribed to Cuzco, Apurimac, Junin, and other departments, thus greatly increasing the confusion. Even the settled districts of Loreto are very imperfectly known, and the eastern part is entirely unexplored. The western boundary is formed by the main chain of the Andes (Cordillera of Peru), and there is a branch chain, the Cordillera Oriental, farther E. The space between these ranges is occupied by the broken and more or less mountainous valley of the upper HUALLAGA (*q. v.*), and the river, emerging from it, flows over lower land to the Marañon. Farther E. the great river UCAYALI (*q. v.*) crosses the department from S. to N., and also joins the Marañon. The Ucayali flows through flat land, and, so far as known, these flat lands, portions of the Amazon depression, are almost continuous in the eastern and northern portions of the department. It would appear, however, that there are also higher lands, probably outlying portions of the great Brazilian plateau of no great altitude; such probably are the so-called Conomamas Andes, which vague reports locate E. of the Ucayali. From the base of the main Andes eastward a vast forest stretches over Loreto; it is interrupted by some tracts of grass-land in the upper Huallaga valley, and on the Pampas del Sacramento, an extensive but little-known region W. of the Ucayali; but E. of that river the forest is probably unbroken. Rubber and other forest products are obtained about the great rivers; rich salt-beds exist in the Huallaga, and are worked on a small scale, and gold and other minerals are reported; but the future of the department probably lies in its fertile soil. At present about 65,000 inhabitants, mainly civilized Indians, acknowledge the Government of Peru. These are mostly gathered in the upper Huallaga valley and along the Marañon. The remainder of the department is inhabited only by wild Indians, vaguely calculated at 300,000, but probably less than half that number. The capital is Moyobamba. Steamers ascend the Marañon to Nauta, and have explored the region above, the Ucayali and the lower Huallaga. See J. W. de Mattos, *Diccionario topographico do departamento de Loreto* (Para, Brazil, 1874), and the travels of Herndon, Smyth, Mawe, Castlenau, and Orton. HERBERT H. SMITH.

Loreto, Sisters of, or "Friends of Mary at the Foot of the Cross": a Roman Catholic religious order for women, founded in 1812 in Kentucky by Charles Nerinckx (1761–1824), a priest. They have many establishments in the western parts of the U. S., and devote themselves to the cause of education and the care of destitute orphans.

Lorette, lō-ret′: post-village of Quebec County, Canada; 7 miles from Quebec (see map of Quebec, ref. 4–D). It is a beautiful place, resorted to for the view of its waterfall, and has some manufactures of paper and flour. The inhabitants are partly Christianized Huron Indians. At this place are water-works for the supply of Quebec.

Lorgues, ANTOINE FRANÇOIS FELIX ROSELLY, de: See ROSELLY DE LORGUES.

Lorica′ta [Mod. Lat., liter., neut. plur. of Lat. *lorica′tus*, cuirassed, deriv. of *lorica′re*, clothe in mail, deriv. of *lorï′ca*, cuirass, leather corselet, deriv. of *lo′rum*, thong]: a term applied to those reptiles which are "loricated," or furnished with a coat-of-mail formed by an epidermal exoskeleton of bony scales, as in the crocodiles. The name was originally given to the armadillos, and has been used for very different groups of animals, including some of the ganoids and gurnards among fishes, certain mollusks, and a group of infusoria. The term is, however, generally used in reference to the Crocodilians. Revised by F. A. LUCAS.

Lorient, lō′ri-äṅ′, or **L'Orient**: town; in the department of Morbihan, France; at the mouth of the Scorff, in the Bay of Biscay (see map of France, ref. 4–B); founded in the middle of the seventeenth century by the French East India Company, whence its name, Port de l'Orient. It at one time had a very large trade. In 1770 it was made one of the four stations of the French navy, and has a capacious and safe harbor lined with handsome quays, and protected with strong fortifications at its entrance. Its dockyards and arsenals are extensive, and its manufactures of all kinds of naval equipments are very important. Pop. (1896) 41,894.

Lorillard City: See CENTRAL AMERICAN ANTIQUITIES.

Lorimer, JAMES: See the Appendix.

Loring, EDWARD GREELY, M. D.: ophthalmologist; b. in Boston, Mass., in 1837; studied medicine in Italy, and at the Harvard Medical School, where he graduated in 1864; studied diseases of the eye and ear for a year; practiced in Baltimore one year; settled in New York city in 1867. He was one of the founders of the Manhattan Eye and Ear Hospital. His chief work is *Text-book of Ophthalmoscopy* (New York, 1886). D. in New York city, Apr. 23, 1888.

Loring, GEORGE BAILEY, M. D.: agriculturist; b. at North Andover, Mass., Nov. 8, 1817; graduated at Harvard College 1838, and at the Harvard Medical School 1842; was physician to the Chelsea Marine Hospital for some years; devoted himself after 1850 entirely to scientific agriculture and the preparation and delivery of speeches, lectures, and occasional addresses upon political, historical, scientific, educational, and agricultural topics, and the writing of reports and essays on similar subjects. He took up his residence at Salem; represented that city for several terms in the Massachusetts House of Representatives and Senate; was for three years president of the latter body, and for many years president of the State Agricultural Society, and was a member of the Republican national conventions of 1868, 1872, and 1876. Dr. Loring had a wide reputation as an orator, and was frequently invited to deliver addresses upon memorial occasions. An address at the opening of the scientific course of the American Institute, New York, 1870, was widely copied. He contributed largely to Flint's *Agricultural Reports*, to Murray's work *On the Horse*, and wrote a serial for the Boston *Globe*, called *The Farmyard Club of Jotham*, dealing with New England life and modes of thought. He was a member of Congress 1876–81; U. S. commissioner of agriculture 1881–85; U. S. minister to Portugal 1889–90. D. in Salem, Mass., Sept. 14, 1891.

Loring, WILLIAM WING: general; b. in Wilmington, N. C., Dec. 4, 1818; entered the U. S. army as private soldier in a detachment of mounted volunteers, and served in the Florida war 1835–42; became second lieutenant in 1837, captain of mounted rifles 1846, major in 1847, lieutenant-colonel in 1848, and colonel in 1856; commanded a regiment in the battles in the valley of Mexico; was breveted lieutenant-colonel for gallantry at Contreras and Churubusco, and colonel for gallantry at Chapultepec; lost an arm at the Belen gate of Mexico; commanded an expedition on the Gila river, New Mexico, 1857, where he fought the Mogollan Indians; resigned his colonelcy May 13, 1861; became a brigadier-general, and subsequently a major-general, in the Confederate army, serving in West Virginia 1862, at Vicksburg 1863, and with Gen. Bragg at Chattanooga and in the ensuing campaign. In 1869 he went to Egypt, and became pasha and chief of staff of the army of the khedive; returned to the U. S. in 1879, and published *A Confederate Soldier in Egypt* (New York, 1883). D. Dec. 30, 1886.
Revised by JAMES MERCUR.

Lo′rinser, KARL IGNAZ; physician; b. at Niemes, in the Bohemian Mountains, July 24, 1796; studied medicine at Prague and Berlin, where he took his degree in 1817; held several medical offices in Prussia, from which he retired to private life in 1850. D. at Patschkau, in Silesia, Oct. 2, 1853. His *Untersuchungen über den Rinderpest* (Berlin, 1831) proved of great benefit to the farmers, and his *Zum Schutz der Gesundheit in den Schulen* (Berlin, 1836), which caused a long and vehement controversy, occasioned the re-establishment of *Turn-places* at the Prussian schools.—His son, FRANZ LORINSER (b. in Berlin, Mar. 12, 1821), has acquired a name as a Roman Catholic theologian, and as well versed in Spanish literature, from which he has made several successful translations. He is author of *Aus meinem Leben* (2 vols., 1891).

Loris-Melikoff: See MELIKOFF.

Lormian, BAOUR: See BAOUR-LORMIAN, PIERRE MARIE FRANÇOIS LOUIS.

Lorne, JOHN GEORGE EDWARD HENRY DOUGLAS SUTHERLAND CAMPBELL, Marquis of: b. in London, Aug. 6, 1845; was educated at Eton, St. Andrews University, and Trinity

College, Cambridge. He represented Argyllshire as a Liberal member of Parliament 1868–78; was married to the Princess Louise in 1871; and was Governor-General of Canada, 1878–83. Both he and the princess were popular in Canada, and contributed much toward fostering and inducing sentiments of loyalty to the mother-country. The marquis was an unsuccessful candidate for Hampstead in the Liberal interests in 1885; again defeated in 1892, when he stood for the central division of Bradford. He has contribnted to American and British magazines, and has published *A Trip to the Tropics, and Home through America* (1867); *Guido and Lita: a Tale of the Riviera*, a poem (1875); *The Psalms Literally rendered in Verse* (1877). The Princess Louise has displayed talent as a painter and sculptor, and drew the illustrations for one of her husband's works. Succeeded his father as Duke of Argyll in 1900. NEIL MACDONALD.

Lorrain, CLAUDE: See GELÉE.

Lorraine, lor'rān' (Germ. *Lothringen*): a territory between the rivers Rhine, Saône, Meuse, and Scheldt; forming a plateau from 500 to 800 feet high, which leans against the Vosges, with a northern and northwestern inclination. Originally it was that portion of the empire of Charlemagne which, with Northern Italy, was assigned to Lothaire in the treaty of Verdun, 843. It then constituted the border-land between the eastern and western Franks, and stretched all the way from Switzerland to the North Sea. Its name was derived from Lothaire II., son of the Emperor Lothaire I., who received this territory at the division of his father's dominions, and called it *Lotharii Regnum* (Lotharingia). Under the Carlovingian dynasty the country was an object of perpetual strife between France and Germany. After the extinction of the Carlovingian house the Emperor Otho I. gave it to his brother Bruno, Archbishop of Cologne, who divided it into two parts—Upper Lorraine, between the Rhine, Saône, and Meuse, and Lower Lorraine, between the Rhine, Meuse, and Scheldt. The latter received the name of the duchy of Brabant, became a part of Burgundy, fell to the house of Austria, and the greater part of it is now incorporated with Belgium. Upper Lorraine was ruled for centuries by a dynasty of its own, subject, however, either to French or to German authority, but by the peace of Westphalia in 1648 the three bishopries of Toul, Metz, and Verdun were ceded to France. In 1733, in the Polish war of succession, the duchy was conquered by the French, and in 1737 the legal heir, Frantz Stephan IV., the husband of Maria Theresa, exchanged it for the grand duchy of Tuscany. Stanislaus, the ex-King of Poland and father-in-law to Louis XV., was then made duke, and on his death in 1776 Upper Lorraine became a part of France. The inhabitants, however, although they became very much attached to France, remained German in language and customs in the eastern and northern districts, and this part of the country, with the fortress of Metz, was ceded to Germany May 10, 1871. It is now governed, in connection with Alsace, as a province of the German empire. See ALSACE-LORRAINE.

Lorris, lō'rees', GUILLAUME, de: poet; b. at Lorris, not far from Orleans, France, soon after 1210; d. about 1237. He received an excellent education for his time, probably at Orleans, then a center of classical studies. He is famous as the author of the first part of the ROMANCE OF THE ROSE (*q. v.*), which he composed at the age of twenty-five. After his premature death, his work was left for forty years incomplete, until Jean de Meung continued it at great length and in a very different spirit. A. R. M.

Los Altos, lōs-aal'tōs: a portion of Western Guatemala which, from Feb. 2, 1838, to Jan. 29, 1840, constituted a sixth state of the Central American republic. It was formed of the departments of Sololá, Totonicapan, and Quezaltenango, embracing also (nearly) the present departments of Huehuetenango, San Marco, Retalhulen, and Suchitepequez. Dissatisfied with the condition of affairs, the people of this region seceded from Guatemala; a constitution was adopted in May, 1839, and Marcelo Molina was elected first president; a treaty was celebrated with Salvador. Guatemala at first pretended to be friendly to the new state, but pretexts for a quarrel soon arose. Carrera invaded the territory at the head of Guatemalcan forces, and defeated the troops of Molina Jan. 29, 1840. Los Altos was then reincorporated with Guatemala. The secessionists were treated with great cruelty. HERBERT H. SMITH.

Los Andes: a western state of Venezuela; between Zulia, Lara, Zamora, Armisticio territory, and Colombia, with a short coast on the east side of Lake Maracaibo. Area, 14,719 sq. miles. The Cordillera Oriental of Colombia, entering it from the southward, traverses the state and joins the Venezuelan coast range; these mountains, locally known as the Sierra Nevada de Merida, are the highest in Venezuela, some peaks attaining, it is said, over 15,000 feet; many rise above the snow limit. They include valleys and elevated plains noted for their fertility and delightful climate. The chief products are coffee, cacao, and, in the lower valleys, sugar; maize and even wheat are grown to some extent on the high plains. Pop. (1891) 336,146. Capital, Merida. Other important towns are Trujillo, Bocono, La Grita, and San Cristobal. HERBERT H. SMITH.

Los Angeles, lōs'aan'je-lēez; Span. pron. lōs'aang'haă-lās [Span., liter., the angels]: city (founded Sept. 4, 1781, "under the patronage of Our Lady, the Queen of the Angels," by eleven families of Indian, Negro, and mixed blood, with whom a contract for that purpose had been made by the Viceroy of Mexico); capital of Los Angeles co., Cal. (for location of county, see map of California, ref. 12–F); on both banks of the Los Angeles river, and the Los A. Terminal, the S. Pac. and the S. Cal. railways; 482 miles S. E. of San Francisco. It is the center of a region characterized by an excellent climate and a soil that produces in profusion many of the fruits of semi-tropical as well as temperate climes. The region is also rich in gold, silver, coal, and other minerals, and has rich veins of petroleum, of which a large amount is used for fuel. The city is 30 miles from the mouth of the river and 24 miles N. of San Pedro, its seaport. Vessels of the Pacific Coast Steamship Company, while *en route* between San Francisco and San Diego, touch at San Pedro, and the port is visited by vessels from all maritime countries. In the calendar year 1900 the imports of foreign merchandise amounted in value to $26,809, and the exports of domestic merchandise to $123,148. The census returns of 1890 showed that 747 manufacturing establishment (representing 83 industries) reported. These had a combined capital of $6,807,088; employed 4,950 persons; paid $3,474,618 for wages and $5,008,162 for materials; and had products valued at $9,877,905. There are 3 national banks, 10 commercial banks, and 7 savings-banks. The combined resources of the banks are $28,000,000, and the deposits $23,000,000; clearings for the year ended Nov. 1, 1900, $116,856,762. The city is lighted with gas and electricity, and has over 175 miles of electric street-railway. There are 68 churches, 55 public schools, 8 colleges, 2 high schools, a branch of the State Normal School, 3 Roman Catholic seminaries, the Roman Catholic College of St. Vincent, the University of Southern California, a public library, 7 hospitals, 2 orphan asylums, 6 cemeteries, a crematory, and 5 daily, 23 weekly, and 7 monthly periodicals. The assessed valuation of all taxable property in 1900 was $67,576,074, real estate being assessed at about one-half of actual value. Pop. (1880) 11,183; (1890) 50,395; (1900) 102,457. FRANK WIGGINS.

Los Gatos: town; Santa Clara co., Cal. (for location of county, see map of California, ref. 8–C); on the S. Pacific Railway; 10 miles S. W. of San José, the county capital. It is in an agricultural and an olive and grape growing region; manufactures brandy and wines; and has 2 weekly newspapers. Pop. (1880) 555; (1890) 1,652; (1900) 1,915.

Los Reyes, CIUDAD DE: See LIMA.

Los Rios, lōs'ree'ōs: a western inland province of Ecuador, between Guayas, Bolivar, Tunguragua, and Leon; area, 2,295 sq. miles. Pop. (1889) 32,800. It lies mainly on the western slope of the Andes, and Chimborazo is on the eastern frontier. Agriculture and cattle-raïsing are the only industries. Capital, Babahoyo; pop. 5,000.

Los'sing, BENSON JOHN, LL. D.: historian; b. at Beekman, Dutchess co., N. Y., Feb. 12, 1813; was employed as a watchmaker in Poughkeepsie from 1826 to 1835; was next a journalist at that place for several years, and in 1838 became a wood-engraver in New York, where he edited *The Family Magazine*, an illustrated periodical. He conducted *The Young People's Mirror* (1848–49), and from 1872 to 1875 edited at Philadelphia *The American Historical Record*. He wrote a large number of historical works, most of which were illustrated by himself. Among them were *Pictorial Field-book of the Revolution* (1850–52); *History of the United States* (1854–56); *Mount Vernon and its Associations* (1859); *Lives of the Presidents*; *Pictorial Field-book of the War of 1812* (1868); *The Civil War in America* (3 vols., 1866–68); *The American Centenary*, 2 vols., a work illustrating American progress from 1776 to 1876 (1875);

Cyclopædia of United States History (1881); *History of the City of New York* (2 vols., 1884); *The Two Spies: Nathan Hale and John Andre* (1886); *Mary and Martha, Mother and Wife of George Washington* (1886); *The Empire State, a Compendious History of the Commonwealth of New York* (1887). D. June 3, 1891.

Lossini, los-sce′nēe [Ital., whence Germ. name *Lussin*]: an island in the Gulf of Quarnero, an inlet of the Adriatic Sea, belonging to the government of Triest, Austria; 19 miles long and 3 miles broad, with (1890) 11,848 inhabitants, mostly engaged in agriculture, fishing, and commerce. The principal town is Lossini Piccolo, a thriving place, with 4,975 inhabitants, an excellent harbor capable of receiving the largest men-of-war; has an active trade in wheat, wine, olive oil, fruits, etc.

Lot: a tortuous river of France, which rises in Mont Lozère, in the Cévennes, becomes navigable at Entraigues, and joins the Garonne at Aiguillon after a course of 270 miles.

Lot: department of France; on both sides of the river Lot. Area, 2,012 sq. miles. The surface is elevated and mountainous, traversed by a range of hills, the sides of which are covered with vines, while the valleys abound in wheat, hemp, tobacco, and fruits. Some iron is mined. Of the entire area of the department, 691,920 acres are arable and 222,402 acres are forest-land; 168,038 acres are occupied by vineyards. Wine is the principal product of the department, that of Cahors being the most valued. Sheep are the most abundant live stock; poultry and bees are reared in great quantities. Pop. (1896) 240,403. Capital, Cahors.

Lotbinière, lōt′bēe′ni-ār′, Michael Eustace Caspard, Marquis de: Canadian officer; b. in Canada in 1723. He was appointed engineer to the French colony in 1753; soon after the defeat of Baron Dieskau in 1755 he constructed Fort Carillon (Ticonderoga), with the object of preventing the British from entering Canada, and contributed more than any other person to the defeat of the British at that place. For this and other services he was appointed a chevalier of St. Louis, and soon afterward a marquis. He was a member of the Institute of France. D. in New York in 1799.—His son, Eustace Gaspard Michael Chartier, de (b. in Canada; d. there in 1821): was elected to the Assembly and in 1793 appointed Speaker. An effort to abolish the French language in the Legislature was defeated by his efforts. Neil Macdonald.

Lot-et-Garonne, lōt′ā-gaă′rŭn′: department of France, extending along the Lot and the Garonne, and comprising an area of 2,067 sq. miles. The soil is exceedingly fertile in the river basins; hemp here reaches an extraordinary height; the wine is strong and rich, and capable of being transported across the sea without losing its fine qualities; more wheat is raised than used, but outside of the river basins the soil consists of a ferruginous clay or of sandy tracts which are entirely unproductive. Much iron is manufactured in this department. The forges, high furnaces, and foundries are important. Brazier's ware is manufactured; also agricultural implements and other machines. Plaster, lime, cement, bricks, tiles, etc., are made. Pop. (1896) 286,377. Capital, Agen.

Lothaire (Fr. pron. lō′tār′) **I.**: Roman emperor from 840 to 855; b. about 795, a son of Louis le Débonnaire; shared, together with his two younger brothers, Pepin and Louis, in the government of the empire, and with them resisted the claim of their half-brother Charles to a portion of the territory. On the death of Louis in 840 Lothaire claimed the whole empire, but his two brothers Louis and Charles (Pepin being dead) united against him, and Lothaire was defeated in the battle of Fontenay June 25, 841. In 843 the famous treaty of Verdun was concluded between them, according to which Lothaire retained the imperial title and dignity, Italy, and a strip of land between Germany and France, stretching from the Mediterranean to the North Sea, and extending between the Rhine on the one side and the Rhône, Saône, Meuse, and the Scheldt on the other. Lothaire was a weak, violent, and treacherous character, and utterly unable to defend and govern his land. The Saracens attacked him in Italy, the Norsemen in the Netherlands, while the clergy, the dukes, and his own sons filled the interior with violence and bloodshed. Dividing the country between his sons, he retired to the monastery of Prüm in the Ardennes, where he died a few weeks afterward, Sept. 29, 855.

Lothaire II., The Saxon: King of Germany and Roman emperor from 1125 to 1137; b. about 1060 (according to some authorities in 1075) of a family not very conspicuous; married in 1100 Richenza, the heiress of the wealthy house of Brunswick, and received in 1106 Saxony as a fief of Henry V. At the death of the prince in 1125, Lothaire was elected King of Germany, chiefly through the intrigues of Bishop Adalbert of Mentz, who hated and feared the Hohenstaufen house. His reign was vigorous and fortunate. Bohemia was again brought under German authority; the refractory dukes, especially the Duke Frederick of Suabia, were compelled to submit, and the two Italian campaigns undertaken in defense of Innocent II. were successful. Nevertheless, he bought his crown and the assistance of the Church by the concession of important imperial rights to the pope, and in order to retain Henry the Proud of Bavaria and other dukes in his party, he allowed the principle of heredity to establish itself with respect to the crown fiefs. Thus he weakened the imperial power, and made it incapable of consolidating and governing Germany. D. near Trent, Dec. 4, 1137.

Lo′thian: an old Scottish name now applied to Haddington, Edinburgh, and Linlithgow as East, Middle, and West Lothian respectively. Though now confined to the south shore of the Forth, it formerly extended S. to the Tweed and W. to the Cheviots and Lowthers.

Lothrop, Harriett Mulford: See the Appendix.

Loti, lō′tee′, Pierre, pseudonym of Julien Viaud: novelist; b. at Rochefort, France, Jan. 14, 1850. He was educated in the naval academy and entered the French navy, in which he is an officer. His novels and sketches—*Aziyadé*, *Le Mariage de Loti*, *Le Roman d'un Spahi*, *Fleurs d'ennui*, *Mon frère Yves*, *Pêcheur d'Islande*, *Japoneries d'automne*, *Propos d'exil*, *Madame Chrysanthème*, *Au Maroc*, *Le Roman d'un Enfant*, *Le Livre de la pitié et de la mort*, *Fantôme d'Orient*, *Matelot*—produced in rather rapid succession since 1877, are very simple in construction, often without plot, dealing with few characters and choosing them from simple sailors and fishermen, or from the representatives of the exotic civilizations of the lands whose life and nature they describe—Japan, Tahiti, Senegal, Morocco. His special gifts are an extreme sensitiveness to sensuous impressions, and a rare power of recording and imparting these impressions in a language whose charm is remarkably free from literary reminiscences. He was elected to the Academy in 1891. An edition of his *Œuvres complètes* was published in 1893–94 (8 vols). A. G. Canfield.

Lotoph′agi, or **Lotus-eaters** [*Lotophagi* = Lat. = Gr. λωτοφάγοι; λωτός, lotus + φαγεῖν, eat]: a people first mentioned by Homer as feeding upon the sweet fruit of the lotus, the quality of which was such that all who ate of it immediately forgot their native land and lost all desire to return. The ancient geographers placed the lotus-eaters on what is now the coast of Tripoli, near the Lesser Syrtis, as well as on the island of Meninx. At the present day the cave-dwellers on that coast subsist upon jujubes, and drink a sirup made of that fruit, perhaps the lotus-wine of the ancients. See Lotus.

Lototen: See Athapascan Indians.

Lottery [Germ. *lotterie*, from Fr. *loterie*, deriv. of *lot*, lot, share (ultimately from the Teutonic word equivalent to Eng. *lot*]: a game of chance; a scheme for the distribution of prizes by lot or chance, usually in return for a consideration. The awarding of duties and privileges by lot formed a distinct feature in the political and religious customs of all ancient peoples. The division of land among the children of Israel by lot illustrates the religious usages, while the choice of public officers in Athens by lot illustrates the political usage. The Emperor Augustus is credited with having made the lottery a feature in the Roman social life by the distributing of favors among the guests at the great public entertainments, at which each guest received a sealed packet, which contained a present. The packets were all alike, but the contents would vary from a pea-bean to a diamond.

The Lottery as a Business Enterprise.—Through the social institution thus established, the lottery as a business institution is said to have been developed. Certain it is that the Italian merchants made use of the popular craving for the distribution of prizes as a means of selling their goods, and from Italy the lottery as a means of making money was introduced into Northern Europe, where it had previously existed only as a religious and political institution. It was in the sixteenth century that the institution thus spread, the first lottery-drawing in France taking place in 1539 and the first in England in 1569. The Church

used the lottery for the building of cathedrals, the state used it for the construction of public works, while private individuals found that there was no means so easy of making money as by ministering to the craving for sudden enrichment. The form of lottery generally most common consisted in drawing from a wheel of fortune as many numbers as there were prizes, and then the prizes assigned to each. This was known as the Dutch lottery, though it originated in Italy. The form of lottery most common in France but popular throughout Europe was what is known as the Genoese lottery. It had its origin in the custom at Genoa of selecting the five members of the great council by putting the names of ninety candidates into a wheel of fortune and drawing but five. Bets upon the names that would be drawn became a popular form of gambling, and as elections did not take place often enough to satisfy the demand for this form of excitement, numbers were substituted for names. While there was but one chance in eighteen that any one number named would be drawn, there was but one chance in several hundred that any two numbers named (an *ambe*) would be drawn, and but one chance in several hundred thousand that any four numbers named (a *quaterne*) would be drawn. Yet, by making the prize for the *quaterne* 60,000 times the amount risked (as in the Austrian lottery), people were fairly crazed by the thought of the great prize, and ignored the fact, plain to every one of them, that vastly less money was returned to them than they deposited. The lottery was a kind of savings-bank which paid no interest, and returned but a fraction of the principal. Yet such is the element of irrationality in our nature that the desire to invest savings in these lottery banks became a mania. The Genoese lottery was introduced into nearly all European countries, and the drawings were held as often as two or three times a week. In the large cities in which the lotteries were drawn a great portion of the population lived in a perpetual excitement, which made men unfit for serious business, and generally ended in thoroughly demoralizing them.

Free Lotteries, Licensed Lotteries, Government Lotteries.—In every country the lottery business was at first free, but private lotteries multiplied so rapidly and were so frequently fraudulent in their character, that government supervision was soon of necessity introduced. In England from 1709 to 1823 lotteries were annually licensed. Generally the licensed lotteries were conducted in the interest of some partly public undertaking, being used, for example, for the founding of the British Museum and the building of the Westminster Bridge. The evils resulting from such lotteries, however, were so marked that Parliament, in 1778, partly for the sake of revenue, but avowedly for the purpose of protecting the people, levied an annual tax of £50 a year upon every one conducting a lottery. This measure reduced the number of lotteries from 400 to 41, but did not reduce the business in anything like the same proportion. In 1823 it was decided that the only way to protect the people was to prohibit the business, and lotteries were accordingly suppressed. In France the Government very early imposed a slight tax on lotteries, and in 1700 Louis XIV. established a national lottery, which in 1776 was made a monopoly upon the principle that the money taken from the public by means of the lotteries ought not to go to the enrichment of private individuals, but to the state. The edict establishing the royal lottery did not, however, admit the evils that came to the public. It ran as follows: "His Majesty having noticed the natural inclination of his subjects to vest their money in private lotteries, and desiring to afford them an agreeable and easy means of procuring for themselves a sure and considerable revenue for the rest of their lives, and even of enriching their families by vesting sums so small that they can not cause them any inconvenience, has judged it opportune to establish at the Hôtel de Ville at Paris a royal lottery." To the statesmen of the French Revolution belongs the credit of having first refused to raise a public revenue through an institution so demoralizing to the public and so impoverishing to the very poor. On Nov. 12, 1793, the Convention abolished the lottery of France, "as an invention of despotism to make men silent about their miseries and enslave them with a hope which aggravates their distress." A few years later the lottery was restored for revenue purposes, and with the re-enthronement of the Bourbons came to yield an annual revenue of 14,000,000 francs. After the next democratic revolution in 1831, however, this peculiarly iniquitous method of raising revenues from the poor was again attacked, and in 1836 was prohibited. The French Parliament has since permitted lottery bonds to be issued, as in the scandalous case of the Panama Canal Company; but public sentiment in France has come to believe with J. B. Say, that "the legislators who sanctioned such a tax vote a certain number of thefts and suicides every year. There is no pretext of expense that can justify provocation to crime." In the remaining countries of Europe this sentiment is rapidly gaining, though Prussia is still (in 1894) realizing a revenue of 10,000,000 marks from its lotteries, Austria a revenue of 40,800,000 crowns, Italy a revenue of 75,300,000 lire, and Spain (according to ex-Minister Curry) a revenue of 75,000,000 pesetas.

Early Lotteries in the United States.—In the American colonies lotteries were very frequently resorted to as a means of raising revenue. "It was with the money collected from the sale of lottery tickets," says McMasters, "that Massachusetts encouraged cotton-spinning and paid the salaries of many of her officers; that the city-hall was enlarged in New York; that the court-house was built at Elizabeth; that the library was increased at Harvard College; and that many of the most pretentious buildings were erected in the Federal city." Some of the buildings at Yale University also were erected by the aid of lotteries, and Columbia College about the middle of the eighteenth century received aid from the same source. During the Revolutionary war the Continental Congress tried to raise money by this means, and for a half century after the Revolution lotteries were frequent in the U. S. As early as 1699, however, an assembly of Boston ministers attacked lotteries as cheats, and their agents as "pillagers of the people." The fact that lotteries seemed to gain about the time of the Revolutionary war was due to the need of public revenue. The fact that lotteries continued to gain after the close of that war, when the growth of cities made easier the operations of the lotteries, was what awakened the public conscience to the evil. In 1833 appeared at Philadelphia Job R. Tyson's *A Brief Survey of the Great Extent and Evil Tendencies of the Lottery System of the United States*, and a society was formed in Pennsylvania with the purpose of working for the abolition of the institution. It was indeed abolished in Pennsylvania and Massachusetts in the very same year, in Connecticut in 1834, in Maryland in 1836, etc.

The Rise of the Louisiana Company.—At the beginning of the civil war in 1861 the lottery business in the U. S. was of slight importance, but in 1868 the Louisiana Legislature granted a lottery charter for twenty-five years, and despite serious opposition in several quarters the business flourished during the entire period of the "carpet-bag" *régime*. During Gov. Nichols's first administration the Legislature abolished the lottery, but the act was invalidated by a decision of a U. S. district court declaring it an impairment of the obligation of contract, and consequently in violation of the Constitution. It was now a great social and political power in the State, and having secured as inspectors Gens. Beauregard and Early, men of national reputation, it became known throughout the country. Having full confidence in the fairness of the drawings all classes were tempted to take chances, and the earnings of the poor especially were invested in the hope of securing prizes. Before each drawing the company offered $28,000,000 worth of tickets, of which $14,767,000 was promised in prizes ranging from petty sums to $15,000, while the balance, or about 47 per cent., was to be retained by the company. Thus the public paid 28,000,000 earned dollars in order to get back 15,000,000 unearned dollars, and required no account of the balance. While the expenses of the company were very heavy, including 15 per cent. to the agents, who broke the laws of other States in selling the tickets, and large sums devoted to advertising the drawings, silencing the press, and contributing to campaign funds, charities, etc., its profits were enormous, enabling dividends estimated at 170 per cent. to be declared in 1889.

The Campaign of Extermination.—The owners were naturally loath to part with their profitable privileges, and in the spring of 1890 it was announced that the company would apply to the people of Louisiana for the renewal of the charter, offering as the people's share of the profits the sum of $500,000 instead of the $40,000 which had hitherto constituted their portion. Not until this offer had been increased to $1,250,000, however, could the requisite two-thirds of the Legislature be secured to vote that the company's proposition be submitted to the people. This was of the nature of a bribe equivalent to $5 for every legal voter in Louisiana for each of the twenty-five years for which the new charter was asked. It was, moreover, most skillfully distributed, so as to seem a grant in aid of the most worthy objects; but in-

stead of destroying the anti-lottery sentiment, it stirred up an enthusiastic campaign against the re-chartering of the company. An anti-lottery league was formed in New Orleans; an anti-lottery newspaper was started in the face of the bitterest opposition, and the Churches throughout the State took up the agitation. In the following campaign the anti-lottery movement gathered such force that its supporters claimed the majority in the Democratic State convention, but the machinery being in the hands of the regular Democracy, who refused to insert an anti-lottery plank in the platform, the anti-lottery delegates withdrew. The contest was then between the regular or McEnery Democracy and the anti-lottery Democracy. Meanwhile interest was aroused in the North. Mass meetings were held in New York and Boston, the great magazines and weekly newspapers joined in the crusade, and the clergy vehemently denounced the attempt to fasten the lottery anew upon the State of Louisiana. Fearful of losing the election, the company withdrew its demands for a re-charter, and the regular Democracy now called upon the "bolters" to return. The latter would only consent to new primaries to determine which candidate was in reality the choice of the party. The result was favorable to the anti-lottery interest, and the regular Democrats now became in their turn the "bolters." The election gave an overwhelming victory to the anti-lottery ticket, and the new Legislature promptly passed an act declaring it a felony to conduct a lottery in Louisiana after Dec. 31, 1893. With this act the last refuge of the lottery business was lost, and it became an outlaw in every State of the Union. C. B. Spahr.

Lot'to, Lorenzo: painter; b. in the latter part of the fifteenth century. A Venetian, or perhaps born at Treviso, in the Venetian territory; erroneously supposed to have been a native of Bergamo. He was a pupil of Giovanni Bellini, but successfully imitated all the masters of his day. He established himself in Bergamo in 1513, and executed his best works there, of which the most famous are the altar-piece in San Bartolemmeo and a *San Giovanni Battista* in the Church of Santo Spirito. At Venice also there are three important works by Lotto: *St. Antonino*, at the Church of St. Giovanni and Paolo; *St. Nicholas*, at the Carmine; and *The Madonna with Two Angels*, at St. Jacopo dall' Orto. In his later years he painted at Recanati, and at Loreto, where he ended his life about 1554 or soon after, in the service of the Madonna in her Holy House (Chiesa della Casa Santa), which he had adorned with his work. W. J. Stillman.

Lo'tus, or **Lotos** [from Gr. λωτός, lotus]: a name applied in literature to many widely different plants: (1) To the *Zizyphus lotus*, a kind of jujube-tree of Barbary (family *Rhamnaceæ*), whose fruit is extensively gathered as food. It is the subject of much Arabic poetry. (See Jujube.) It is probably the tree whose fruit beguiled the Lotophagi (*q. v.*) (2) The *Melilotus messinensis*, a valuable forage-plant of the Levant (see Melilot), and of the family *Leguminosæ*. (3) The ebenaceous date-plum or pishamin (*Diospyros lotus*) of Europe and Asia, much resembling our persimmon, and producing a valuable fruit. (4, 5) The fragrant blue and white Nilotic water-lilies (*Castalia cærulea* and *C. lotus*), which were greatly honored by the Egyptians, and were everywhere worshiped. They were mystically connected with their mythology. The stalks and roots furnished food. (6) The *Nelumbo speciosa*, or sacred Egyptian bean, another beautiful pink water-lily, mystically honored in China and India, as well as in ancient Egypt. Its large seeds and roots were, and are still, eaten. This is the lotus-flower (*padme*, lily-pad) of India. (7) A North African and European hackberry-tree, *Celtis australis*, whose wood is prized by carvers, and whose fruit is edible. Most of the above, with other trees, have been claimed as the source of the food of the fabled lotus-eaters. (8) There is a large genus of clover-like leguminous plants called *Lotus* by Linnæus, and still bearing that name. It includes the bird's-foot trefoils and other Old World plants, which in Europe are cultivated as forage-herbs. The pods of some kinds are used as food; others are well known as garden flowers. (9) In the U. S. botanical writers apply the name lotus to the *Nelumbo lutea*. It closely resembles No. 6 of this article. It is known as the water-chinquapin, and its seeds and roots, if cultivated, would yield a valuable supply of food. Many writers believe that the Homeric lotus was *Nitraria tridentata* (family *Zygophyllaceæ*), a thorny shrub of Northern Africa.

Lotze, lot'se, Hermann Rudolf: philosopher; b. at Bautzen, Saxony, May 21, 1817; studied medical science, natural philosophy, and metaphysics at Leipzig, and was appointed Professor of Mental Philosophy there in 1843. In the following year he accepted a call to Göttingen, and in 1881 to Berlin, where he died July 1 of the same year. He very early pronounced against the Hegelian philosophy on the one side and materialism on the other, and joining the small circle of theistic philosophers—Charles Philip Fischer, I. H. Fichte, Jr., H. Weisse, Ulrici, etc.—he gradually developed his own conception of theism. His principal works are *Mikrokosmus* (1856–64, 3 vols.; Eng. trans., 3d ed. Oxford, 1888); *System der Philosophie* (1874–79, 2 vols.: *Logik*, Eng. trans., 2d ed. Oxford, 1888, and *Metaphysik*, Eng. trans., 2d ed. Oxford, 1887); *History of Æsthetics in Germany* (1868); *Medicinische Psychologie* (1882); *Dictaten* from lectures (translated in six small volumes of *Outlines*, Boston, 1884, *seq.*).

His Philosophy.—In the development of German philosophy Lotze represented a reconstruction of elements drawn from speculative idealism on one hand, and from natural and empirical science on the other. The task of metaphysics is to find what reality is, not "how it is made." This amounts to an assumption of reality as that which is, and limits philosophy to the recognition of the real and the systematic arrangement of all our thoughts of reality—whether drawn from objective science, from psychology, or from logic—in a self-consistent system. The method of philosophy is therefore empirical, as its main assumption is realistic.

In constructing his system on this basis Lotze reached several conclusions which have strongly influenced contemporary thought. Inquiring into the nature of external reality, he establishes by lines of argumentation of astonishing subtlety and power, and with equally astonishing mastery of the modern sciences of mathematics, mechanics, and biology, a theory of immanent causation which postulates theoretical monism of world-ground, together with a form of monadology in the atomic constitution of the world. He then banishes the thing in itself of Kant as well as the ontological "reals" of Herbart, finding in phenomenal change, or "becoming," the mode of self-manifestation of the world-principle. The reality of things consists in their "standing in relations"; but this standing in relations gets its permanent meaning in the dynamic interplay—in and through modes of relationship—of qualitative changes in regular and recurring series, as apprehended by consciousness. Things to be what they are must appear to a consciousness; but what appears to finite consciousness is not the whole of reality. "Reality is richer than thought."

The theory of knowledge, therefore, is a critique of our thoughts about reality. In this critique he reaches the subjectivity of space, though rejecting Kant's proofs of it. Space is our translation of the logical relationships of reality. Time, as universal form, is also subjective; but succession is in the nature of reality. The logical timeless dialectic of Hegel is thus replaced by a real progress, or becoming, in the nature of the absolute.

The inquiry as to the nature of the world-principle leads to the view that qualitative change with permanence of being can only be conceived after analogy with consciousness. The ultimate becomes therefore a spiritual theistic principle; all beings are spiritual, and the human soul is the highest form of finite reality. The course of the world thus becomes the teleological plan of the realization of the theistic principle, and the criterion of reality becomes worth in this plan. In the ethical consciousness, where "worth" is the criterion of judgment, the essential teleology of the universe becomes evident. So the dynamic realism of natural science and empirical evolution is harmonized with the ethical idealism of Fichte.

Lotze thus combines in a coherent and organic system of philosophy the leading philosophical and scientific conceptions of the century. In the U. S. his influence is stronger in academic philosophy, perhaps, than that of any other author; and in several ways: (1) He gave impulse to the recent development of physiological psychology both by his doctrine of the relation of body and mind and by his positive contributions of psycho-physical theory (i. e. the theory of "local signs"); (2) his philosophy has tended to replace the theological natural realism inherited from Scotland; (3) his more adequate treatment of positive science, as affording basis for philosophical construction, has brought metaphysics into closer touch with the empirical disciplines.

References.—Erdmann, *History of Philosophy*, vol. iii., pp. 299 ff. (London and New York, 1892); Falckenberg, *History of Modern Philosophy*, pp. 605 ff. (New York, 1893).

J. Mark Baldwin.

Loudon, low'dŭn, John Claudius: writer on horticulture; b. at Cambuslang, Lanarkshire, Scotland, Apr. 8, 1783; was educated at Edinburgh University; became a landscape-gardener near London 1803; traveled extensively as an observer and student of horticulture, and became a practical instructor in the art. The best of his numerous works are the *Encyclopædias*—of Gardening (1822), of Agriculture (1825), of Plants (1829), of Architecture (1832)—and the *Arboretum et Fruticetum Britannicum* (1838); was editor of *The Gardener's Magazine* (1826–43), of *The Magazine of Natural History* (1828–36). D. Dec. 14, 1843.—His wife, Jane Webb Loudon (1808–58), was an able and pleasing writer, chiefly upon botanical and horticultural subjects.

Revised by L. H. Bailey.

Loudonville: village; Ashland co., O. (for location of county, see map of Ohio, ref. 3-G); on the Mohican river, and the Penn. Railroad system; about 20 miles from the capitals of Ashland, Richland, Wayne, Holmes, and Knox Counties. It is in a grain-growing and stock-raising region, and has 7 churches, electric lights, and 2 weekly newspapers. Pop. (1880) 1,497; (1890) 1,444; (1900) 1,581.

Louis I.: King of Bavaria. See Ludwig I., Karl August.

Louis II.: Roman emperor from 855 to 875; b. in 822; the eldest son of Lothaire I. After the death of Louis le Débonnaire, the empire was divided between his three sons, Lothaire I., Louis the German, and Charles the Bald, by the treaty of Verdun. This division of the empire of Charlemagne was carried still further on the death of Lothaire I., his part being subdivided between his three sons, Louis, Lothaire, and Charles. Louis II. received Italy and the title of emperor; Charles, Provence and Lyons; and Lothaire II. the territory between the Rhine, Saône, Meuse, and Scheldt, called Lotharingia (Lorraine). Louis II. fought successfully against the Saracens in Italy, defeated them at Benevento in 848, and expelled them from Bari. He also understood how to vindicate his authority over the great Italian families, of which many steadily conspired with the Byzantine empire. Charles died without children in 863, and Louis II. and Lothaire II. divided his dominions; but when in 869 Lothaire II. also died childless, Charles the Bald and Louis the German took advantage of the emperor's engagement in a new and less successful war with the Saracens in Italy, and divided Lothaire's dominions between themselves. Louis II. died at Brescia, Aug. 13, 875.

Louis II.: King of Bavaria. See Ludwig II.

Louis III., The Child: Roman emperor from 908 to 911; b. in 893; a son of Arnulf, and raised to the throne of Germany on his father's death in 899 by Duke Otto of Saxe, Margrave Luitpold of Austria, and Archbishop Hatto of Mentz, who wished to govern the country during his minority, but the state of Germany while under their rule was miserable; the Hungarians invaded the country, and devastated it as far as Thuringia. In 908 Louis assumed the title of Roman emperor, but he died in 911, and with him the Carlovingian dynasty became extinct in Germany.

Louis IV., The Bavarian: Emperor of Germany from 1314 to 1347; b. in 1286; a son of Duke Louis the Severe of Bavaria and Matilda of Hapsburg. On the death of Henry VII. of Luxemburg in 1314 he was chosen emperor by a majority of the electors, while a minority chose his cousin, Frederick III. of Austria. A long and devastating war began between the two emperors, but Frederick was at last defeated in the battle of Mühldorf Sept. 28, 1323, taken prisoner, and compelled to renounce his claims. Having supported the Viscontis in Milan against Pope John XXII., a quarrel arose between the pope and the emperor. Louis IV. was excommunicated, but went in 1327 with an army to Italy; was crowned in Milan and Rome, deposed John XXII., and established Nicholas V. as antipope. In spite of his success, he was soon compelled to leave Italy, and John XXII. and his successors, supported by French intrigues, continued to oppose and harass him; Germany was placed under interdict. A diet at Rhense on the Rhine (July 16, 1338) declared that an emperor legally chosen by a majority of the electors needed no confirmation from the pope, nor was he in any way subject to his authority. Thus supported by the German princes, and having strengthened his position by large acquisitions of personal property, the emperor prepared for a new campaign against the pope, when he died suddenly at Fürstenfeld, near Munich, Oct. 11, 1347.

Louis: the name of eighteen kings of France; (1) Louis I., le Débonnaire (*q. v.*), Roman emperor, 814–840.—(2) Louis II., le Bégue (877–879), b. in 846, a son of Charles the Bald.—(3) Louis III. (879–882), b. about 864, a son of Louis II., divided the country with his brother Carloman, who inherited the whole after his death.—(4) Louis IV., d'Outremer (936–954), b. in 921, a son of Charles the Simple; was educated at the court of King Athelstane of England, a brother to his mother, Ogive. In 936, on the death of Raoul of Burgundy, he was called to the French throne by Hugh of Paris and William of Normandy, but his reign was only a series of contests with these two vassals, who in the war with Otho I. of Germany even allied themselves with the enemy.—(5) Louis V., le Fainéant (986–987), b. in 966, a son of Lothaire and Emma: was the last king of the Carolingian dynasty.—(6) Louis VI., le Gros (1108–37), was b. about 1078, a son of Philip I. The possessions of the French king were at that time the cities of Paris, Orleans, Étampes, Melun, and Compiègne, with their territories, and the kingship itself was a rank rather than a power, but Louis VI. declared that his royal precedence among the princes of France involved a public charge, and he began to act according to this idea. Under him the *oriflamme* was first used as a national banner, and a feeling of national unity became prevalent in the population.—(7) Louis VII., le Jeune (1137–80), b. about 1119, a son of Louis VI., married Eleanor of Aquitaine, thereby uniting this large territory to the possession of the crown. He quarreled vehemently with Pope Innocent II. and with Henry II. of England. In 1147 he placed himself at the head of the second crusade, but was unsuccessful.—(8) Louis VIII., surnamed le Lion (1223–26), b. in 1187, a son of Philip Augustus, was stopped by the pope in his progress against the English, who at this time were nearly driven out of France. He twice invaded England, and then made a crusade against the Albigenses, which contributed much to the development of the royal power by assembling the vassals under the royal banner.—(9) Louis IX., Saint (1226–70), b. in 1215, a son of Louis VIII., was only eleven years old when his father died; during his minority the country was governed by his mother, Blanche of Castile, a woman of great energy, sagacity, and virtue. In 1236 Louis assumed the throne himself, and shortly after the Count of Marche rose in insurrection, supported by Henry III. of England. But Louis defeated them at Taillebourg and Saintes in 1242, and after the victory he treated the rebellious count with so much magnanimity that he won not only the respect, but the good will, of all his vassals. The most prominent trait in the character of St. Louis was his piety. His conscience, and not his ambition, governed his will. Religious enthusiasm was the motive-power in most of his actions. When the massacre of the Christian inhabitants of Jerusalem in 1244 became known in Europe, St. Louis took the cross in spite of all the remonstrances of his mother and councilors, and in Aug., 1248, he departed with an army of 80,000 men from Aigues-Mortes, on the Mediterranean, for the island of Cyprus. In June, 1249, he landed in Egypt and took Damietta, but when, after five months' postponement, he began to push forward to Cairo, he was stopped by the Egyptians in the battle of Mansoorah, and on Apr. 5, 1250, was compelled to surrender himself and his whole army, whose number meanwhile had been reduced to about 30,000. After paying a large ransom he was liberated and sailed for Syria, where he remained several years laboring to do something for the cause of Christianity in these regions. In 1254 he returned to France with about 500 followers. The following fifteen years of his reign were marked with many wise and vigorous reforms, such as "La Quarantaine de Roi," by which a truce of forty days was established from the committal of an offense, during which term the case was tried by the royal courts, and any attempt at private revenge was prohibited; "La Pragmatique Sanction," by which it was forbidden to levy money in France for the pope without the consent of the king, and those cases were defined in which ecclesiastics were to be tried by the secular courts; the foundation of the Sorbonne, of the library of Paris. The University of Paris under his inspiration and direction now acquired international fame. The general wisdom and energy of his rule entitle him to recognition as one of the greatest and noblest of French kings. In June, 1270, the king embarked with an army of 60,000 men for a new crusade. He landed in Tunis, and formed a camp near the ruins of Carthage; but the plague broke out in the army, and he died Aug. 25. He was canonized by Pope Boniface VIII. in 1297.—(10) Louis X., le Hutin, The Quarreler (1314–19), b. in 1289, a son of Philip IV. His reign, of less than two years, was unimportant.—(11) Louis XI. (1461–83), b. in 1423, a son

of Charles VII. His private character was harsh, grasping, and suspicious, but his talent as a ruler was of a high order. He consolidated the territory of France and the authority of the French crown in this territory, and founded numerous institutions which were of great benefit to the public in general; but the means by which he curbed the feudal houses of France and brought them into absolute dependency on the crown were without scruple. The Count of Armagnac was murdered in 1473; the Duke of Alençon died in prison in 1474; the Count of Luxembourg was beheaded in 1475; the Duke of Nemours was kept for years in an iron cage, and beheaded in 1477; in all, he is said to have put about 4,000 persons to death, most of them secretly. By intrigue he came into possession of Provence, Maine, Anjou, Perpignan, etc., but his principal acquisition was the inheritance of Charles the Bold. Charles was a member of the league which was formed against Louis in the beginning of his reign by all the principal vassals of the French crown, among whom was the king's own brother, the Duke of Berry. After the battle of Mont l'Héry in 1465, Louis made great concessions to all the members of the league, but having succeeded in disuniting some of the associates, he had the whole treaty annulled in 1466 by the States-General of Tours, and recommenced the quarrel. He now invited Charles to an interview at Péronne, and while this took place he incited the citizens of Liège to revolt against him. As soon as Charles heard of this treachery he seized the king, and liberated him only on very hard conditions. Louis now allied himself with the Duke of Lorraine and the Swiss, and when Charles fell in the battle of Nancy (in 1477) he at once incorporated Champagne, Artois, Picardy, and parts of Flanders with France, and managed to keep them in spite of the protest of Charles's heirs. In his internal policy he favored the lower and middle classes, especially the cities, encouraged learning, art, manufactures, and trade, improved public roads and canals, established the first post system, made the administration of justice regular and cheap, etc.; nevertheless, he was feared and hated, not only by the feudal lords, but by all, and he spent the last years of his life in the fortress of Plessis-les-Tours, where he died in 1483. He did much to break down the feudal nobility and centralize the government. Though unlearned, he favored the universities, and promoted general order.—(12) Louis XII. (1498–1515), b. in 1462, a son of Duke Charles of Orleans, succeeded Charles VIII. As a descendant of Valentina Visconti he laid claim to Milan, and in 1500 conquered the city and took Ludovico Sforza prisoner. In connection with Ferdinand of Aragon he soon after conquered Naples, but, disagreeing about the partition of their conquest, war broke out between the two allies, and in 1503 Gonsalvo de Córdova expelled the French from Southern Italy. In 1508 Pope Julius II. formed the League of Cambray between Ferdinand of Aragon, Louis XII., and the Emperor of Germany against the republic of Venice; but Venice having satisfied the pope by ceding several towns to him, and the pope having become much alarmed at the progress of the French in Italy, the league was suddenly dissolved, and a new one, the so-called Holy League, was formed in 1511 between the pope, the emperor, Venice, Ferdinand of Aragon, and Henry VIII. of England against France. Defeated at Novara, the French were driven out of Italy in 1513. At the same time Henry VIII. landed in France with an army of 45,000 men, and having joined the imperial army pushing forward from the Netherlands, he defeated the French at Guinegate. Thus hard pressed on all sides, Louis began to negotiate, and succeeded in escaping from the difficult situation without any great loss. One of his last acts was a marriage with Mary Tudor, the young sister of Henry VIII. of England.—(13) Louis XIII. (1610–43), b. in 1601, a son of Henry IV. and Marie de Médicis. His education was much neglected. During his minority the country was governed by his mother and her favorite, Concini, who was made a marshal and Marquis of Ancre, but the government was only a mixture of weakness, violence, and intrigue. After the murder of Concini in 1617, Albert de Luynes, a favorite of the king, who was made a duke and peer of France, grasped the reins, but his government was little better. After his death in 1621, Cardinal Richelieu (*q. v.*) arose into great prominence; in 1624 entered the council, and guided the affairs of the government for the next eighteen years. The king lived mostly in seclusion, occupied in hunting, drawing, and quiet social enjoyments; but the affairs of state both at home and abroad were conducted by the great minister with such consummate skill that the power and importance of France were greatly increased during the reign.—(14) Louis XIV. (1643–1715), b. at St.-Germain-en-Laye, Sept. 5, 1638, a son of Louis XIII. and Anne of Austria. During his minority his mother and Cardinal Mazarin (*q. v.*) governed the country, and brought to a final close the contest between the royal power and the wealthy and ambitious aristocracy, represented at this period by the league of the Fronde. To this minister belongs the chief credit for the great gains secured by France in the Peace of Westphalia at the close of the Thirty Years' war in 1648. Mazarin died Mar. 9, 1661, and the next day, when the chiefs of the different departments of the administration asked the king to whom they had to address themselves in the future on questions of business, he answered, "To me." He was from this moment his own prime minister, and in the dispatch of business he developed, besides an almost Asiatic despotism, great energy and much sound judgment. He surrounded his person with a magnificent splendor, and guarded his dignity with the most minute forms of etiquette, but his haughtiness did not offend people; it dazzled them, and while his brilliant personal gifts fascinated all who came in contact with him, and attracted to his court all that was eminent in France, the extraordinary prosperity of his government during the first half of his reign made him the idol of the nation. Colbert brought order not only in the finances, but in the whole internal administration, and under his leadership great enterprises were undertaken with signal success. The harbors and ship-yards of Brest, Rochefort, Lorient, Havre, Dunkirk, Cette, and Toulon were constructed and fortified; the Canal of Languedoc, uniting the Atlantic with the Mediterranean, was built, and other canals and public roads were improved; commercial treaties were concluded with Holland and Italy; manufactures of different kinds were established; and while the condition of the people improved, the revenues increased and the king grew rich. No less successful was Louis XIV. in the organization and development of the intellectual life of the French people. The Academy of Inscriptions and Belles-Lettres was founded in 1663, the Academy of Sciences in 1666, the Academy of Painting and Sculpture in 1667; nineteen new professorships were founded at the Royal College; the Royal Library was greatly increased; an observatory was built at Paris; and all these institutions were not only amply supported, but the interest the king showed for them gave their social position dignity and influence. A new taste was created—not in the sense of a new fashion, but of a new ideal of beauty—and this taste was actually imposed on the whole civilized world by Racine, Molière, Boileau, Fénelon, Bossuet; by Lebrun, Poussin, Claude Lorrain; by Perrault, Mansard, Blondel, and others. To these successes it must be added that Louvois, Vauban, and the Duke of Beaufort created a powerful army and navy, which under the leadership of Turenne, Condé, Luxembourg, Vendôme, Duquesne, Tourville, and others made any movements of the king with respect to his foreign policy most effective. His ambition was fired by his imagination, not by any passion. The theatrical effect seemed to satisfy him. His first wars had for their principal purpose the establishment of a safe frontier to the N. and N. E., and France certainly needed a reconstruction of her boundaries on these sides. They are blamable, nevertheless, on account of the arrogance and entire disregard of all international rights with which they were begun, and the almost unexampled barbarity with which they were conducted. In 1665 Philip IV. of Spain died, and Louis, who in 1660 had married his daughter, Maria Theresa, now claimed the Spanish possessions in the Netherlands, and overran the country with a large army. A triple alliance was formed between England, Holland, and Sweden for the purpose of establishing peace between France and Spain, but by the treaty of Aix-la-Chapelle (May 2, 1668) Louis obtained the so-called French Flanders, besides a number of places along the frontier. His first object after the peace was to separate England from Holland; a master in intrigue, he completely succeeded in seducing the weak Charles II., and when in 1670 he began the war against Holland, England was his ally. In Holland, William of Orange was appointed stadtholder and commander-in-chief, and by his diplomatic skill a new league was formed against France between Holland, Brandenburg, the Emperor of Germany, and Spain. By the Peace of Nymwegen (in 1678) Louis nevertheless obtained the whole of Franche-Comté and Alsace. Not content, however, with that which he gained by actual wars, he now

began to seize cities and territories during time of peace and under the most futile pretexts. Thus in 1681 he took Strassburg, in 1684 Luxembourg, and so on. In order to put an end to such proceedings, a league was formed at Augsburg in 1686 between Holland, Austria, Spain, Bavaria, and Savoy, but although the king opened the war with his usual energy, overrunning the Palatinate and transforming this beautiful country into a desert, and although his armies gained one brilliant victory after the other, yet the victories proved sterile, and by the Peace of Ryswick (Sept. 20, 1697) he had to give up all the conquests he had made during the war, make considerable commercial concessions to Holland, and, what was most humiliating to his pride, recognize William III. as King of England. A great change had taken place during this period in Europe, in France, and in Louis himself. The accession of William III. to the throne of England indicates the turning-point of the fortune of Louis XIV. William was his equal in diplomatic craftiness, and far his superior in statesmanship. In France, Colbert died Sept. 6, 1683, Louvois July, 1691, and the government passed into the hands of Madame Maintenon, whom the king married secretly in 1685. The Revocation of the Edict of Nantes (Oct. 22, 1685) threw the internal affairs of the country into a most disastrous confusion. The building of Versailles and the expensive armaments for the re-establishment of James II. in England completely exhausted the finances; and while the means of realization became more and more limited, the plans of the king became more and more arrogant. His pride and egotism assumed the most odious forms. He maintained a bloody war along the whole frontier merely for the whims of his vanity. He banished, persecuted, and ruined his own subjects merely because they did not hold the same creed. He sanctioned by his example crimes utterly destructive of the very foundation of civilized society, merely because they suited his passions, and at last he dragged the exhausted and already suffering people into misery for a mere dynastic purpose. The failure of his policy in the East seemed to make him willing to stake everything upon an effort to secure the succession in Spain. Anticipating the death of Charles II., Louis devoted the last years of the century to preparations for war. The question of the succession was so complicated that it involved England as well as Germany and Spain. The war of the Spanish Succession which continued from the year 1700 to the Peace of Utrecht in 1713, is memorable not only for the great victories of Marlborough at Blenheim and Malplaquet, but also for the general impoverishment of France. The results of the war were in every way disastrous. In point of territory France was shorn on almost every side. The glories that characterized the first half of the reign were lost, and nothing less than the great Revolution would now restore France to its former place among the nations. Overwhelmed during the last years of his life with domestic calamities, he died Sept. 1, 1715.—Louis XV. (1715–74), a great-grandson of Louis XIV., b. at Versailles, Feb. 15, 1710. During his minority the country was governed by the Duke of Orleans (*q. v.*), during whose regency the country was plunged into the deepest financial embarrassment by the failure of the great Mississippi scheme. (See Law, John.) After the death of the duke in 1723, Cardinal Fleury, who had been the teacher of the young king, became Prime Minister, and his parsimony restored some order to the finances, which had been brought to the very verge of bankruptcy by the prodigality of Louis XIV. and the wild schemes of the regent. The young king, who had married in 1725 Maria Leszczynski, a daughter of Stanislaus, ex-King of Poland, seemed to be a noble and honest man, and the war with Saxony, Russia, and Austria, which France began in 1733 for the purpose of reinstating Stanislaus on the Polish throne, was conducted with success, and brought the country the beautiful province of Lorraine by the Peace of Vienna (1738). These encouraging prospects were soon changed in the saddest manner. During the Austrian war of succession Cardinal Fleury died in 1743 at the age of ninety, and in the mean time the frivolous and corrupted court had succeeded in seducing the young king, whose profligacy and dissipation soon assumed an extent and openness hitherto unheard of. Michelet aptly described the tendency of affairs by saying that "to the government of an old priest succeeded that of a young mistress." Madame de Pompadour now rose to power as the king's mistress. Her authority, well-nigh absolute, lasted for twenty years. The profligacy of the court became the scandal of Europe. Meanwhile foreign affairs were becoming more and more complicated through the claims and the energy of Frederick the Great. In the first and second Silesian wars France was in alliance with Prussia; but in the third, or Seven Years' War (*q. v.*), the influence of Maria Theresa and Kaunitz upon Madame de Pompadour led the French Government to an Austrian alliance against Prussia and England. The result was disastrous, for France had to cope with the statesmanship of William Pitt as well as with that of Frederick the Great. The consequence was that France suffered the immeasurable calamity of losing India and Canada. Thus the scandals of the profligate court, the feeble and unskillful administration of domestic affairs, and the failures of foreign undertakings, conspired to weaken the power of the nation and strengthen the forces of discontent. The king was conscious of the perilous state of affairs, but he thought, "Après moi le déluge," and went on. The popular opposition to the horrible abuses of the royal authority began to show itself through the Parliament of Paris, whose privilege it was to countersign the royal tax-edicts, but which refused to do so. The resistance, however, was curbed with violence. The Parliament was broken up, its members punished and replaced by more willing tools. Society was disorganized. The nobility lost its courage and its love of country by giving itself up to the vices and frivolities that had been encouraged by the example of the court. The clergy was divided into two antagonistic interests; for the higher prelates had the rank of nobles and were able to impose heavy burdens upon the people, while they were exempt from the necessity of bearing burdens themselves. The lower clergy were generally devoted to their duties. The burgher or citizen class had grown in prosperity since the death of Louis XIV., but the peasantry was in a most wretched condition. About a quarter of the soil was in their hands; but the burdens of taxation were so excessive and the lack of capital so universal that every year thousands of them were reduced to the point of famine. Matters grew worse until the king's death, which occurred May 1, 1774. His reign, which extended over forty-nine years, was one uninterrupted calamity to the nation.—(16) Louis XVI. (1774–93), a grandson of Louis XV., b. Aug. 23, 1754, was a good-natured, well-meaning, honest man, of pure morals, and capable of making a sacrifice for the public weal, but his will was weak and his intellect narrow. He was unable to comprehend the situation, and he was entirely destitute of political instincts. Thus he hastened the approach of the Revolution. The finances, burdened by a new debt of 1,500,000,000 francs, contracted by the participation of France in the war of independence in North America, formed the point of issue. The annual budget showed a deficit of 140,000,000 francs. There were two remedies—restriction of the expenses, which the queen and the court opposed, and taxing the privileged classes, which the Parliament opposed. The king, incapable of deciding in such a dilemma, hoped to find a third expedient by appealing to the people; and thus it came to pass that he himself appealed to the Revolution. When he summoned the States-General, which had not met in 175 years, he afforded the opportunity for outbreak. When the representatives of the Third Estate (*q. v.*) were refused a seat with the other estates, they determined to take matters into their own hands. The Assembly became a prey to faction. The hopelessness of the situation led to all manner of excesses. The king was finally tried, condemned, and executed Jan. 21, 1793. (See France—*History.*)—(17) Louis XVII., a son of Louis XVI. and Marie Antoinette, b. at Versailles, Mar. 27, 1785; shared at first the imprisonment of his parents in the tower of the Temple, but was after the decapitation of his father separated from his mother, and died of ill-treatment and neglect in his cell (June 8, 1795). A number of impostors pretended to be Louis XVII., and excited some attention, but their claims were easily disproved.—(18) Louis XVIII. (1814–24), b. at Versailles, Nov. 17, 1755, a brother of Louis XVI., received at his birth the title of Count of Provence. In 1791 he fled, and lived in Coblentz, Verona, Milan, and England. After the death of Louis XVII. he assumed the title of King of France, but his pretensions elicited generally only a smile, and the court of emigrants he assembled around him often excited disgust. Nevertheless, after the fall of Napoleon he was called to the French throne. Both the French people and the foreign powers wished peace, and the re-establishment of the Bourbons was considered its only safe guaranty. There was, however, only one fraction of the French people with which the king was in full harmony—

LOU
A R K A N S A
T E X A S
G U L F O F
C A D D O
B O S S I E R
W E B S T E R
C L A I B O R N E
U N I O N
L I N C O L N
O U A C H I T A
M O R E H O U S E
R I C H L A N D
B I E N V I L L E
J A C K S O N
C A L D W E L L
D E S O T O
R E D R I V E R
N A T C H I T O C H E S
W I N N
G R A N T
C A T A H O U L A
S A B I N E
V E R N O N
R A P I D E S
A V O Y E L L E S
S T. L A N D R Y
C A L C A S I E U
A C A D I A
C A M E R O N
V E R M I L L I O N
Magnolia
El Dorado
Hamburgh
Mt. Pleasant
Daingerfield
Pittsburgh
Linden
Jefferson
Gilmer
Longview
Marshall
Henderson
Carthage
Center
Nacogdoches
San Augustine
Lufkin
Homer
Hemphill
Rockland
Jasper
Newton
Woodville
Hardin
Liberty
Beaumont
Orange
Wallisville
Port Arthur
Sabine Pass
Galveston Bay
Bolivar
GALVESTON
Frog Level
Red Land
Garfield
Black Bayou
Shreveport
Greenwood
Bethany
Spring Ridge
Stonewall
Keatchie
Grand Cane
Mansfield
Logansport
Minden
Homer
Arcadia
Ruston
Monroe
Farmerville
Winnfield
Natchitoches
Many
Colfax
Alexandria
Pineville
Leesville
Marksville
Opelousas
Washington
Lake Charles
Sulphur City
Jennings
Crowley
Lafayette
St. Martinville
New Iberia
Abbeville
Cameron
Grand Chenier
Johnson's Bayou
Sabine Lake
Calcasieu Lake
Grand Lake
White Lake
Marsh Island
Vermillion Bay
Cote Blanche Bay
Sabine River
Big Cypress Cr.
Angelina R.
Trinity R.
Neches R.
Red R.
Sabine Pass
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Longitude
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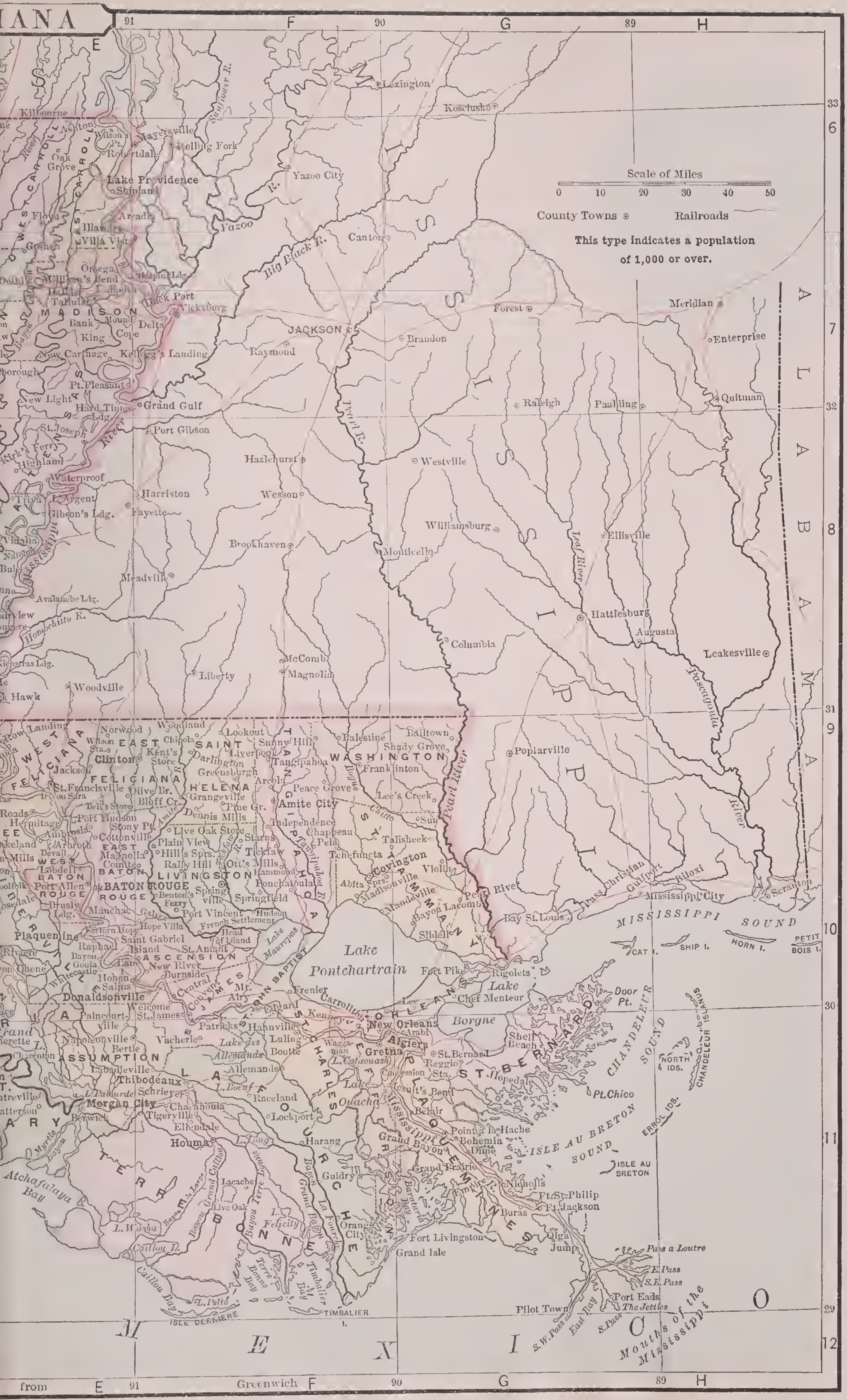

IANA
Scale of Miles
0 10 20 30 40 50
County Towns
Railroads
This type indicates a population of 1,000 or over.
M I S S I S S I P P I
A L A B A M A
Lexington
Kosciusko
Yazoo City
Canton
JACKSON
Brandon
Forest
Meridian
Enterprise
Raymond
Vicksburg
Raleigh
Paulding
Quitman
Grand Gulf
Port Gibson
Hazlehurst
Westville
Harriston
Fayette
Wesson
Williamsburg
Ellisville
Brookhaven
Monticello
Meadville
Hattiesburg
Augusta
Columbia
Leakesville
McComb
Magnolia
Liberty
Woodville
Poplarville
Pearl River
Leaf River
Pascagoula
Big Black R.
Pearl R.
Yazoo
Lake Providence
Natchez
Clinton
WASHINGTON
ST. TAMMANY
Covington
Mandeville
Slidell
Amite City
Franklinton
Bay St. Louis
Mississippi City
Biloxi
Gulfport
Pass Christian
Scranton
MISSISSIPPI SOUND
CAT I.
SHIP I.
HORN I.
PETIT BOIS I.
Lake Pontchartrain
Lake Borgne
ORLEANS
New Orleans
Algiers
Gretna
ST. BERNARD
CHANDELEUR SOUND
CHANDELEUR ISLANDS
NORTH IDS.
ERROL IDS.
Pt. Chico
ISLE AU BRETON SOUND
ISLE AU BRETON
PLAQUEMINES
Pointe la Hache
Ft. St. Philip
Ft. Jackson
Pass a Loutre
E. Pass
S.E. Pass
Port Eads
The Jetties
S. Pass
S.W. Pass
Pilot Town
Mouths of the Mississippi
Grand Isle
Fort Livingston
BATON ROUGE
Donaldsonville
ASCENSION
ASSUMPTION
Thibodeaux
Houma
Morgan City
TERREBONNE
LAFOURCHE
Atchafalaya Bay
ISLE DERNIERE
TIMBALIER I.
Lake Maurepas
LIVINGSTON
ST. HELENA
EAST FELICIANA
WEST FELICIANA
M E X I C O
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from Greenwich

namely, the old emigrants, who hoped through him to get not only restitution, but also vengeance; and even these partisans he was compelled to disappoint in order to preserve his throne. His reign was a time of confusion and dullness, and in the actual process of restoration and reorganization, which went on silently and instinctively, he took no part. Personally, he was indolent, apathetic, good-humored, and shrewd in a small way. D. Sept. 18, 1824.

Revised by C. K. Adams.

Louis, Pierre Charles Alexander, M. D.: clinician; b. at Aï, Champagne, France, Apr. 14, 1787; graduated M. D., School of Medicine of Paris, in 1813; at the time of the French Restoration went to Russia, returning in 1820; worked in the Charité Hôpital with his friend Chomel, there conducting extensive investigations that gave the data for his famous works *Recherches pathologiques et thérapeutiques sur la phthisie* (Paris, 1825) and *Recherches anatomiques, pathologiques et thérapeutiques sur la maladie connue sous les noms de fièvre typhoïde, putride, etc.* (Paris, 1829). These researches served to establish the identity of typhoid fever as a separate disease. In 1828 he went to Spain with Chervin and Trousseau, commissioned by the French Government to study the effects of an epidemic of yellow fever. On his return he was appointed a physician to the Pitié Hópital, and later to the Hôtel Dieu. He was one of the foremost teachers in the world, and science and humanity are under great obligation for his investigations. His writings have been translated into many European languages. D. Aug. 22, 1872. S. T. Armstrong.

Louisa, Queen of Prussia: See the Appendix.

Louisburg: a famous fortress built by the French soon after the Peace of Utrecht (1713) upon the eastern coast of Cape Breton island, in lat. 45° 53′ 30″ N., lon. 60° W., receiving its name in honor of Louis XIV. The works constructed here were of the heaviest and most complete description, and were built of stone (see map of Quebec, ref. 1–D). A large and well-built town of some 3,000 inhabitants sprang up, favored by the spacious and excellent harbor. Since the existence of so strong a place threatened the colonial and British fisheries, it was determined in 1745 by the Legislature of Massachusetts Bay (France and Great Britain being then at war) to strike a blow at the town. Accordingly, a force of colonists, consisting of 3,250 Massachusetts militia, aided by 516 men from Connecticut and 304 from New Hampshire, set sail in 100 vessels, and landed near the town Apr. 30, 1745. An active but irregular siege (though the men were without tents and the proper means of conducting such operations) was terminated June 17, 1745, by the capitulation of the French under Duchambon —an event that caused the greatest joy throughout the British empire, but the Peace of Aix-la-Chapelle (1748) gave back all Cape Breton to France. The town was invested in 1758 by Gen. Amherst with 14,000 British troops, twenty line ships, eighteen frigates, and other vessels. After a tremendous bombardment, which quite destroyed the town and breached the walls badly, the garrison and French fleet surrendered July 26, 1758. The ruins still remain.

Louis d'Or, loo′ee′dōr′ [= Fr., liter., golden louis]: a French gold coin, first struck in 1641 under Louis XIII., not coined since 1795, but the name is often given to the twenty-franc piece or gold Napoleon, and to certain German five-thaler pieces. The value of the louis fluctuated considerably, but may be roughly stated to be about $5 in U. S. money.

Louisiade Archipelago: a group of islands off the southeast angle of New Guinea, of which they form an extension. They have belonged to Great Britain since 1885. The group extends about 300 miles, and consists of three large islands and numerous islets. The large islands are St. Rignan (nearest New Guinea; area, 106 sq. miles), Southeast island (area, 380 sq. miles), and Rossel (area, 300 sq. miles). Total area of group, 850 sq. miles. The inhabitants are Papuans. See Macgillivray, *Narrative of the Voyage of H. M. S. Rattlesnake* (2 vols., 1851). M. W. H.

Louisiana, loo-ee′zĕĕ-aa′na: one of the U. S. of North America (South Central group).

Situation and Area.—It lies between 89° and 94° W. lon. and 28° 56′ and 33° N. lat.; has an extreme length from E. to W. of 298 miles, and from N. to S. of about 280 miles; and is bounded on the N. by Arkansas and Mississippi, on the E. by Mississippi, on the S. by the Gulf of Mexico, and on the W. by Texas. It includes the entire delta of the Mississippi river, and within its area of 48,720 sq. miles are embraced 1,060 sq. miles of landlocked bays, 1,700 sq. miles of inland lakes, and 540 of river surface, leaving 45,420 sq. miles of land area.

Seal of Louisiana.

Physical Features.—The geology of the State reveals the Cretaceous, Tertiary, and post-Tertiary formations. The Cretaceous underlies the whole State, and crops out from N. to S. in St. Landry, Sabine, Winn, and other parishes; the Tertiary embraces the larger portion of the upland; while the post-Tertiary is represented in the loess found in elevated ridges and in the alluvial lands which form from one-third to one-half of the entire area. The highest measured point is 387 feet above sea-level, and is near Arcadia, Bienville parish. The land surface has been classified by Commissioner Poole as, good upland, 5,250,000 acres; pine hills, 5,500,000; bluff lands, 1,500,000; prairie, 2,500,000; arable alluvial, 2,250.000; pine flats, 1,500,000; coast marsh, 3,500,000. From an agricultural point of view there is very little waste land in the State. The pine flats are generally sandy and sterile, but, with irrigation and fertilizers, yield fair profits. The timber upon them is of great and increasing value, and is now rapidly marketed. The pine flats are noted as resorts in pulmonary cases for their sanitary results. The only lands not susceptible of culture, except at great cost, are portions of the coast marsh-lands, which, however, afford range and pasture for large herds of cattle and innumerable flocks of water-fowl. The uplands are fertile and healthful. The alluvial lands are of an inexhaustible fertility, the soil varying from 10 to 40 feet in depth. Lying, for the most part, along the banks of the Mississippi and its tributaries, they are liable to overflow unless protected by dikes or levees. Through the aid of the general Government in its efforts to improve navigation, and with the direct and vigilant care of the local authorities under State laws, the cultivation of these lands is yearly becoming more secure and remunerative. The prairies on the right, or south, bank of the Bayou Teche have, however, been considered the most favored and attractive section of the State. In fertility, health, climate, and exemption from overflow, they enjoy a peculiar combination of advantages.

Rivers, Lakes, etc.—The great river of Louisiana is the Mississippi, which traverses the State from N. to S. for nearly 600 miles. Indeed, the State is the creation and product of the river. In geological periods the whole State was covered by an arm of the sea. As the continent was upheaved, the waters of the inland sea to the N. were discharged through a vast channel many leagues wide; but as the upheaval continued, and the sources of supply were drained, the river gradually shrank to narrower limits and cut a deeper channel to the gulf. Then along the lowered banks of its final channel it deposited the fine loam which now constitutes the alluvial lands. Red river, one of the great tributaries of the Mississippi, after flowing along the northern boundary of Texas and traversing about half the length of Louisiana diagonally from the N. W., discharges its waters into the Mississippi. It is navigable for large steamboats throughout a great part of its course. In seasons of high water its floods are diverted into the Atchafalaya river, thus interfering with navigation and affording a problem that so far has baffled the best hydraulic engineers. Other navigable rivers are the Ouachita or Washita, the Bœuf, the Tensas, the Pearl, the Sabine, and the Calcasieu. The bayous are, properly speaking, outlets of larger streams, and to this class the Atchafalaya belongs. These bayous often broaden into lakes, and again contract to narrow streams, which at their mouths are lost in the frequent estuaries or bays, as Barataria, Atchafalaya or Berwick's, Vermilion, etc. The bayous are generally navigable, and with the indentations of the coast-line constitute an important system of commercial waterways, unsurpassed in the U. S. The total river front-

age is estimated at 4,258 miles. Several canals connect important streams.

Soil and Productions.—With its rich alluvial delta and fertile uplands, and a heavy rainfall well distributed, the State presents an agreeable contrast to the arid appearance of many States in the South and West, both in the extent and variety of its forest growths and in the luxuriance of its grasses. The conditions are highly favorable to varied and productive agriculture and horticulture. Almost all the fruits of the temperate and sub-tropical belts flourish, and orange-culture, principally carried on in Plaquemines parish, yields about 450,000 boxes annually. The banana, guava, and some other tropical fruits do well and bear in sheltered spots. The palmetto and date palm are abundant in New Orleans. More Northern fruits, as the apple, quince, and pear, are cultivated. The strawberry is grown successfully for the Northern market, and the blackberry and dewberry grow in profusion and are indigenous. The principal crops are sugar, cotton, and rice. Indian corn occupies a considerable place in the agriculture of the State, with an annual yield valued at from $12,000,000 to $16,000,000; but this is insufficient for home needs. Tobacco, also, of a very high quality, known as perique, is grown, but in limited quantities. Sugar-culture is the most important industry in the State, and is carried on in the southern belt. Under the Sugar Bounty Act the number of producers licensed to manufacture sugar in 1891 was 697, which was diminished in 1892 to 618, and in 1893 to 552, in both instances with a large increase in the crop. These changes were due to the establishment of central factories and improved methods of manufacture, requiring larger investments and better machinery. The production has been, in hogsheads of 1,000 lb. each, 1880, 218,314; 1890, 420,426; 1893, 445,857; 1894, 640,000; (1899) 295,680.

The cotton crop, which in 1879–80 was 508,569 bales from 864,789 acres, increased in 1889–90 to 659,583 bales from 1,270,885 acres; in 1891–92 to 780,000 bales from 1,283,000 acres; and in 1892–93 it was 435,000 bales from 1,155,000 acres. In 1891–92 Louisiana was the fifth among the ten cotton States in cotton production, and the second in yield per acre; in 1892–93 it was the seventh in production, and the third in yield per acre. 1891–92 was the unprecedented 9,000,000-bale year, and the year following was one of disaster. In 1898–99 it was the seventh in production and the second in yield per acre, with a production of 717,747 commercial bales from 1,281,691 acres. In 1900 there were 5 mills, with 62,220 spindles in operation, and 3 new mills building. Rice-culture was seriously undertaken in Louisiana on plantations that had failed in sugar from crevasses, low prices, or other misfortunes after the civil war. In 1885 the rice crop on the Mississippi and Bayou Lafourche amounted to 1,100,000 barrels, but in 1889 it had fallen to 477,000 barrels, owing to the restoration of plantations to sugar-culture. In the meantime, through the introduction of rice-culture in Southwest Louisiana by Western immigrants, the crop there amounted to 302,000 barrels; in 1890 to 700,000 barrels; and in 1891 and 1892 to three-fourths of the total output. Low prices in 1893 somewhat depressed this industry. The production of the State in 1898–99 was 107,792,000 lb.

Timber.—Louisiana, next to Arkansas, is the most heavily wooded State in the Union. The long-leaf pine lumber standing is estimated at 25,643,000,000 feet; the short-leaf pine at 20,978,000,000 feet. It is of very fine quality, and will average 4,000 feet to the acre, often running up to 10,000 and even 15,000 feet. The swamp cypress, a wood of the very best quality, is becoming an important industry. The rough boards have a value about double that of white pine. Live oak is found in abundance on the Gulf coast, and white oak is extensively used in the manufacture of barrel-staves, etc. The forests contain a great variety of valuable timber-trees, such as ash, sweet gum, hickory, black walnut, magnolia, many varieties of oak, cottonwood, willow, cedar, and elm.

Minerals.—There are marbles supposed to be of much value, but as yet they are not quarried to any great extent. A large and valuable deposit of sulphur exists in Calcasieu parish, but the engineering difficulties are so great that it has never been successfully worked. The well-known salt mine at Avery's island, in Iberia parish, is a deposit lying about 20 feet below the surface. It has been bored for 1,000 feet in depth without finding any change in the character of the deposit, which has a purity of 99·67 per cent. The output has been about 36,000 tons per annum, but it is capable of yielding ten times that quantity without difficulty. Lignite, carnelians, agates, fire-clay, and sandstone are also found on Avery's island, which is an isolated loess deposit in the alluvium. Ocher, marl, fire-clay, gypsum, kaolin, lead, sulphate of soda, sulphate of iron, and carbonate of lime occur in considerable quantities in the State. Petroleum is found at various points, but not in quantities to give it a commercial value. Copper has also been found. Quartz crystals, jasper, agates, carnelians, onyx, sardonyx, and feldspar abound in the Tertiary and loess.

Fauna.—The native fauna differs little from that of adjoining States. Black bears, wolves, wild-cats, and a few panthers are still found in the woods and swamps. Raccoons, opossums, squirrels, and hares, and all the smaller forest animals abound. The reptiles are very abundant, but hunters have rendered the alligator scarce. Birds, and especially water-fowl, are more numerous and of greater variety than in any other State in the Union. Game birds are found in great plenty, and attract many sportsmen in the winter season. The waters of the Gulf afford an abundant supply of the choicest varieties of fish. The pompano, Spanish mackerel, sheepshead, red snapper, redfish, sea trout, croaker, and many others are noted for flavor and abundance. In the inland waters a black bass is caught which is much esteemed. The oysters are of the finest quality, and very abundant. Shrimp, crabs, crayfish, and other shellfish are a common article of diet. The live stock does not constitute so important an interest relatively as formerly, or as it deserves. With some drawbacks, the country is favorable to animal life, especially if it receives due attention. The number and value of the live stock in 1899, exclusive of swine, which were not returned, was as follows:

ANIMALS.	Number.	Value.
Horses	145,029	$5,228,953
Mules	92,722	5,837,072
Milch Cows	123,232	2,704,942
Oxen	171,729	2,296,702
Sheep	113,205	179,203
Totals	645,917	$16,246,872

Climate.—The climate is mild and genial and little exposed to extremes in temperature. The greatest extremes of temperature, with the least annual rainfall and earliest and most frequent frosts, are naturally found in the north belt, while the coast district shows the greatest average annual rainfall, the lowest summer and highest winter maximum temperatures, and highest winter minimum temperatures. The difference between the several sections amounts to as much as twenty degrees in the annual range of temperature; for while the Gulf section has a highest maximum on record of 97°, the interior parishes have 103°; and while the minimum of the coast district in 1888–94 was 26°, for the interior and northern sections it was 13° and 11° respectively. The coast district has an average annual rainfall of 56·50 inches; grouped with the remainder of the southern section the average is 54·19; while the northern section has 48·20, or 6 inches less. The average for the State is 51 inches. The average precipitation at New Orleans in 1872–94 was 61·56 inches. The average date of the earliest frost in New Orleans, Dec. 19, is a month later than in the northern section. The annual range of temperature in the Gulf district is 62° and in the interior parishes 83°. While the rainfall greatly exceeds that of the interior States and the Northwest, the State has a very large percentage of clear days, 200 of the 365, or nearly 55 per cent. On only eighty-five days does rain fall at all. The prevailing winds of April to August inclusive are from the S. In October, December, January, and February N. and N. E. winds prevail. In February, March, September, and November they alternate, at the turn of the seasons. Considering the low levels, extent of swamp-lands, and moist, warm atmosphere, it is generally assumed that the climate is necessarily miasmatic and unhealthful. These conditions do not apply at all to the uplands, and in the southern belt the malarial influences are largely modified, even at sea-level, by the Gulf breezes, which blow constantly. The Acadians, French peasants, who have been settled on this coast for more than a century, are a stalwart race, and the other white inhabitants have health and strength above the average people of the country. By a rigid and continually improved system of quarantine and disinfection, pronounced by experts the most effective in the world, the yellow fever has been almost entirely excluded. There have been but two epidemics since 1859; one in 1867, the other in 1878.

Divisions.—For administrative purposes Louisiana is divided into fifty-nine parishes (which correspond with the counties of other States), as follows:

PARISHES.	* Ref.	Pop. 1890.	Pop. 1900.	PARISH-TOWNS.	Pop. 1900.
Acadia	10-C	13,231	23,483	Crowley	4,214
Ascension	10-E	19,545	24,142	Donaldsonville	4,105
Assumption	11-E	19,629	21,620	Napoleonville	945
Avoyelles	9-D	25,112	29,701	Marksville	837
Bienville	7-B	14,108	17,588	Arcadia	924
Bossier	6-B	20,330	24,153	Benton	463
Caddo	6-B	31,555	44,499	Shreveport	16,013
Calcasieu	10-B	20,176	30,428	Lake Charles	6,680
Caldwell	7-D	5,814	6,917	Columbia	382
Cameron	10-B	2,828	3,952	Cameron	1,323
Catahoula	8-D	12,002	16,351	Harrisonburg	303
Claiborne	6-C	23,312	23,029	Homer	1,157
Concordia	8-E	14,871	13,559	Vidalia	1,022
De Soto	7-B	19,860	25,063	Mansfield	847
E. Baton Rouge	10-E	25,922	31,153	Baton Rouge	11,269
East Carroll	6-E	12,362	11,373	Lake Providence	1,256
East Feliciana	9-E	17,903	20,443	Clinton	960
Franklin	7-D	6,900	8,890	Winnsborough	.....
Grant	8-C	8,270	12,902	Colfax	190
Iberia	10-D	20,997	29,015	New Iberia	6,815
Iberville	10-D	21,848	27,006	Plaquemine	3,590
Jackson	7-C	7,453	9,119	Vernon	.....
Jefferson	11-F	13,221	15,321	Gretna	.....
Lafayette	10-D	15,966	22,825	La Fayette	3,314
Lafourche	11-F	22,095	28,882	Thibodeaux	3,253
Lincoln	7-C	14,753	15,898	Ruston	1,324
Livingston	10-F	5,769	8,100	Springville	.....
Madison	7-E	14,135	12,322	Tallulah	.....
Morehouse	6-D	16,786	16,634	Bastrop	787
Natchitoches	8-B	25,836	33,216	Natchitoches	2,388
Orleans	10-G	242,039	287,104	New Orleans	287,104
Ouachita	7-D	17,985	20,947	Monroe	5,428
Plaquemines	11-G	12,541	13,039	Pointe à la Hache	.....
Pointe Coupée	9-D	19,613	25,777	New Roads	770
Rapides	9-C	27,642	39,578	Alexandria	5,648
Red River	7-B	11,318	11,548	Coushatta	600
Richland	7-D	10,230	11,116	Rayville	.....
Sabine	8-B	9,390	15,421	Many	354
St. Bernard	11-G	4,326	5,031	St. Bernard	.....
St. Charles	11-F	7,737	9,072	Hahnville	.....
St. Helena	9-E	8,062	8,479	Greensburg	315
St. James	10-E	15,715	20,197	Convent	.....
St. John Baptist	10-F	11,359	12,330	Edgard	.....
St. Landry	10-D	40,250	52,906	Opelousas	2,951
St. Martin	10-D	14,884	18,940	St. Martinville	1,926
St. Mary	11-D	22,416	34,145	Franklin	2,692
St. Tammany	10-F	10,160	13,335	Covington	1,205
Tangipahoa	9-F	12,655	17,625	Amite City	1,547
Tensas	8-E	16,047	19,070	St. Joseph	717
Terrebonne	11-E	20,167	24,464	Houma	3,212
Union	6-C	17,304	18,520	Farmerville	458
Vermilion	10-D	14,234	20,705	Abbeville	1,536
Vernon	9-B	5,903	10,327	Leesville	1,148
Washingtou	9-F	6,700	9,628	Franklinton	236
Webster	6-B	12,466	15,125	Minden	1,561
W. Baton Rouge	10-E	8,363	10,285	Port Allen	.....
West Carroll	6-E	3,748	3,685	Floyd	.....
West Feliciana	9-E	15,062	15,994	St. Francisville	1,059
Winn	8-C	7,082	9,648	Winnfield	.....
Totals		1,118,587	1,381,625		

* Reference for location of parishes, see map of Louisiana.

Principal Cities and Towns, with Population in 1900.—New Orleans, 287,104; Shreveport, 16,013; Baton Rouge, 11,269; New Iberia, 6,815; Lake Charles, 6,680; Alexandria, 5,648; Monroe, 5,428; Crowley, 4,214; Donaldsonville, 4,105; Plaquemine, 3,590; Lafayette, 3,314; Thibodaux, 3,253; Houma, 3,212; Opelousas, 2,951; Franklin, 2,692; Natchitoches, 2,388; and Morgan City, 2,332.

Population and Races.—In 1860, 708,002; 1870, 726,915; 1880, 939,946; 1890, 1,118,587 (white, 558,395; colored, 560,192, including 333 Chinese, 39 Japanese, and 627 civilized Indians; native, 1,068,840, foreign, 49,747; males, 559,350; females, 559,237); 1900, 1,381,625.

Industries and Business Interests.—In 1890 there were 2,613 manufacturing establishments reported in the census, which employed $35,754,121 capital and 31,901 persons who received $13,159,564 as wages. There were 7 large mills employed in sawing swamp cypress, 189 in sawing other lumber, 132 planing-mills, 43 shingle-mills, and many other establishments employed in dressing lumber. The mills have a capacity of nearly 5,000,000 feet per day, and saw lumber to the value of $8,225,000 annually. The total forest products amount in value to $15,878,000 annually.

Finance.—The assessed valuation was $235,768,969 in 1890, and $276,568,507 in 1900. The total revenues derived from all privilege tax turned in by the sheriffs was $329,157.62. The license fees paid direct to the State treasury not embraeed in this statement were about $70,000.

Banking.—On Sept. 5, 1900, there were 21 National banks with a capital of $3,285,000, and deposits of $20,308,027.80; on June 30, 1900, 56 State banks, capital $3,630,210, deposits $12,683,333; and 2 savings banks, capital $200,000, deposits $3,284,892.

Railways.—The leading railway systems are the Illinois Central, the Southern Pacific, the Louisville and Nashville, the Texas and Pacific, the New Orleans and Northeastern, and the Vicksburg, Shreveport and Pacific. In 1850 the railway mileage was 80; 1860, 335; 1870, 450; 1880, 672; 1890, 1,739; 1900, 2,123.

Churches.—The French who settled Louisiana brought the Roman Catholic religion with them, and that was the only denomination there till the cession of the territory to the U. S. The first religious exercises under the auspices of Methodism were held in 1804; the first Protestant church in New Orleans was founded by the Episcopalians in 1805; the first Baptist church in the State was established in 1812; and the first Presbyterian in 1819. The census of 1890 gave the following statistics of the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	206	204	211,763	$1,568,200
Baptist, colored	876	885	68,308	616,390
Baptist	482	477	27,736	333,977
Methodist Episcopal South	316	318	24,874	483,470
Methodist Episcopal	218	216	15,073	303,302
African Methodist Episcopal	81	115	13,631	193,115
Colored Methodist Episcopal	138	133	8,075	134,135
Protestant Episcopal	85	70	5,162	387,950
Presbyterians in the U. S.	64	54	4,926	433,985

While an occasional congregation is found dissenting from the principal Protestant organizations, Louisiana has probably fewer small sects than any other State.

Schools.—The first educational institution was a Roman Catholic convent and school for girls, established in New Orleans in 1727 by a party of Ursuline nuns who were sent from France for the purpose at the request of Bienville. In 1804 the College of Orleans was opened. This was in operation till 1825, when it was superseded by the College of Louisiana, which has since become Centenary College, under charge of the Methodist Episcopal Church South. The State was quite liberal in appropriations to literary institutions in 1812–45, granting them over $1,600,000, and to 1894 probably $3,000,000. The institutions of real college grade for white students are TULANE UNIVERSITY (*q. v.*), the Louisiana State University and Agricultural and Mechanical College, the State Normal School, Centenary College, and Jefferson College (Roman Catholic). There are four universities in New Orleans for colored students): the Southern (State institution); Straight (Congregational); Leland (Baptist); and the New Orleans (Methodist Episcopal North). The State University at Baton Rouge is endowed with the national land grant, was originally established in Rapides parish in 1860, under the superintendence of Gen. W. T. Sherman, and is doing useful work after many reverses. The State Normal School at Natchitoches was opened in 1885. Under the present constitution, the Legislature is required to provide public schools free for all children six to eighteen years of age. The State school fund was sold at auction and virtually confiscated during the reconstruction period, but the present constitution recognizes a free school fund of $1,130,867, bearing 4 per cent. interest, and the seminary fund of $136,000. The funds derived from the poll-tax, from the interest on sales of public lands and the proceeds of other real estate coming to the State, as well as from the general taxation for educational purposes, are set apart for the support of the public schools. In 1899 the total population of school age was 404,757; the enrollment in the public schools was—white children, 121,936; colored, 74,233; average attendance—white, 90,187, colored, 56,136; and the number reported in attendance in private schools—white, 11,896, negroes, 2,798. There were 4,157 teachers, as follows: white males, 1,455; white females, 1,617—total white, 3,072; colored males, 566; colored females, 549—total colored, 1,085. The total revenue for school purposes was $1,242,026.

Libraries.—In 1892 there were 32 public libraries of 1,000 volumes and upward each, which contained 200,618 bound volumes and 25,284 pamphlets. They were classified as follows: General, 4; school, 4; college, 14; college society, 3; law, 1; medical, 1; public institution, 1; Young Men's Christian Association, 1; scientific 1; art, 1; and society, 1. The State Library, founded in 1838, contained 41,000 volumes and 3,500 pamphlets, obtained chiefly by exchange.

The Howard Memorial Library was founded in 1889 by Annie T. Howard, with a building valued at $100,000, an endowment of $115,000, and 8,000 volumes, valued at $12,000, and has since received liberal donations from the Howard family. The libraries of Tulane University contain 27,000 volumes.

Charitable and Penal Institutions.—The charitable institutions of the State and of New Orleans especially, founded and supported in whole or in part by private charity, are very numerous. Among the public institutions are the Louisiana Institution for the Deaf and Dumb at Baton Rouge, founded in 1852, and receiving from the State an annual appropriation of $14,000; the State School for the Blind at Baton Rouge, established in 1851; the State Insane Asylum at Jackson, established in 1847, and receiving an annual State appropriation of $90,000; the Soldiers' Home at New Orleans, authorized in 1866 and in operation since 1883; the State Penitentiary at Baton Rouge, established in 1822, and conducted on the leased-labor plan; and the Touro Infirmary, established on a bequest of Judah Touro, supported chiefly by Israelites, with buildings valued at $100,000, unsectarian in its benevolence, and costing annually for maintenance about $30,000. One of the most noted institutions is the Charity Hospital in New Orleans, founded in 1786 by Don Andres Almonaster y Rosas, and receiving an annual appropriation from the State of $80,000. In fifty-eight consecutive years, excepting 1863, its admissions aggregated 449,453, discharges 374,864, and deaths 66,134.

Political Organization.—The political organization of the State closely resembles that of its sister States. Still the constitution adopted in 1879 presents some peculiarities. The executive department consists of the Governor, lieutenant-governor, auditor, treasurer, and secretary of State, all elected for four years. The Governor has the veto power, subject to a reversal by the Legislature; has the pardoning power, on the recommendation of a board of pardons; has unusually large powers in the appointment of officers; appoints the five judges of the Supreme Court, who hold office for twelve years, and also appoints all officers whose selection is not otherwise provided for in the constitution, and the patronage under this clause is immense. Five courts of appeals, with two judges each and a jurisdiction of from $100 to $2,000, were created, but have been found cumbrous and useless. The judges are elected by the General Assembly in joint session. There are twenty-six district courts, with original civil jurisdiction of all matters over $50, and unlimited original jurisdiction in all criminal, probate, and succession matters. They try appeals from justice in cases involving more than $10. District judges are elected by a plurality of qualified voters in their respective districts. The legislative power is vested in a Senate of not more than 36 nor less than 24 Senators, and a House of Representatives of not more than 98 nor less than 70, elected for four years, which causes some anomalies in the election of U. S. Senators. The General Assembly has no power to contract, or authorize the contraction of, any debt or liability on behalf of the State, except to resist invasion or insurrection; and it can not pass any local or special law except for a few specified objects, such as general appropriations for the ordinary expenses of government, for interest on the public debt, and for public schools and charitable institutions. All other appropriations are made by separate bills, each embracing but one object. A liberal homestead exemption is provided for.

History.—The first Europeans who set foot on the soil of Louisiana were Alvarez de Pineda and his companions, who in 1519 entered the mouth of the Mississippi, and spent six weeks on its banks. They found the Indians friendly and living in large towns. Ten years later the ill-fated expedition of Pamphilo de Narvaez touched at the mouth of the Mississippi. In 1541 Hernando de Sota, after three years' wanderings, crossed the Mississippi to perish, after incredible hardships, in the wilderness. This was the end of Spanish exploration. Robert Cavalier de la Salle made several attempts to explore the great river, but it was not until 1682 that he succeeded in descending it to its mouth. Then he took possession of the land for his king, Louis XIV. of France, and named it in his honor. La Salle's success gained him such credit that the king granted him the right to found a colony, and furnished him four ships and 280 colonists for his expedition. On New Year's Day, 1685, they came in sight of land, but their bearings had been too far to the W., and a landing was made in Matagorda Bay. The expedition wholly failed in its purpose. In 1698 the Count de Pontchartrain, Minister of Marine to Louis XIV., and his son Jérôme, Count de Maurepas, projected an expedition to colonize Louisiana, which was placed in charge of Pierre le Moyne d'Iberville. D'Iberville, with his younger brother, Jean Baptiste Le Moyne, Sieur de Bienville, made a landing at Pensacola Bay, which he found occupied by the Spaniards, whence he proceeded to explore Mobile Bay and the shores to the W. of it, and on Feb. 27, 1699, entered the mouth of the Mississippi and established a colony at Biloxi. Here the history of Louisiana really begins. For years Iberville, and after him his brother Bienville, maintained the infant colony against difficulties and embarrassments beyond the usual measure of colonial settlement. In 1718 he founded the city of New Orleans, named in honor of the Duke of Orleans, regent of France. In 1712 a royal charter granted Louisiana to a rich merchant, Antoine Crozat, as a trading establishment, but he surrendered his charter in 1718, and another was granted to the Company of the West, a monopoly under the control of JOHN LAW (*q. v.*), who obtained various privileges of trade and colonization, which, however, finally inured to the benefit of the colony. In 1722 Bienville was authorized to remove the capital from Biloxi to New Orleans, and in 1724 he was recalled to France. In 1731 Louisiana was declared a royal province; in 1733 Bienville was again made Governor, and in 1743, at his own request, he was relieved and returned to France after forty-five years of service to the colony. He was succeeded by the Marquis de Vaudreuil. In 1763 France, by the Treaty of Paris, surrendered to Great Britain all her territory E. of the Mississippi, except New Orleans and the adjacent district. On the same day, by a secret treaty, France ceded to Spain all the rest of her territory in America. When the latter fact became known in Louisiana the colonists sent petitions to the king imploring him not to expatriate them, but without avail. Noxious regulations, promulgated by Don Antonio de Ulloa, the Spanish governor, who landed in 1767, led to open revolt, a second petition to the king, and the sudden appearance of Count O'Reilly, lieutenant-general of the Spanish army, with a strong fleet and military force. New Orleans was seized, a Spanish code substituted for existing forms of government, and a year of tyranny ensued. O'Reilly was succeeded by Don Luis de Unzaga, who gave the colonists a mild and judicious administration from 1770 till 1777. He was followed by Don Bernardo Galvez, who, after the declaration of war by Spain against Great Britain, captured Baton Rouge, Natchez, Mobile, and Pensacola, and secured the surrender of all West Florida to Spain. In 1785 Miro became Governor, and in 1792 Baron Carondelet, who remained till 1797. The wealth and culture of the province were greatly increased under both of these administrations. From 1797 till 1803 Gayoso de Lemos, Don Francisco Bouligny, the Marquis de Casa Calvo, and Don Juan Manuel de Salcedo succeeded each other as Governors.

On Oct. 1, 1800, Napoleon made a secret treaty with Spain by which Louisiana was restored to France, with its former boundaries, and on Apr. 30, 1803, he sold the province to the U. S. for $15,000,000. The territory was formally transferred on Dec. 17 following; the part now known as Louisiana was organized by Congress as the Territory of Orleans on Mar. 26, 1804, and it was admitted to the Union as a State on Apr. 30, 1812. (For the military operations in Louisiana in the war of 1812–15, see NEW ORLEANS.) In 1845 a new constitution was adopted, abolishing the property qualification for voters and introducing other important features, including an anti-duelling clause, which was made more stringent in the constitution of 1852.

At the beginning of the civil war the importance of New Orleans as a strategical point was self-evident, and its possession was one of the earliest objects of the Federal Government. (For the naval operations, see FARRAGUT, DAVID GLASGOW, and PORTER, DAVID DIXON; for military operations, see BANKS, NATHANIEL PRENTISS; BUTLER, BENJAMIN FRANKLIN; and TAYLOR, RICHARD). During the reconstruction period New Orleans was the scene of long-continued excitement, of conflicts between the White League and the metropolitan police, and of Federal military intervention. In 1877 President Hayes withdrew the support of the U. S. troops from the State government, headed by Stephen B. Packard, whereupon the government, headed by Francis T. Nicholls, assumed the administration of State affairs. In 1879 a new constitution was adopted, the chief provisions of which are given above. In this year also JAMES B. EADS (*q. v.*) completed his jetties in the South Pass, which have opened

the mouth of the Mississippi to vessels of the heaviest draught. The levees, which had been greatly neglected and broken, were taken in hand, and much progress was made; but in 1882 a great flood produced 284 crevasses, and swept away 56 miles of levees. Unusual efforts were, however, put forth by the localities directly affected and the State, and aid was liberally given by the U. S. Government, so that in the flood of 1890, which was higher than that of 1882, in 1,100 miles of levees there was only a breakage of 4½ miles. In 1878 4,000 persons died of yellow fever in Louisiana. This was the last epidemic. A sanitary system of disinfection of vessels was established by Dr. Joseph Holt at the quarantine station at the mouth of the Mississippi river, which has since effectually excluded this pestilence, and is considered the best in the world. In 1884 a centennial exposition, to celebrate the export of the first shipment of cotton in 1784, was held in New Orleans. Though its glories pale before those of the World's Columbian Exposition, and the season was the most unpropitious on record, it contained notable features and had valuable results. In 1891 a very bitter political contest occurred over granting a renewal of charter to the Louisiana Lottery Company. When the U. S. Government refused the use of its mails to the lottery company, that corporation withdrew its offer to pay a large sum for its privileges, and the anti-lottery party elected its candidates.

GOVERNORS OF LOUISIANA.

Territory of Orleans.	
W. C. C. Claiborne	1804–12
State.	
W. C. C. Claiborne	1812–16
Jaquez Villere	1816–20
Thomas B. Robertson	1820–24
H. S. Thibodeaux (acting)	1824
Henry Johnson	1824–28
Peter Derbigny	1828–29
A. Bauvais (acting)	1829–30
Jacques Dupre (acting)	1830–31
Andre B. Roman	1831–35
Edward D. White	1835–39
Andre B. Roman	1839–43
Alexander Mouton	1843–46
Isaac Johnson	1846–50
Joseph Walker	1850–53
Paul O. Hebert	1853–56
R. C. Wickliffe	1856–60
Thomas O. Moore	1860–62
George F. Shepley	1862–64
Michael Hahn	1864–65
James M. Wells	1865–67
Benjamin F. Flanders	1867–68
Joshua Baker	1868
Henry C. Warmoth	1868–72
J. McEnery (claimant)	1872
Wm. Pitt Kellogg (*de facto*)	1872
Wm. Pitt Kellogg	1872–77
Stepheu B. Packard	1877–78
Francis T. Nicholls	1878–80
Louis A. Wiltz	1880–81
S. D. McEnery	1881–88
Francis T. Nicholls	1888–92
Murphy J. Foster	1892–96
Murphy J. Foster	1896–1900
William Wright Heard	1900

AUTHORITIES.—The earliest history of Louisiana is that of Le Page du Pratz, who lived in the colony in 1717 (London, 1774). For original authorities, see Pierre Margry's *Mémoires et Documents* (6 vols., Paris); also *Notes et Documents*, in MSS., belonging to the Louisiana Historical Society; and B. F. French's *Historical Collections of Louisiana*. The most extended history is that of Charles Gayarre (4 vols., New Orleans, 1879), which is very full as far as 1815, and contains the annals of Louisiana to the civil war. Another valuable work is F. X. Martin's *The History of Louisiana from the Earliest Period* (2 vols., New Orleans, 1827). It extends to 1815. The latest work is *A History of Louisiana*, by Grace King and J. R. Ficklen (New Orleans, 1893). For complete bibliography of works on certain periods of Louisiana history, see *Narrative and Descriptive History of America*. WILLIAM PRESTON JOHNSTON.

Louisiana: city; Pike co., Mo. (for location of county, see map of Missouri, ref. 3–I); on the Mississippi river, and Burl. and the Chi. and Alton railways; 115 miles N. W. of St. Louis. It is in a fruit-growing and lumber region; has steam flour, planing, and lumber mills, machine-shops, tobacco-factories, stone-quarries, lime-works and nurseries, and contains McCune College (Baptist, opened 1880), high school, public-school library, gas and electric light plants, and a weekly and two semi-weekly newspapers. Pop. (1880) 4,325; (1890) 5,090; (1900) 5,131. EDITOR OF "PRESS."

Louis le Débonnaire, loo'ee'le-dā'bō'nār', or THE PIOUS: Roman emperor from 814 to 840; b. at Casseneuil in 778; a son of Charlemagne by his third wife, Hildegard. His elder brothers having died, he succeeded his father Jan. 28, 814, and the first years of his government were quite successful, but in 817 he yielded to the wishes of his sons, and gave each of them a share in his dominions, and hence arose complications which resulted in the dissolution of the empire. Lothaire received Austrasia and the title of emperor; Pepin, Aquitania; and Louis, Bavaria, Bohemia, and the Avarian districts on the eastern frontier. Bernard, a nephew of Louis, who had inherited Italy after his father, received nothing, and revolted, but the emperor allured him to Châlons, took him prisoner, put out his eyes, and gave Italy to Lothaire. As soon as done the atrocity of the deed struck the mind of the emperor with horror; he went to the Church to be comforted, and from this period he was merely a tool in the hands of the clergy. In 819 he married a second wife, Judith of Bavaria. In 823 she bore him a son, Charles, who later received the surname of THE BALD, and in 829 he proposed to undertake a new division of the empire in favor of his youngest son. The three elder brothers were unwilling to lose anything, and a war broke out which, often stilled, always reopened, and lasted to the death of the emperor. Twice the father was defeated, taken prisoner, deposed, and subjected to various indignities by his three sons, but both times the avarice and ambition of Lothaire, who wished to reign alone, disunited the brothers, and Louis and Pepin again raised their father to the throne. Pepin died in 838, and the emperor proposed to give his dominions to Charles the Bald, thus excluding his sons from their inheritance; but when he at the same moment gave Italy and Austrasia to Lothaire and nothing to Louis, the latter revolted immediately, together with the sons of Pepin. During this war the unhappy emperor died at Ingelheim, near Mentz, June 20, 840, and was buried at Metz.

Louis Napoleon: See NAPOLEON III.

Louis Philippe: King of the French from the revolution of July, 1830, to that of Feb., 1848; b. in Paris, Oct. 6, 1773; the eldest son of Duke Louis Philippe Joseph of Orleans, known as Philippe Égalité. From his father and governess (Madame de Genlis) he imbibed the revolutionary ideas of the period, entering the National Guard and the Jacobin Club, and renouncing his titles for the name of Citizen Égalité. He greatly distinguished himself as General de Chartres in the battle of Jemappes, and, what is not so well known, made the journey to Paris to dissuade his father from voting for the death of Louis XVI. Though the edict which banished the Bourbon family exempted him and his father, his position became difficult, especially as his commander, Dumouriez, was suspected by the Convention of intriguing to place him on the throne. Orders of arrest were issued both against him and Dumouriez, and on Apr. 4, 1793, they fled across the Austrian frontier. For more than twenty years he was an exile, often contending with very hard circumstances, as shortly after his flight his father was executed, his mother banished from France, and all the property of the family confiscated. He lived for some time in Switzerland, where he taught mathematics in a school; passed some time traveling in the north of Europe; lived from 1796 to 1800 in the U. S.; from 1800 to 1807 at Twickenham near London; and after 1809 at the court of Ferdinand I. of Sicily, whose daughter, the Princess Marie Amélie, he married. He twice attempted to join the adherents of the Bourbon family in Spain, but was both times foiled by British diplomacy. After the fall of Napoleon he returned to Paris, was reinstated in the possession of the immense property of the Orleans family, taking up his residence in the Palais Royal; but, although a reconciliation had taken place between him and the elder line of the Bourbon family, the king, Louis XVIII., disliked, suspected, and feared him. The Duke of Orleans, as was now the title of Louis Philippe, was a man of great gifts and of great attainments, eloquent, accomplished, fascinating, with vivid instincts and large views, shrewd and sound in his judgment of persons and things. Alexander of Russia marked him out as the most prominent member of the Bourbon family, and although he lived in a rather retired manner in Paris and took very little part in politics, he soon became very popular. On the outbreak of the revolution of July, 1830, the Chamber of Deputies, after deposing the king, chose him lieutenant-general of the realm, Charles X. recognizing him as such and hoping through him to preserve the throne for the Count of Bordeaux. Whether this could have been done is doubtful; the crown was offered by the Chamber of Deputies to Louis Philippe, who accepted it, though henceforth he was considered by the pure legitimists disloyal to the cause of legitimacy. His reign of eighteen years shows a series of commonplace events, but France received some substantial benefits from his government. The foundation of the kingdom of Belgium, which protected the northern frontier, and the conquest of the large and beautiful colony of Algeria are among the most notable, and may well be set off against what have been considered the reproaches of his reign. Louis Philippe

was both a statesman and a shrewd administrator, but his government was too little in sympathy with the feelings of the French people; many causes of discontent arose, accompanied with charges of corruption in the ministry. An extension of the elective franchise was demanded. Resisted by the king, the revolution broke out which deprived him of his throne and banished him from the country. As the revolution was without adequate reason, it paved the way for lawlessness and discontent and the consequent advent of Napoleon III. D. at Clermont, near London, Aug. 26, 1850. The best authorities on the reign are Guizot, *Memoirs*; Blanc, *History of Ten Years*; Hillebrand, *Geschichte Frankreichs*; Lamartine, *History of the Revolution of 1848*; Normanby, *A Year of Revolution*.

Revised by C. K. Adams.

Louis the German (Germ. *Ludwig der Deutsche*): b. about 805; a son of the Emperor Louis le Débonnaire; received by the first division of the empire of Charlemagne (in 817) Bavaria and the Slavic countries on the eastern frontier, but by the treaty of Verdun in 843, which ended the war between the heirs of Louis le Débonnaire, he obtained the whole territory E. of the Rhine, and became the founder of the German empire. Invited by the discontented vassals of Charles the Bald, he broke into France in 858, and conquered the country, but the difference between the Eastern and Western Franks—that is, between the Germans and the French—were at this period so great that a union of the two tribes proved impossible, and Louis was compelled to give up his conquests. Against the Bulgarians in the southeast and the Normans in the northwest he fought with valor, though not always with success; the bishopric founded at Hamburg in 834 he was compelled to remove to Bremen in 858, as the pagans burned down the former city. After his death in 876 his sons divided the empire between them.

Louis the Great: King of Hungary from 1342 to 1382; b. 1326; a son of Charles Robert of Anjou; was one of the most successful of the elective monarchs of that country. Although he failed in his expeditions to Naples for the purpose of avenging his brother Andrew, who had been murdered by his wife Joanna, Queen of Naples, he extended the boundaries of Hungary to the S. E., and united Poland to it on the death of Casimir the Great in 1370. He expelled the Jews, but by decreasing the duty on merchandise he greatly encouraged the commerce of the country. On the general development of civilization in his realm he exercised great influence. He founded a rich college in Fünfkirchen, and Buda became one of the most splendid capitals of Europe. D. in 1382.

Louisville: the chief city of Kentucky and capital of Jefferson County; situated at the falls of the Ohio river, in lat. 38° 15′ N., and lon. 8° 45′ 52″ W. from Washington (for location, see map of Kentucky, ref. 3-G).

Situation and Area.—The city has an area of 20.28 sq. miles. It stands on the south bank of the river, 441 feet above sea level, 70 feet above low water, and beyond the reach of hurtful inundations, in a rich agricultural country, kept perennially productive by the decay of underlying Silurian and Devonian rocks, and within easy reach of inexhaustible forests of timber and mines of coal and iron.

Plan and General Appearance.—Viewed from the Indiana shore its river-front presents a graceful crescent, 8 miles in length, and from a central elevation on its northern boundary the perspective of broad streets lined with handsome houses and beautiful shade-trees for 4 miles to the S. is very striking. Its plan is that of a series of named streets parallel with the river from E. to W., and numbered streets cutting them at right angles from N. to S. Except Broadway, which is 120 feet wide, and Main, Market, and Jefferson, each of which is 90, nearly all of the streets are 60 feet wide. They are well paved with granite blocks or asphaltum, and electric cars run to all parts of the city.

Louisville is one of the most healthful cities in the world. The death-rate in 1900 was 15.52 to the thousand, and it has not been more in a long series of years, while in some years it has been much less.

Parks and Squares.—The original plan of Louisville embraced parks and public squares, but the early trustees sold all of them except enough for the court-house and jail. In 1892 a wiser policy prevailed, and grounds were purchased for parks and public squares. In the E. is Cherokee Park, containing 333 acres; in the W., Shawnee Park with 167 acres; and in the S., Iroquois Park, embracing 673 acres. Shawnee Park is a level plain on the bank of the Ohio, Cherokee Park is riven by waterways into plains, undulations, and ravines, and Iroquois Park is richly wooded. Baxter and Boone Squares and Kenton and Logan Places are in the thickly settled parts of the city.

Public Buildings.—A characteristic of the buildings is the ample ground on which they stand and the shade-trees which adorn the grounds of the private residences. The court-house in the Doric, the city-hall in the Renaissance, and the post-office in the mixed style of architecture are imposing structures. Among the more notable buildings may be mentioned the Columbia building, the American National Bank, the Louisville Trust Company, the Louisville Medical College, and the Lonisville Male High School.

Churches.—Louisville has 212 churches. Of these the Baptists have 56, the Disciples 14, the Episcopalians 17, the Evangelical Associationists 11, the Israelites 6, the Lutherans 8, the Methodists 39, the Presbyterians 23, the Roman Catholics 28, the Spiritualists 4, Unitarians 2, and the Christadelphians, Seventh-day Adventists, United Brethren in Christ, and Congregationalists one each. Some of them, especially the Warren Memorial, the Calvary, St. Paul's, the Cathedral, and the Broadway Baptist, are fine specimens of ecclesiastical architecture.

Education.—The city maintains 55 public schools in large brick buildings, attended by 27,000 pupils, at a cost per year of $608,774. The male and the female high schools are really colleges of a superior order. Others are the Normal School and a manual training-school. There are as many private schools as public. There are also 8 medical colleges, 4 theological seminaries, a law school, a school of dentistry, 2 schools of pharmacy, an art school, a number of music salons, and various other schools. The State school for the blind is located here. Attached to it is the Printing House for the Blind, supported by a Federal appropriation. It prints books for all the institutions for the blind in the Union.

Libraries.—The only public library is that of the Polytechnic Society, which has about 50,000 volumes. There are however, such libraries as that of the Baptist Theological Seminary, the Louisville Law School, and the medical department of the University of Louisville, which almost serve the purposes of public collections. There are several large and valuable private libraries, one of which has 50,000 books, pamphlets, periodicals, maps, and manuscripts.

Hospitals, Asylums, etc.—Louisville is well provided with hospitals, asylums, infirmaries, orphanages, homes, etc., having no fewer than thirty-five.

Finance.—The property within the city limits was assessed for 1901 at $124,100,000. A tax-rate of $1.50 per $100 laid on this sum yields $1,733,056.50 net for the expense of the city government. In addition to this tax a considerable sum is raised from licenses, etc., for the sinking fund. This income, added to the cash assets already accumulated in the sinking fund, to the amount of $1,087,202, enables it to meet the annual interest of the bonded debt of the city, amounting to $8,206,000, and to liquidate the principal as it falls due.

Manufacturing and Business Interests.—The census of 1890 showed that 1,622 manufacturing establishments (representing 131 industries) reported. These had a combined capital of $30,542,947; employed 24,807 persons; paid $11,034,028 for wages and $22,879,000 for materials; and had products valued at $45,452,209. In one year the Dennis Long Foundry uses 90,000 tons of iron in making water and gas pipes; the Avery Works manufacture 400,000 plows; the Kentucky Works make 30,000 wagons; and the Ballard Mills make an average of 1,000 barrels of flour each day. The tanners use in a year 320,000 Kentucky hides, out of which they make 12,800,000 lb. of leather, with Kentucky bark; the distillers make 28,000,000 gal. of Bourbon whisky; the mills make 2,000,000 barrels of hydraulic cement; the looms weave 7,500,000 yards of jeans; and the warehouses handle 175,000 hogsheads of tobacco.

There are thirteen banks with a capital of $6,373,600, a surplus of $2,679,500, and an average daily deposit of $31,194,780. There are also 3 trust companies with a capital of $2,806,100 and a surplus of $1,034,400.

Means of Communication.—Three bridges across the Ohio connect Louisville with the neighboring cities of Jeffersonville and New Albany; and a canal around the falls, 2½ miles long, removes all serious obstructions to the navigation of the Ohio river. Its position on the bank of the Ohio connects it with 2,000 miles of navigable rivers in Kentucky, and 33 navigable rivers in the Mississippi valley. The five railways that enter it on the Kentucky side give it connec-

tion with 3,629 miles of railway in this State, while the five that enter it from the Indiana side extend its connections to the great railway system of the U. S.

History.—On May 27, 1778, Gen. George Rogers Clark, on his way to the conquest of the Illinois country, landed on a little island in the Ohio river, at the falls, forty-nine white men, women, and children, and one Negro, who had come on his boats from Redstone as emigrants to Kentucky. In the fall of 1778 and the spring of 1779 these families moved from the island to the shore, and on Apr. 17, 1779, with others who had joined them, established the town of Louisville, and placed it under the government of seven trustees. The Legislature of Virginia, in whose county of Fincastle the new town was located, passed an act which took effect May 1, 1780, recognizing this town of Louisville and giving it corporate existence. The town continued to be governed by trustees until 1828, when the Legislature of Kentucky granted it a charter, which lodged the governing power in a mayor and council. This first charter lasted until 1851, when it was superseded by a second, and this second, in 1870, was abolished by a third. A fourth charter which made radical changes in all previous organic law went into effect under the new constitution of Kentucky in 1892. By it was inaugurated a board of public works and a board of public safety, which will take much of the power of the city heretofore vested in the mayor and council.

Population.—The U. S. census of 1790 does not give the population of Louisville, and that of 1800 gives it only 359. Its population from other sources is reliably estimated at 100 in 1780, and 600 in 1800. The census of 1830 gives it as 10,341, of 1880 as 123,758, of 1890 as 161,129, and that of 1900 as 204,731, an increase over that of 1890 of 27.06 per cent. In 1890 it was the twentieth city in population. In 1900 it was the eighteenth. J. Stoddard Johnston.

Lounsbury, Thomas Raynesford: scholar and author; b. at Ovid, N. Y., Jan. 1, 1838. He graduated at Yale in 1859, and was engaged upon *The American Cyclopædia* until 1862. In the latter year he was commissioned first lieutenant in the 126th Regiment of New York Volunteers, and served until the close of the civil war. In 1870 he was appointed instructor and in 1871 Professor of English in the Sheffield Scientific School of Yale University. Among his publications are editions of Chaucer's *Parliament of Foules* (1877); a biography of James Fenimore Cooper (1883); a *History of the English Language* (1879); and exhaustive *Studies in Chaucer* (3 vols., 1892). H. A. Beers.

Lourdes, loord: a town of the department of Hautes-Pyrénées, France; the capital of a canton, the seat of the civil court of the arrondissement of Argèles; 12 miles S. W. of Tarbes, on the Gave de Pau (see map of France, ref. 9–D). Marble and slate quarries are extensively worked in the vicinity. The town is chiefly noted for the grotto of Massavielle, in which Roman Catholics believe the Virgin Mary revealed herself frequently in 1858 to a peasant girl. A large church has been built above the grotto, and the place is visited by pilgrims from all parts of the world. The town has considerable trade in rosaries and in the water of its miraculous fountain. See Zola's *Lourdes* (Paris, 1894). Pop. (1896) 7,758.

Lourenço Marques, loo-ren'sō-maar'kās: the most southern settlement of the Portuguese in East Africa (see map of Africa, ref. 9–G). The present town was founded (1867) on the site of an old village of the same name on Delagoa Bay, which affords the best harbor on the east coast S. of Zanzibar. It is a regular port of call for steamers from Lisbon, Hamburg, and Dartmouth, is connected with Europe by the cable laid along the East African coast, and is the terminus of the Delagoa Bay and East African Railway, completed in 1887 to the Transvaal frontier, 57 miles, and extended by the South African Republic, 200 miles farther west to Pretoria, in the summer of 1895. C. C. Adams.

Louse [M. Eng. *lous* < O. Eng. *lūs* : O. H. Germ. *lūs* > Mod. Germ. *laus*, louse]: any wingless insect that infests animals or plants. The plural of louse is Lice (*q. v.*).

Louth, lowth: county; in the province of Leinster, Ireland; bounded E. by the Irish Sea and S. by the Boyne. Area, 316 sq. miles. The surface is mostly level or slightly undulating, except in the northern part, where it is traversed by a mountain range ending in Mt. Carlingford, 1,935 feet high. Wheat, oats, barley, and potatoes are raised, and cattle of a good breed are reared. Pop. (1891) 71,038. The seacoast is mostly low and sandy. The most important rivers are the Fane, Lagan, Glyde, and Dee, all of which flow eastward. The principal towns are Drogheda and Dundalk.

Louvain, loo'văñ' (Flem. *Leuven*; Germ. *Löwen*; anc. (Lat.) name *Lova'nia*): city of Belgium; in the province of Brabant, on the Dyle; 19 miles by rail E. of Brussels (see map of Holland and Belgium, ref. 10–E). In the fourteenth century it had 200,000 inhabitants, and was one of the largest manufacturing cities in the world, employing 15,000 workmen in cloth-manufacturing alone, but its attempt to vindicate its independence with the other towns of Flanders was defeated, and it lost most of its wealth and importance. In the sixteenth century its university, attended by 6,000 students, was one of the first scientific institutions in Europe, celebrated especially for its department of Roman Catholic theology, but during the French Revolution the university was suppressed, and although it was reconstituted in 1817 it has not regained its past glory. It has about 1,600 students. Many buildings attest the former splendor of the city; as, for instance, the town-hall, one of the richest existing structures of Gothic architecture, and the cathedral. Generally speaking, Louvain is a quiet place, but it has important breweries, bell-foundries, paper-mills, and tanneries. Pop. (1891) 40,698.

Louverture, or **L'Ouverture**, Toussaint: See Toussaint Louverture.

Louvet de Couvray, loo'vā'de-koov'rā', Jean Baptiste: politician and author; b. in Paris, June 11, 1760; received a very insufficient education, and was clerk in a bookseller's store when his romance, *Les Aventures du Chevalier Faublas* (13 vols., 1787–89), suddenly made him famous. In 1790 followed another romance, *Émilie de Varmont*, dealing with the question of divorce—less frivolous than *Faublas*, though more radical. Under the ministry of Roland he began the publication of a periodical, *La Sentinelle*, noted for its violent attacks on royalty. Having been elected a member of the Convention, he proved one of the greatest orators of that assembly. He attacked Robespierre with eminent courage as the originator of the September massacre, but after the defeat of the Girondists, his allies, he was compelled to flee and to hide himself till the fall of his great antagonist. He then returned to the Convention, and was member of the Council of Five Hundred. He had made many enemies, however, and these attacked him with great virulence, both in his public career and in his private life. An especial handle against him was made of his relations to a beautiful woman, whom he called Lodoiska, who deserted her husband for him, and whom he subsequently married. Before he died he wrote an autobiographic account of the most perilous part of his life: *Quelques notices pour l'histoire et le récit de mes périls depuis le 31 mai, 1793* (1795). D. Aug. 25, 1797. His wife, who was much devoted to him, attempted to poison herself, but was saved.

Revised by A. R. Marsh.

Louvois, loo'vwăa', François Michel le Tellier, Marquis de: statesman; b. in Paris, France, Jan., 1639; bought the right of succeeding his father in the office of Secretary of War; applied himself with great energy and assiduity to the study of all the details of the business, and took charge of the whole department in 1668; in a few years created the largest, most effective, and most brilliant army modern Europe had seen, introduced perfect discipline, established regular grades of rank in the command, and gave each of the different arms its perfect development by founding separate schools of engineering, artillery, and cavalry. His genius showed itself still more brilliantly when this army came to be used in war. All its movements were accomplished with an order, rapidity, and precision which doubled its effect and led to astonishing successes. He was extremely ambitious; to keep himself in office, and to make his office the most important in the kingdom, was his sole aim, and the advice, political and military, which he offered in the king's council was exclusively governed by this aim, often to the great detriment of the country. Still more detestable were the means he applied. The devastation of the Palatinate, one of the greatest barbarities of modern times, was his plan, as also the idea of using dragoons for converting the Huguenots. After the death of Colbert in 1683 he also assumed the administration of the finances, but, knowing no other expedients than extortions and loans, he soon ruined the finances and exhausted the country. The last years of his life were spent in great anxiety. He had become very exacting and overbearing, and the king, who was

easily irritated by any want of submission, treated him coldly and even slightingly; and had just made up his mind to throw Louvois into the Bastile when the latter died suddenly, July 16, 1691.

Louvre, loovr, **The** (transl. of Fr. *Palais du Louvre*): an ancient palace of the Kings of France, which throughout the nineteenth century has been used chiefly as a museum of art, in Paris, close to the north bank of the Seine. Throughout the Middle Ages the Louvre was a strong castle, which owed its chief character to the Kings Philip Augustus and Charles V. Francis I. destroyed the old keep, and his successors began and carried on a structure on all sides of a square court, and four times the size of the old castle, besides some galleries carried southward and westward along the river. The palace of the Tuileries stands a third of a mile farther W., and the kings from Henry IV. on were always aiming at the extension of the one building to connect with the other, but this was difficult on account of the crowd of small houses, churches, and narrow streets which were in the way, and it was only completed under Napoleon III. During the Communist revolt of 1871 the buildings of the new galleries were very seriously damaged by fire.

The museum of the Louvre is the most extensive and varied of Europe. It includes almost everything that has ever been considered material for a public collection of works of art; paintings both ancient and modern, and in immense number and great variety of schools and epochs; a splendid collection of drawings by the greatest masters; sculpture, Egyptian, Assyrian, Greek (though not very rich in this), Roman and Græco-Roman, mediæval, Renaissance, post-Renaissance, and modern; Greek and Etruscan vases in great numbers; vases and cups of rich material and in splendid mountings (the finest collection in the world); an immense Egyptian collection; majolica, carved wood, bronze, ivory, furniture, and tapestries. It is open free every day in the year except Mondays, when the galleries are closed for cleaning. The catalogues are very incomplete, but some of the volumes are of great utility as books of general reference. RUSSELL STURGIS.

Lovat, SIMON FRAZER, Lord: b. in Scotland about 1667, grandson of the ninth and cousin of the tenth lord, by whose will he succeeded to the title and estates; but in order to strengthen his title he endeavored to get possession of the sister of the late lord, and failing in the attempt seized upon the widow, whom he compelled to marry him. These daring acts provoked reprisals, and Lord Lovat was for several years obliged in self-defense to maintain an attitude of insurrection against the constituted authorities. On the accession of Queen Anne he was outlawed and forced to flee to the Continent, where he led a mysterious life for twelve years. On the outbreak of the Jacobite insurrection of 1715 he was invited by his clansmen to espouse that cause, but preferred to take the opposite course, inducing them to follow his guidance, for which service he was restored to his estates. In the insurrection of 1745 he sent his clan under his son to fight for the Pretender, while he protested his own loyalty to the house of Brunswick. This double dealing was unsuccessful, and made him especially obnoxious to the Government, which brought him to trial for treason, and he was executed on Tower Hill, London, Apr. 9, 1747.

Love [Anglo-Sax. *lufe*; Germ. *Liebe*]: the sentiment or emotion of strong attraction toward persons or other animate things. Psychologists divide the great movements of the emotional life into two great classes called respectively emotions of attraction and emotions of repulsion. The popular word "love" covers the former, as "hate" covers the latter.

Theories of Attractive Emotion.—Two great classes of theories have arisen having reference especially to the explanation of personal attachment or love. The *first* of these, led by Prof. Bain (*Emotions and Will*, 3d ed. New York, 1888), holds that the origin of all attachment is sexual, that all love arises by association, through many refining indirect influences, of the object of attachment with the reproductive impulse. This theory is open to very evident objections. In the first place, it is difficult to see how the reproductive instinct itself could have arisen except on the basis of earlier sensibility to attractive qualities in other individuals. Again, the phenomena of emotions of attraction generally extend into the ideal life so thoroughly, and these sentiments attach so directly to objects with which no sexual association can be traced, that all presumptions are in favor of the *second* general view, i. e. that emotions of attraction and repulsion represent the opposite modes of reaction of the organism and of consciousness upon all objects which are pleasure or pain giving. These emotions then become exponents of the value of certain objects in experience, both physical and mental, and of course the reproductive life which dictates a large part of what may be called sensuous attractiveness is included in this formula. Consequently the phrase *expressive* emotion serves best to distinguish all the feelings of this class. They are an expression of the reaction or behavior of consciousness when given objects are presented. They represent the reactive, outgoing side of consciousness, as the affective emotions or feelings of self represent the receptive or reflective side.

Looked at from this point of view, emotions rest upon impulses and exhibit the two great directions which appear in impulse, i. e. toward or from an object as fitted to satisfy, or the contrary. Careful distinction in terminology—more careful and exact, no doubt, than the facts warrant—gives over the active, impelling factor in a state of high emotion to IMPULSE (*q. v.*), and reserves for emotion only the mental excitement, agitation, felt disturbance of consciousness. This, at any rate, serves to cover both aspects of the case, and gives us a terminology which may be consistently maintained.

It is in view, therefore, of the direction of the impulses which the expressive emotions accompany that emotions of love are distinguished from emotions of hate.

The Development of Emotions of Attraction and Repulsion.—Under the general head of attraction we may include all tendencies toward an object or individual, or satisfaction in its presence; from the slight feeling of approval to the boisterous expression of social enjoyment, or to the quieter but stronger movings of affection and love. The progress of this emotion in degree and closeness of attachment is an interesting and typical chapter in the natural history of feeling.

Beginning with interest, an object becomes attractive as it comes into clear relation with one's self. Both simple association, by its egoistic reference, and increasing knowledge of attractive qualities in the person or thing in question tend to increase its attracting force. Further, any effort which may have been put forth in connection with such an object increases its hold upon us, and, by strengthening our interest, makes its presence a matter of need. We get interested in persons by assisting them.

In this increased attractiveness of an object, however, we discriminate clearly between persons and things. Familiarity with things always leads to *attachment* to them simply by association and interest. If the thing is useful we become further attached to it; if it turn out useless, we simply neglect it; but it still has its place in its interesting environment. Things never arouse in us the opposite, repellent emotion except by some kind of association with persons.

In the case of persons, on the other hand, the simple attachment which now becomes, in its earliest form, *admiration*, passes over, on further acquaintance with the person, into a more positive and vigorous emotion. Strengthen the ties of association and self-relation (kinship, partnership, etc.) sufficiently and the emotion of attachment becomes *affection* and *love*. There is a line in the growth of the emotion of attraction beyond which all revelations of character or action, however damaging, only deepen and strengthen the earlier tie; but if this line has not already been reached when damaging discoveries are made—if the attractive emotion has only reached the stage of admiration arising from intellectual interest and casual association—then there comes a revulsion to emotion of repulsion.

Around these three stages in the growth of emotions of attraction the varieties of such feelings may be grouped. *Admiration*, the feeling of deep interest in persons, is *veneration* when its object is elderly, superior, or of high rank; *awe* when it is obscurely grand and imposing. *Attachment*, the feeling of close association with and dependence upon persons and things, has distinct colorings when felt toward inanimate objects, animals, inferior or superior persons, etc. *Affection*, the feeling of profound attraction toward persons, arising from the deeper ties of family or common life interests, parallel opinions and aims, or congenial dispositions, takes on innumerable forms known by name as distinct emotions—feelings of *confidence*, *patience*, *security*, *help*, *congratulation*, *self-surrender*, *self-denial*, *tenderness*—in short, all the infinite emotional phases of past, present, and future reference which poets have sung and women have

felt since one human heart first learned to enlarge its borders to include another. It is the important function of fiction and the drama to depict the subtle movements of such emotions and the social situations to which they give rise. Sympathy is also an interesting and extremely important element in the whole development.

The repelling impulses also supply us with a group of emotions of enormous range and importance. What has been said about the development of the feeling of attraction applies with some modification to this class also. Simple interest and some knowledge is necessary to induce the feeling of *unattractiveness* in the first instance; it grows to be *objectionableness* in things (mainly) or persons. The feelings toward things do not pass into stronger emotion except through association with persons; but with persons it passes into *distaste*, a positive feeling which becomes intense in *abhorrence*. At any stage, except that of extreme repulsion, an attracting motive—kinship, pride, intellectual admiration, etc.—may assert itself so strongly as to cause a revulsion of feeling over to the attractive side; and attachments thus formed are often most lasting and intense.

Many modifications of the so-called feeling of *objectionableness* might be mentioned: feelings of *inferiority*, of *poor breeding*, of *bad faith*, *disdain*, *distrust*, etc. So positive *distaste* may take form as *impatience*, *scorn*, *rebellion*, *impertinence*, *malice*, *vengeance*, *present fear*, *anger*, *hatred*, etc.; and *abhorrence* has varieties in *detestation*, *contempt*, *disgust*, *loathing*, etc. Cf. Baldwin, *Handbook of Psychology*, vol. ii., pp. 180 ff.

Social Considerations.—The importance of this topic in its social bearings has never been overlooked. It is evident that in theory love must be viewed very largely as the expression of instinct. Recent Italian writers (Lombroso, Forri, Mantegazza) have developed the theory that woman is in her constitution less developed than man, and so more instinctive. While woman's love is undoubtedly more instinctive than man's, it is also more ideal. Men calculate more—that is, are more reasonable—in the life of affection; but just in so far the claim of lower indulgence is more apt to be recognized by them. This is shown both by the fact that men make more suitable marriages as respects wealth, social standing, etc., and by the fact that they are oftener than women faithless to the tie of matrimony. The instincts by which women are moved in this matter are generally those which respond to moral character, calls for sympathy, pity, and direct service or self-denial, while among the "reasonable" considerations which appeal to men the claims of social or personal self-indulgence are more apt to be influential. At the same time it seems to be proved that in women in whom the ideal instincts of refined affection are weak the lower life of passion reveals itself in greater excesses of moral degradation. It seems also to be true that the restraints of a purely social kind—public opinion, custom, etc.—are stronger with men. Woman is more a law unto herself, more whimsical, impulsive, independent—and unreasonable. The deeper social problems which arise about this class of sentiments will probably be among the gravest questions of the future, both to social reformers and to religious teachers.

References.—On the general nature of these emotions, see the "general works" cited under Psychology. On the social side, Plato, *Republic*; Ibsen, *Collected Plays*; Mantegazza, *Fisiologia di Amore*; Lombroso, *La donne delinquente*.

J. Mark Baldwin.

Love-bird: a popular name for the small Old World parrots of the genus *Agapornis*, given them on account of their affection for one another. They are among the smallest of the parrots, being only 5 or 6 inches in length.

Love, Courts of: institutions of mediæval France, in which offenses against the laws of chivalric love were tried before judges (generally ladies), whose decisions were binding upon all knights, and upon the ladies in whose service they were. The belief in the existence of such courts has been prevalent since the appearance in 1575 of the pleasant, fantastic book of John of Nostradamus (brother of the famous impostor Michael Nostradamus), entitled *Les vies des plus célèbres et anciens poètes provensaux, etc.* This work first called the attention of the post-Renaissance world to the poetry of the troubadours, and its popularity was widespread. Its entire untrustworthiness, however, made it a most fruitful source of all kinds of fantastic notions about the French Middle Ages. Perhaps no other of these notions has been so generally accepted as that of the courts of love. For a long time there was no question as to their reality, and even when in the rationalistic eighteenth century some few scholars doubted them on grounds of inherent improbability (cf. Abbé de Sade, *Mémoires pour la Vie de François Pétrarque*, vol. ii., p. 44, n., and p. 60, n. (3 vols., 1764–67), and also *The Plays of Philip Massinger*, ed. by W. Gifford, 1805, introductory note to *The Parliament of Love*, vol. ii., p. 235), still no one made a critical examination of the evidence with a view to disproving their existence. It was still possible for the President Rolland, in his *Recherches sur les prérogatives des Dames chez les Gaulois, les Cours d'Amours, etc.* (1787), to treat them as indubitable, and for von Aretin, in his *Aussprüche der Minnegerichte, etc.* (1803), to give as authentic a collection of decisions pronounced in them. Indeed, they seemed gradually to be gaining in substantiality. In 1817 Raynouard published in the second volume of his famous *Choix des poésies originales des Troubadours* (p. lxvii., *seq.*) an essay upon them, in which he made use of new and seemingly conclusive documents in their favor, notably the Latin treatise of a certain André, a chaplain at the French royal court in the twelfth century, entitled *Liber de arte amandi et de reprobatione amoris*, which contains a large number of judgments purporting to have been given at such courts, presided over by Eleanor of Aquitaine (later wife of Henry II. of England); her daughter, Marie, Countess of Champagne; Ermengard, Viscountess of Narbonne; the Countess of Flanders; and ladies of Gascony. The first serious note of critical protest came from the great scholar Friedrich Diez (*q. v.*), who in his essay *Ueber die Minnehöfe* (1825) undertook to destroy the whole fabric raised by Raynouard and his predecessors. He concluded that courts of love in a formal sense had never existed; that the work of André le Chapelain was composed in the fourteenth instead of the twelfth century; and that the most that can be admitted is that in Provence and France it was a social diversion to discuss questions of amorous casuistry in the manner in which the contemporary theologians were disputing about points of philosophy. Quarrels of lovers also, he thinks, were at times submitted to the arbitration of others. The formal spirit of the time gave the conclusions or decisions thus arrived at the appearance of judicial decrees. Since the publication of this work of Diez, many scholars have occupied themselves with the question, notably Trojel, in his *Middelalderens Elskovhoffers* (Copenhagen, 1880); Gaston Paris, in the *Journal des Savants* (1888); Pio Rajna, *Le Corti d'Amore* (Milan, 1890); Vincenzo Crescini, *Per la questione delle corti d'amore*, Padua, 1891 (extract from vol. vi. of the *Atti e Memorie* of the Academy of Padua). In its main lines, however, Diez's conclusions have remained firm. It has been shown conclusively that on certain points he was in error, the chief being his view of the date of the treatise of André le Chapelain. (Cf. P. Rajna, *Tre studj per la storia del libro di Andrea Cappellano*, in *Studj di Filologia Romanza* (Fasc. 13, 1890), and *Andreae Capellani . . . De amore libri tres*, Rec. E. Trojel, Copenhagen, 1892.) This was certainly written very early in the thirteenth, if not in the end of the twelfth, century. In spite of this deduction, nevertheless, Diez's theory has not suffered serious harm.

Some explication, however, will be expected by the reader of the manner in which a notion at first sight so preposterous as the old romantic one of the courts of love could for so long a time maintain itself. Something of apparent evidence there must have been to mislead a scholar of the erudition of Raynouard. Such there really is, and of two different kinds. In the first place, the name courts of love is not to be charged as a mere invention against Nostradamus. It had existed and been abundantly employed for more than three centuries before he wrote. We even know the work from which he directly got it. This was the *Arrests d'Amours* of Martial d'Auvergne, a writer of the second half of the fifteenth century; but the court of love of which Martial d'Auvergne talks is something very different from what Nostradamus imagined or described. It is merely an allegorical court of the god Love himself, and has nothing to do with human institutions. Furthermore, it is not primarily a court of justice, but rather a royal court like any other, though naturally the decrees of Love have somewhat the appearance of judicial decrees. The allusions to such an allegorical court of love during the fourteenth and fifteenth centuries are innumerable, not only in French, but in other literatures of Europe. Nothing could better illustrate the passion for allegory which after the appearance of the *Romance of the Rose* ran riot among the poets. On occasion this passion was felt by others than the poets, and

the court of love seemed to be realized on earth. We have several accounts of festivals in which the court was actually instituted, and Love was represented in the person of a president or lord. Such was the famous festival described by Giovanni Villani (*Cronaca Fiorentina*, vii., ch. 89) as lasting for two months at Florence in 1283—a festival in which a *Signore dell' Amore*, surrounded by a band of more than a thousand white-clad followers, spent the time in uninterrupted feasts, balls, and pleasures of all kinds. Clearly, however, it would be wrong to infer from such amusements as these the existence of courts of love with judicial functions.

These, however, were not the only evidences on which Raynouard relied. In his reading of Provençal and Old French literature he had found that nothing was more common among poets and in society than the discussion of intricate questions about love. For reasons that need not be given here, this was the all-engrossing theme of mediæval knights and ladies. From the poets we have numerous examples of such discussions in poetical form (the *tensos*, or *tenzone*), in which after each poet has defended his side of the proposed question appeal is made to a third party, commonly a lady, for a decision as to which has attained a victory. Who was this third party? Was she not a formal president of some tribunal? And then there is the indubitable fact that André le Chapelain gives us a series of decrees, which he declares to have emanated from the noble ladies mentioned above. Were they also not formal decisions of organized and well-recognized institutions? A detailed study of the documents shows us nothing of the kind. The inherent improbability of such institutions is borne out by the facts. What does seem clear, however, is that in the society in which these great dames moved the discussion of the true nature and practice of love was treated with the greatest seriousness, and the conclusions arrived at in particular cases were eagerly passed from hand to hand, so that there finally established itself a kind of code upon the subject (*dreg d'amor*), which all true knights and ladies felt bound to recognize and adopt. In short, we have here a manifestation of the manner of development of mediæval and modern social ideals, which on the one side can not be regarded as too ridiculous, but which on the other has the most serious interest for the student of culture. From the confusion and misinterpretation of these phenomena proceeded the fantastic, romantic notion of the courts of love.

A. R. Marsh.

Lovedale: a town in the division of Victoria East, Cape Colony, Africa, wholly given up to the literary and industrial training-schools of British missionaries. Natives from far and wide are taught various trades and fitted for missionary service. The Bible and other books are printed by native craftsmen in various languages, and have extensive circulation in South Africa. C. C. A.

Love-feast: a modern restoration of the ancient Agapæ (*q. v.*). The Moravian Brethren, the denominations of Methodists, and some other bodies of Christians observe this custom. In some places the love-feast is a simple meal, at which prayer, singing, and religious conversation are in order. Generally, among the Methodists, bread and water alone are used, and all church members are allowed to participate. The Sandemanians have a weekly love-feast, eaten on Sunday.

Lovelace, Richard: poet; b. at Woolwich, Kent, England, in 1618; graduated at Oxford in 1636; became courtier of Charles I., and colonel in the royal army during the great rebellion; served also in the French army; was twice imprisoned in England, and solaced his lonely hours by the composition of amatory verses, the most familiar of which are the fine lyrics *To Althæa, from Prison*, and *To Lucasta, on going to the Wars*. D. in London in 1658. An edition of his *Poems*, edited by W. C. Hazlitt, was published in 1864.

Lovell, James: educator; son of "Master Lovell"; b. at Boston, Mass., Oct. 31, 1737; graduated at Harvard 1756; was assistant teacher of the Latin School under his father 1757–75; delivered the official address before the city authorities Apr. 2, 1771, in commemoration of the "Boston massacre," thus inaugurating a custom which has continued to the present time. He was imprisoned by Gen. Gage after the battle of Bunker Hill; exchanged in Nov., 1776; was a member of the Continental Congress Dec., 1776–82; receiver of taxes 1784–88; collector of the port of Boston 1788–89; and naval officer 1790–1814. He was at one time master of the North Grammar School, Boston, and published some tracts. D. at Windham, Me., July 14, 1814.

Lovell, John: educator; b. at Boston, Mass., June 16, 1710; graduated at Harvard 1728; became usher of the Boston Latin School 1729, and was its master from 1734 to its suppression by the siege of Boston, Apr. 19, 1775. During this long period "Master Lovell" was the instructor of many men eminent in the Revolutionary annals, but he was himself a loyalist, and embarked with the British troops Mar. 14, 1776, for Halifax, Nova Scotia, where he died in 1778. He was an excellent classical scholar, and, though rigid in discipline, was popular for his genial disposition. He delivered the address at the dedication of Faneuil Hall, Mar. 14, 1743, and was the author of miscellaneous publications.

Lovell, Mansfield: general; b. at Washington, D. C., Oct. 20, 1822; graduated at West Point 1842, and entered the artillery; served under Gen. Taylor in the war with Mexico, and was wounded at Monterey; transferred to the army of Gen. Scott, he was aide and assistant adjutant-general of Quitman's division, and was severely wounded in the assault on the city of Mexico; resigned from the army in 1854, settled in New York, and was (1858–61) superintendent of street improvements and deputy street commissioner; in the civil war served as major-general of the Confederate army, and was in command of the department of the South at the time of the capture of New Orleans; subsequently served in the North Mississippi and Georgia campaigns; at the close of the war was in command in South Carolina. After spending a few years on a plantation in Georgia he went to New York city, and assisted Gen. Newton in removing the obstructions to navigation in the East river. D. in New York city, June 1, 1884. Revised by James Mercur.

Lov'er, Samuel: author; b. in Dublin, Ireland, Feb. 24, 1797; early attained some distinction as a painter, poet, and singer. His earliest work, excepting contributions to the journals, was *Legends and Songs of Ireland*; in 1828 he became a member of the Royal Hibernian Academy, giving successful attention to portraits and miniatures. His *Rory O'More* (1837), *Handy Andy* (1842), and *Treasure Trove* (1844), comic Irish tales, widely extended his fame. *Songs and Ballads* (1839), *Lyrics of Ireland* (1858), *Metrical Tales* (1859), and several successful dramatic works were written by him. He also gave public exhibitions and lectures in Great Britain, Ireland, and North America with much success. D. at St. Helier's, island of Jersey, July 6, 1868. Revised by H. A. Beers.

Lover's Leap, The: See Cape Ducato.

Low: a barbarous substantive used in connection with weather-maps as an abbreviation for an area of low pressure. It is equivalent to cyclone, without the popular associations of violence connected with the latter.

Low, Seth, LL. D.: educator; b. in Brooklyn, N. Y., Jan. 18, 1850; received his early education at the Brooklyn Polytechnic Institute, and graduated at Columbia College in 1870 at the head of his class. During his last year in college he attended lectures at Columbia Law School, although he did not regularly complete the course. He entered the tea-importing house of his father, and finally became a member of the firm and of the Chamber of Commerce, serving upon some of its most important committees. He was also a member of many other important commercial bodies, and was very prominent in the organization of the Brooklyn Bureau of Charities. He was elected mayor of Brooklyn in Nov., 1881, and was re-elected Nov., 1883. His endeavors to purify and elevate the government of Brooklyn gave him a national reputation. He was elected president of Columbia College in 1890, and has added much to its prosperity by personal gifts and through his influence. He was nominated for mayor of New York in 1897, but not elected.

Low, Will Hicock: figure and genre painter; b. in Albany, N. Y., May 31, 1853; pupil of Carolus-Duran, Paris; member of the Society of American Artists 1878; member of the Architectural League, New York; National Academician 1890; was awarded second-class medal for drawings, Paris Exposition, 1889. The subjects of his pictures include classical figures and scenes of American life. Mr. Low is widely known as an illustrator, especially for his drawings for Keat's *Lamia* and *Odes and Sonnets*. He has executed decorative work in various buildings in New York, and designs for stained-glass windows. He designed the diploma of awards for the World's Fair, Chicago, 1893. Studio in New York. William A. Coffin.

Lowe, Sir Hudson: soldier; b. at Galway, Ireland, July 28, 1769; entered the army; served in the expedition to

Egypt, in the Peninsular war, in Naples, and Sicily; aided in the conquest of the Ionian islands; became their first governor; was employed in secret missions to Portugal and Sweden; was present at the battle of Bautzen, and carried to London the news of the abdication of Napoleon, to which circumstance he was perhaps indebted for being knighted and promoted to the rank of major-general; served during the following year as quartermaster-general of the army of the Netherlands, until removed by the Duke of Wellington; is now remembered chiefly as governor of the island of St. Helena during the whole imprisonment of Napoleon; afterward served in India; became lieutenant-general in 1830; and died in London, July 10, 1844. *A History of the Captivity of Napoleon from Lowe's Journal* was published in 1853.

Lowe, Robert, D. C. L., LL. D.: statesman; b. at Bingham, Nottinghamshire, England, in 1811; graduated at Oxford in 1833; became a fellow of Magdalen 1835, and private tutor 1836; was admitted to the bar, and settled in Australia in 1842, taking a prominent part in the politics of that colony; returning to England with a considerable fortune in 1851, he entered Parliament as a Liberal, and rose to high office, becoming Chancellor of the Exchequer in the second Gladstone ministry 1868–73, and Home Secretary 1873–74; raised to the House of Lords as Viscount Sherbrooke in 1880; G. C. B. 1885. D. in London, July 27, 1892.

Lowell: city; one of the capitals of Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); at the junction of the Merrimack and Concord rivers; on the Boston and Me. and the Old Colony railways; 26 miles N. W. of Boston. It derives a large water-power from Pawtucket Falls, in the Merrimack. In 1823 the first mill was built, and the industry has since grown to such proportions that the city has a world-wide reputation for its textile manufactures. The census returns of 1890 showed that 828 manufacturing establishments (representing 94 industries) reported. These had a combined capital of $40,457,-399; employed 28,086 persons; paid $10,695,545 for wages and $21,613,680 for materials; and had products valued at $39,638,062. The textile industry, which included the manufacture of cotton, woolen, felt, hosiery, suit, and worsted goods, and of carpets and rugs, and the dyeing and finishing of various textiles, had 31 establishments and $33,491,997 capital; employed 20,253 persons; paid $6,711,488 for wages and $16,086,684 for materials; had $16,750,578 invested in plants; and had products valued at $27,253,026. The next largest industry was the manufacture of foundry and machine-shop products, which had 37 establishments, and $2,536,025 capital; employed 2,100 persons; paid $1,107,-618 for wages and $1,050,861 for materials; had $888,-389 invested in plants and had products valued at $2,554,-111. Another important industry was the manufacture of patent medicines, which had 12 establishments, $589,334 capital, and $1,278,087 in value of annual products. The city has 8 national banks with combined capital of $2,300,-000, 7 savings-banks, 4 libraries (House of Employment and Reformation, City, Rector's, and Young Men's Catholic Association), and 6 daily, 1 weekly, and 3 monthly periodicals. It owns the water-works, which cost $2,387,672, real estate valued at $2,042,324, and other property, total holdings $5,109,384 in value, and had in 1890 an assessed property valuation of $62,353,612. Pop. (1880) 59,475; (1890) 77,696; (1900) 94,969.

Lowell: village; Kent co., Mich. (for location of county, see map of Michigan, ref. 7–H); at the junction of the Flint and Grand rivers, and on the Det., Gr. Hav. and Mil., and the Low. and Hastings railways; 18 miles E. of Grand Rapids, the county-seat, 139 miles W. of Detroit. It is in an agricultural region, and has excellent water-power, two flour-mills, a cutter-factory turning out 20,000 cutters per annum, saw and planing mills, furniture-factories, barrel and ox-bow factories, and electrical works which generate by water-power 5,000 horse-power of electrical energy and transmits it to Grand Rapids. Pop. (1880) 1,538; (1890) 1,829; (1900) 1,736.

Editor of "Journal."

Lowell, Charles Russell: officer; b. at Boston, Mass., Jan. 2, 1835; son of Rev. Charles Lowell; was educated at the Boston Latin School and at Harvard University, graduating in 1854 with the highest honors; after a time passed in European travel and study, returned to the U. S. and engaged in business pursuits; at the outbreak of the civil war was superintendent of iron-works in Maryland; immediately tendering his services to the Government, he was appointed (May, 1861) a captain in the Third U. S. Cavalry, transferring to the Sixth Cavalry in August; served with his company in the Peninsular campaign in Virginia, and subsequently in Northern Virginia and Maryland on the staff of Gen. McClellan; on the recruitment of the Second Massachusetts Cavalry was appointed its colonel, and stationed in the vicinity of Washington, and afterward assigned to command a brigade, and rendered valuable services against Mosby's guerrilla bands, and in the repulse and subsequent pursuit of the Confederate army under Gen. Early from before Washington 1864; assigned to Gen. Sheridan's command, his military services in the Shenandoah valley were conspicuous and brilliant in all the engagements of that army, including the battle of Cedar Creek, where he was wounded while in advance of Getty's division, but would not leave his command, remaining until the final attack was made, in which he was mortally wounded at the moment of victory. In recognition of his services he was appointed brigadier-general of volunteers, to date Oct. 19, 1864. D. at Middletown, Va., Oct. 20, 1864.

Revised by James Mercur.

Lowell, James Russell: author and diplomatist; b. at Cambridge, Mass., Feb. 22, 1819; son of Rev. Charles Lowell (1782–1861); graduated at Harvard College in 1838 as class poet, and at Harvard Law School in 1840; began practice in Boston, but soon devoted himself entirely to literature. He printed in 1841 a small volume of poems entitled *A Year's Life*; edited with Robert Carter in 1843 *The Pioneer, a Literary and Critical Magazine* (monthly), which reached only three numbers; published in 1844 *A Legend of Brittany*; in 1845 *Conversations on some of the Old Poets* and *The Vision of Sir Launfal*; in 1848 *A Fable for Critics*, a literary satire, and *The Biglow Papers*, satirical essays in dialect poetry directed against slavery and the war with Mexico, which acquired wide popularity both at home and in England; a collective edition of *Poems* was issued in 1849. In 1851–52 he traveled in Europe, residing for a considerable time in Italy; delivered in 1854–55 a course of lectures on the British poets before the Lowell Institute, Boston; succeeded Longfellow in Jan., 1855, as Professor of Modern Languages and Literature at Harvard College, and spent another year in Europe, chiefly at Dresden, in qualifying himself for that post. From 1857 to 1862 he was editor of *The Atlantic Monthly*, and from 1863 to 1872 of *The North American Review* (quarterly), in both of which many of his miscellaneous writings appeared. He published in 1864 *Fireside Travels*; in 1866 a new series of *Biglow Papers*; in 1869 *Under the Willows*, with which was included his noble *Commemoration Ode* in honor of the alumni of Harvard who had fallen in the civil war, and *The Cathedral*; in 1870 and 1871 two volumes of essays, *Among my Books* and *My Study Windows*. He again visited Europe in 1872–74, receiving in person the degree of D. C. L. at Oxford and LL. D. at the University of Cambridge, England. A new edition of his complete works was published in 1881. He was U. S. minister to Spain in 1877, and U. S. minister to England 1880–85. He was elected lord rector of St. Andrews University, Glasgow, Scotland, Jan. 2, 1884, but soon after resigned the position as incompatible with his office as U. S. minister to the court of St. James. *Democracy and other Addresses* was published in 1887; *Heartsease and Rue* and *Political Essays* in 1888; *American Ideas for English Readers*, *Latest Literary Essays and Addresses*, and *Old English Dramatists* were issued posthumously in 1892, Mr. Lowell having died at Cambridge, Mass., in 1891 (Aug. 12). His collective writings were published in 1890–91 (10 vols.).—His wife, Maria White Lowell (b. July 8, 1821; d. Oct. 27, 1853), wrote verse of considerable merit. A privately printed volume of her poems was issued in 1855.

Revised by H. A. Beers.

Lower California: See California, Lower.

Low'estoft: town; in the county of Suffolk, England; 118 miles N. E. of London; on the German Ocean (see map of England, ref. 10–M); is much visited during the summer for its excellent sea-bathing, and carries on some ship-building and fishing of herrings and mackerel. It has a good harbor, two piers 1,300 feet in length, a hospital, large fish-markets, and a park. Pop. (1891) 23,347.

Low German: those Germanic dialects spoken on the continent of Europe, which, in distinction from High German and Midland German, have not undergone a second shifting of consonants. Low German is divided into Low Saxon and Low Frankish, the latter being confined to the

Netherlands (see Dutch Language) and to the northern part of Belgium (see Flemish Language and Literature). In Germany the term *Niederdeutsch* (i. e. Low German) is often used for Low Saxon or Plattdeutsch (*q. v.*) alone, in distinction from Niederländisch (i. e. Netherlandish, or Low Frankish); while in England (and occasionally in Germany) it is sometimes applied also to Frisian and Anglo-Saxon, so as to include all of the West Germanic dialects except High German. Both of these usages, however, are better avoided. The former is objectionable, because it is too narrow. There is need of a common name to designate those continental dialects, which were closely connected with High German until their separation by the second shifting of sounds; and Low German is the only one which covers this whole field. This term, on the other hand, ought not to be extended to Frisian and Anglo-Saxon, since both of these are distinguished from Low Saxon and Low Frankish by several important peculiarities (e. g. the change in many Frisian and Anglo-Saxon words of original gutturals into palatals). The non-existence of the second shifting of consonants in Frisian and Anglo-Saxon is not sufficient to justify the extension to these dialects of the term Low German, as the second shifting is lacking also, e. g. in Gothic and Norse.

Hermann Collitz.

Lowrie, John Cameron, D. D.: Presbyterian minister; b. at Butler, Pa., Dec. 16, 1808; graduated from Jefferson College in 1829, and from Western Theological Seminary in 1832, and studied at Princeton Theological Seminary. He was a missionary in Upper India 1833–36; returned in broken health to the U. S.; was assistant secretary of the board of Foreign Missions 1838–51; corresponding secretary 1851–91; and was then made secretary *emeritus*. In 1845–51 he was in charge of the Presbyterian church in Forty-second Street, New York; in 1865 he was moderator of the Old School General Assembly at Pittsburg. He was editor of *The Foreign Missionary Chronicle* (1838–49), of *The Foreign Record* (1850–53, 1861–86), and of *The Foreign Missionary* (1842–65), and published *Travels in Northern India* (1842; 2d ed., *Two Years in Upper India*, 1850); *Manual of Foreign Missions* (eds. of 1854–55–68); *Missionary Papers* (1882); *Presbyterian Missions* (New York, 1893); and many pamphlets and review articles. D. May 31, 1900.

Low Saxon: See Plattdeutsch.

Lowth, Robert, D. D.: biblical scholar; b. Nov. 27, 1710, at Winchester, England, where his father, Rev. William Lowth, a distinguished theologian (1661–1732), was chaplain to the bishop and prebendary in the cathedral; was graduated B. A. 1733, M. A. at New College, Oxford, in 1737; took holy orders 1735; in 1741 became Professor of Poetry at Oxford, and delivered a course of lectures on the *Sacred Poetry of the Hebrews*, the foundation of his later work on the same subject; after filling numerous minor benefices became Bishop of St. David's in 1766; was translated to the see of Oxford the same year, and was appointed Bishop of London in 1777; declined the archbishopric of Canterbury in 1783. D. at Fulham Palace, London, Nov. 3, 1787. His principal works were *Prælectiones de Sacra Poesi Hebræorum* (Oxford, 1753; Eng. trans. London, 1787; 3d ed. 1847) and a poetical *Translation of Isaiah* (1778; 11th ed. 1835), both much esteemed and frequently reprinted. See the *Memoir of the Life and Writings of Bishop Lowth* (1787).

Lowther, James: politician; b. in Leeds, England, in 1840; was educated at Westminster School and Trinity College, Cambridge (B. A. 1862); was called to the bar 1864; was a (Conservative) member of Parliament 1865–80 and 1881–85; Chief Secretary for Ireland 1878–80, in Lord Beaconsfield's Government; again returned to Parliament in 1888 and 1892.

Lowville: village (settled 1797, incorporated 1847); capital of Lewis co., N. Y. (for location of county, see map of New York, ref. 3–H); near the Black river, on the Rome, Water. and Ogdensburg Railroad; 26 miles S. E. of Watertown, 59 miles N. by W. of Utica. It is in an agricultural and dairy region, and contains 4 churches, improved water-works, electric lights, public school, 2 national banks, and 3 weekly newspapers. It has large butter, cheese, and hop interests. Pop. (1880) not separately reported in the census; (1890) 2,511; (1900) 2,352.

Editor of "Journal and Republican."

Loxa: See Loja.

Loy, Matthias, D. D.: theologian; b. in Cumberland co., Pa., Mar. 17, 1828; studied at Columbus, O.; was pastor at Delaware, O., 1849–65; editor of *The Lutheran Standard*; and from 1865 Professor in the Lutheran Theological Seminary at Columbus. He has edited *The Columbus Theological Magazine*, and, besides being a prolific author of articles, has published a volume of sermons; *The Doctrine of Justification* (Columbus, 1862); *Life of Luther* (trans. 1869); and *Essay on the Ministerial Office* (1870). Julian's *Dictionary of Hymnology* gives the titles of twenty hymns of which he is author.

H. E. Jacobs.

Loyal Temperance Legion: an organization of children formed under the direction of the Woman's Christian Temperance Union. Previous to 1886 the various local juvenile societies were at liberty to select their own local names, and there was no very definite plan of work; but in that year a uniform organization was decided upon, and they were consolidated into one great army. They are organized in every State and Territory of the U. S., and the work is extending into other countries. The U. S. division has some 200,000 pledged members, besides many who are in training but are not yet pledged. The aims are to train children in temperance principles, grounded upon scientific knowledge of the effects of alcohol, tobacco, and other narcotics upon the human system, and among means for accomplishing this end is a course of study. The graduates are organized into State legions, with full corps of juvenile officers, holding annual State conventions.

Helen G. Rice, national superintendent.

Loyalty Islands: a chain of islands about 60 miles E. of New Caledonia, running parallel to the latter; a dependency of the French Government of New Caledonia. The larger islands (beginning at the N. W.) are Uvea, or Halgan, which forms one part of the circumference of a lagoon about 20 miles across—it is about 30 miles long, and in some places 3 miles across; pop. 2,500—Lifu, or Chabral, 50 miles long by 25 broad—pop. 7,000, but decreasing—and Marc, or Neugone, triangular and about 80 miles around; pop. 6,000. The islands are of coral, surrounded by reefs, have a thin soil, and are not very fertile. The climate is mild and salubrious; rains occur from December to April, but in the other months the climate is dry; fresh water can be obtained almost anywhere by digging down to sea-level. The primitive race is negrito (dark Melanesian), but the olive Polynesians have migrated to the islands in considerable numbers. The first named are superior, and make excellent sailors. The French took possession of the islands in 1864. British missionaries have been established there for some years, and attempts by the French to interfere with them in 1864 and 1875 have led to British protests. See Macfarlane, *Story of the Lifu Mission* (1873). Mark W. Harrington.

Loyo'la, Ignatius, de: founder of the order of Jesuits (*q. v.*); b. in Guipuzcoa, Spain, in 1491, in the castle of Loyola, whence his surname, his original name being Inigo Lopez de Recalde; was of a noble Spanish family, and the youngest of eleven children. In his youth he served as a page in the court of Ferdinand the Catholic; afterward entered the military service, remaining till his thirtieth year, always giving proof of a valorous, chivalric, and adventurous spirit. Having been wounded in the leg at the siege of Pamplona by the French in 1521, while feeble and suffering he read a life of Christ and various sacred legends (among them probably that of St. Francis d'Assisi, the beginning of whose history is very like that of Loyola), and by degrees the man of the world was transformed into the Christian disciple. When scarcely recovered he divided his goods among the poor, made a pilgrimage to a shrine of the Virgin Mary, to whom he dedicated his armor, declaring himself at the same time her knight, and then retired to the hospice of Manresa. There, and in the neighboring caves, he so macerated his body that one day he was found insensible. Ten months later he embarked from Barcelona for Palestine, but being maltreated by the guardian of the Sepulchre, the provincial of the Franciscans, he returned in 1524, by way of Venice, to Barcelona, where he applied himself to the study of the Latin grammar. Two years afterward, having entered the superior schools, he prepared himself for giving popular instruction. Being accused of witchcraft before the Inquisition, he was arrested; on his release, in 1528, he went to Paris to study theology. There in 1534, together with several more, both Frenchmen and Spaniards, such as Laynez, Bobadilla, Rodriguez, Pierre Lefèvre, and others, he formed the project of founding a new Catholic religious order. Some of his companions not having finished their studies, he returned to Spain and waited for

them. In 1537 the company met again in Venice, and thence Ignatius made his first journey to Rome to obtain permission to establish the new order and receive a blessing upon it. According to some legends, Ignatius was favored at Storta, near Rome, with a vision, in which Christ, bearing a banner, appeared to him and said, "Fear not! I will befriend thee in Rome." Others state, more simply, that Loyola, as he was drawing near to the Eternal City, and in uncertainty as to the reception that awaited him, felt his heart fail him. Stopping before an old chapel which stood by the wayside, he entered it and implored the Divine protection; after which, full of courage, he said to his companions, "Truly, dear brethren, I know not how God may see fit to dispose of us—whether we shall be hung, tortured, or in any other way suffer martyrdom in Rome—but what I can tell you certainly is, that Christ Jesus will be gracious and merciful to us in whatsoever straits we may be." He and his friends resumed the pilgrim's staff, and with their books of theology on their shoulders and huge rosaries about their necks continued their journey, and finally reached Rome. Pope Paul III., "thinking that the pious zeal of these Fathers for the general good of souls would be of no small advantage and honor to the harassed Church," received them with kindness, and on Sept. 27, 1540, gave to Ignatius and his companions the provisory, and in 1543 the definitive, approbation of the order of Jesuits. Loyola was named first general of the order in 1541, although his fellow worker, Laynez, had not been less efficient in founding it. The head of the new company soon gave himself to the religious training of the young, and he was very successful in bringing Jews over to the Christian faith and in reforming erring women. He died July 31, 1556, was beatified in 1599, and canonized by Pope Gregory XV. in 1622. His feast is celebrated by Roman Catholics on July 31, the anniversary of his death. Although Loyola met with much persecution in his own time from bad men whose faith he peacefully sought to quicken and whose morals he tried to reform, yet posterity has never questioned the sincerity of his professions nor the purity of his life. He wrote two small works in Spanish—*The Constitution of the Order of Jesus* and *Spiritual Exercises*. His *Life* has been written many times, but those of Rosweide, Maffei, and Bonhours are specially quoted. The most elaborate *Life* in English is by Stewart Rose (New York, 1891).

Revised by JOHN J. KEANE.

Loyola, MARTIN GARCIA OÑEZ, de: cavalier; nephew of Ignatius Loyola; b. in Guipuzcoa, Spain, about 1548. In 1568 he went to Peru with the viceroy Toledo, and was there intrusted with various important commands. During the campaign against Inca Tupac Amaru (1572) he led the vanguard, pursued the Inca into remote fastnesses, and eventually captured him. After the execution of the Inca, Loyola married his niece, and through his influence she received large grants as heiress of the Inca family. In 1592 he was appointed captain-general of Chili, taking possession of the post Aug. 6. He brought strict orders to prosecute the Araucanian war with vigor, but his resources were very inadequate, and he was still further hampered by the descent of the English corsair Hawkins on the coast (1594). He relieved Arauco in 1593, and established forts in the Araucanian country. In Nov., 1598, while at Imperial, he was warned of an Indian uprising; starting for Angol with sixty officers, he was set upon at a night camp and killed with all his companions (Nov. 22, 1598). A general Indian rising followed, and all the Spanish towns S. of the Biobio were destroyed. HERBERT H. SMITH.

Loyson, CHARLES: See HYACINTHE, CHARLES LOYSON.

Lozère, lō′zãr′: department of France; comprising an area of 1,996 sq. miles, and consisting mainly of an elevated plateau resting on the Cévennes, whose central mass, the so-called Margaride Mountains, covers the whole southern and western part of the department; the highest peak, Mont Lozère, rises 4,884 feet. These mountains are rich in iron, lead, silver, copper, and antimony, and their southern slopes are covered with vines, mulberry, and olive trees. The soil is not generally fertile or suited to tillage; sheep and cattle are extensively reared, and large quantities of chestnuts are raised. The general character of the department is pastoral. Silkworms are reared in the valleys. Pop. (1896) 132,151. Capital, Mende.

Lualaba River: a river which rises on the southern frontier of the Congo Free State, a little W. of 26° E. lon. from Greenwich. It was long thought that it might be the head source of the Congo, but the explorations of Delcommune and Bia (1892) show that the more eastern Luapula has its head fountains much farther from the mouth of the Congo and contributes to it a much larger volume of water than the Lualaba, which is regarded (1894) merely as a tributary of the Congo. C. C. A.

Luang-Prabang, loo-ăng′pra-băng′: a semi-independent Shan state of Indo-China; lying on the middle Mekong, and inclosed by the French territories of Annam and Tonquin; lat. 18° to 22° N., lon. 101° to 104°. It is a mountainous country peopled by Laos, with many wild tribes and numerous immigrant Burmans, Siamese, Tonquinese, and Chinese. Population about 150,000. The capital is Luang-Prabang, or simply Luang, on the left bank of the Mekong, in lat. 19° 54′ N., lon. 102° 5′ E. Pop. 15,000 to 20,000. It was formerly much larger. Pallegoix, in 1830, estimated its population at 50,000. M. W. H.

Lubbock, Sir JOHN, M. P., D. C. L., LL. D., M. D., F. R. S., F. S. A.: scientist; son of Sir John William Lubbock; b. in London, Apr. 30, 1834; educated at Eton; became a banker in London, honorary secretary to the London bankers, and introduced improvements into the system of banking, especially the "country clearing" and the publication of the clearing-house returns; became early interested in ethnology, physics, and natural science; was one of the first scholars who elucidated the significance of the lake-dwellings of Switzerland and the "kitchen-middens" of the Danish coast concerning which he wrote several articles in the reviews about 1860; succeeded to the baronetcy on his father's death in 1865; in the same year published *Prehistoric Times, as Illustrated by Ancient Remains and the Manners and Customs of Modern Savages* (5th ed. revised, 1889), a work which was translated into many languages, was republished in the U. S., and which was truly characterized as epoch-making in the anthropological sciences. In 1870 he issued the complement of the former work, *The Origin of Civilization and the Primitive Condition of Man*, which had a similar popularity, and made good its author's claims to be regarded as one of the chief exponents of the great modern science of which it treats. It is not alone in anthropology, however, that Sir John Lubbock has rendered distinguished services to science; his *Origin and Metamorphoses of Insects* (1874), *On British Wild Flowers considered in Relation to Insects* (1874), *Monograph on the Thysanura and Collembola, Ants, Bees, and Wasps* (1882), *The Senses and Instincts of Animals* (1888), and more than fifty memoirs in the *Transactions* of various learned societies, bear witness to the versatility of his researches. *The Pleasures of Life*, a volume of essays (1887; 20th ed. 1890), was followed by a second series in 1889. He has been president of the Ethnological and Entomological Societies and of the Anthropological Institute, vice-president of the British Association and of the Royal and Linnæan Societies, is an active member of the Society of Antiquaries and the Geological Society, and of the commissions on international coinage, public schools, and the advancement of science, and was vice-chancellor of the University of London 1872–80. In 1865 and 1868 he was an unsuccessful candidate for Parliament in the Liberal interest; was elected for Maidstone in 1870; lost the seat in 1880, but was immediately returned for London University, and still represents it—since 1886 as a Liberal-Unionist. He has spoken on financial and educational topics, and procured the passage of several acts, one of which, the Bank Holiday Act, added four statute holidays to the two previously existing.—Lady LUBBOCK (*Ellen Frances Hordern*) participated in the scientific tasks of her husband, and wrote admirable articles in the scientific and literary periodicals, especially *The Academy*. D. Oct. 20, 1879.

Lubbock, Sir JOHN WILLIAM, F. R. S.: astronomer and mathematician; b. in London, Mar. 26, 1803; graduated M. A. at Trinity College, Cambridge, in 1825; became F. R. S. in 1829; became a baronet by inheritance in 1840; was a successful banker, and sheriff and lieutenant of Kent, but his fame was won by astronomical researches; wrote many valuable papers upon lunar and planetary perturbations, upon tides, eclipses, etc., and also published *Researches on Physical Astronomy* (1830); *Classification of Branches of Human Knowledge* (1838); various papers upon the *Theory of the Moon* (1833); *Treaties on Tides* (1831–37), and other works. D. June 20, 1865.

Lu'beck (= Germ. *Lübeck*): a free Hanse town and an important commercial port of the German empire; situated on

the Trave, 10 miles from its entrance into the Baltic (see map of German Empire, ref. 2–E). It is almost wholly surrounded with water. To the W. and N. the Trave makes a large curve, forming an extensive harbor; to the S. and E. runs the Wakenitz, joining the Trave to the S. of the city. It is still partly surrounded with walls, and contains many old-fashioned houses and churches, which remind one of the Middle Ages. It is egg-shaped in its ground-plan, and divided into four quarters—that of Jacobi to the N. E., of Maria Magdalena to the N. W., of Maria to the S. W., and of Johannis to the S. E. The suburbs, consisting of separate groups of houses, stand on the other side of the rivers. The most important square is the market-place, situated in the center of the city. Here stands the town-house, a large structure built of red and black glazed brick, with five towers, finished in 1517. This building contains the Hansehall, in which in olden times, when Lubeck stood at the head of the Hansa, the representatives from eighty-five German cities held their assemblies, but which is now divided into a number of smaller rooms; and the town-cellar, built in 1443 and stocked with excellent wine. Among the churches (9 Lutheran, 1 Reformed, and 1 Roman Catholic) the Lutheran Marienkirche is the most striking, built between 1286 and 1310, in a severe Gothic style, with three naves and two tall belfries. The whole structure is 354 feet long and 197 feet broad; the middle nave is 134 feet high, the towers 430 feet. In contains a very ingenious clock and several remarkable chapels, one with a *Dance of Death* (1463), and another of black marble (1607). The cathedral, built between 1170 and 1341, the Jacobikirche of the thirteenth century, and the Petrikirche from the beginning of the twelfth, are interesting. The Katharinenkirche, built in the earliest Gothic style, is not used now for worship, but contains a collection of art and antiquities. Noteworthy among the other buildings are the house of the Merchants' Company, with excellent wood-carvings; the Hospital of the Holy Ghost, with a beautiful chapel in the earliest Gothic style; the theater, the lunatic asylum, the Katharineum, an educational institution, the school of navigation, the mercantile academy, etc. Breweries, manufactures of tobacco, cloth, linen and cotton, and silk-weaving factories are in operation. Still more important is the commerce, on account of the location of the city, between Hamburg and the Baltic; about 2,300 vessels, of 443,000 tons burden, enter the harbor annually. The principal items of importation are wool, potash, tar, hemp, copper, and tallow from Russia; timber, iron, copper, and steel from Sweden; corn and spirits from Prussia; wine from France. The wine-trade is very important.

Lubeck has a democratic constitution. Its government consists of a senate of 14 members and a municipality of 120. This government rules a territory of 115 sq. miles, with 76,485 inhabitants, which forms a separate state, an independent member of the German empire. Lubeck has a budget of 3,564,846 marks, and a debt of 9,843,361 marks. It carried on an important commerce as early as the beginning of the twelfth century, and the culmination of its prosperity falls between 1200 and 1500. The Emperor Frederick II. made it a free city of the realm in 1226. It waged successful wars against the Danes, and defeated them in 1227, 1234, and 1249. It was the head of the Hansa, and its fleets swept the Baltic during the thirteenth, fourteenth, and fifteenth centuries; but its power decreased with the Hansa. The burgomaster Wullenweber succumbed when he tried in 1530 to restore to Lubeck its old influence in the affairs of the Scandinavian countries. From 1563 to 1570 it waged its last war, against Sweden. The Thirty Years' war almost crushed it. In 1806 the French captured and sacked it. In 1810 it was incorporated with the French department of the Bouches d'Elbe. In 1813 the Russians expelled the French, but the French returned once more, and held it for a short time, until Bernadotte, the Crown Prince of Sweden, liberated it. Since 1815 its prosperity has developed once more. In 1866 it sided with Prussia, and sent one battalion to the army of the Main. On June 27, 1867, it concluded a military convention with Prussia. May 15, 1868, it entered the Zollverein, and in 1871 the German empire. Pop. of city (1890) 63,590; of territory (area, 115 sq. miles) 76,485; (1900) 96,775.

Lubicz, loo'bits: See BRODY.

Lübke, lüp'ke, WILHELM: writer on art; b. at Dortmund, Westphalia, Jan. 17, 1826; studied at Bonn and Berlin; published in 1853 *Die mittelalterliche Kunst in Westfalen*, and in 1855 *Geschichte der Architektur* (6th ed. 1884); was appointed Professor of Architecture at the Building Academy of Berlin in 1857; traveled in 1858–60 through Italy, France, and Belgium; was Professor of Art History at Zurich in 1861–66 and at Stuttgart 1866–85, when he accepted a similar position at Carlsruhe. His *Grundriss der Kunstgeschichte* (Outline of the History of Art, 1861) and *Geschichte der Plastik* (1863) have been often republished, and are very useful handbooks. His *History of Art* was translated into English by Clarence Cook (New York, 1880). In 1891 he published an autobiography (*Lebenserinnerungen*). He completed the *Geschichte der Baukunst* of FRANZ THEODOR KUGLER (*q. v.*). D. at Carlsruhe, Apr. 7, 1893.

Lublin, loob'lin: town; in the government of Lublin, Russia; on the Bistritza; 96 miles by rail S. E. of Warsaw (see map of Russia, ref. 8–A). It is an old town, and, next to Warsaw, the handsomest and most important in Poland. Among its buildings are notable the Church of St. Nicholas, founded in 986; the Sobieski palace, the cathedral, and the town-hall. A considerable trade in cloth, grain, and Hungarian wines is carried on, and three annual fairs are held, each lasting one month. The chief manufacture is woolens. Pop. (1891) 48,475. The government of Lublin has an area of 6,499 sq. miles and a population of 996,551.

Lubowski, loo-bov'ski, EDWARD: dramatist and novelist; b. at Cracow, Poland, in 1839; was educated in that city; was a regular contributor to the journals *Dziennik Literacki*, *Gazeta Narodowa*, and *Newiasta*. In 1865 he removed to Warsaw, and has since devoted himself exclusively to literature. He wrote a number of dramas and novels. His early dramatic efforts, *Karyery* (The Careers, a comedy in five acts, 1863), *Protegowany* (The Protégé, comedy in four acts, 1864), *Żyd* (The Jew, 1867), and *Ubodzy v salonie* (The Unhappy Ones in the Salon, 1867), attracted little attention; but the satiristic comedy *Nietoperze* (The Bats, 1875) made him famous. It is based upon the conflict of personal dignity and public opinion, and exposes the slanderers. His other dramatic works are mostly character comedies: e. g. *Gonitwy* (The Races); *Przesądy* (Prejudices, 1876); *Pogodzeni z losem* (Reconciled to their Fate, 1878); *Sąd honorowy* (The Court of Honor, 1880); *Jacuś* (1884); *Obsaczony* (1886). Of his novels, the best are *Silni i slabi* (The Strong and the Weak, 2 vols., Cracow, 1865, under the pseudonym *Spirydion*); *Aktorka* (The Actress, Warsaw, 1869), showing the influence of French models; *Na pochylości* (On the Decline, 2 vols., Warsaw, 1874), which portrays Galician nobility living above its means and wasting its estates; *Krok daléj* (One Step Farther, 1885). He also published essays on Mary Stuart, Don Carlos, Wallenstein, the Borgias, Alfred de Musset, etc., and translations from Shakspeare (*Timon of Athens*, *The Taming of the Shrew*), Dumas, Weilen, etc. J. J. KRÁL.

Lubricants, or **Unguents** [*lubricant* is from Lat. *lubrica're*, make slippery, deriv. of *lu'bricus*, slippery; *unguent* is from Lat. *unguen'tum*, fr. *un'guere*, *un'gere*, anoint]: materials used to lessen the friction of the working parts of machinery. As a solid lubricant, plumbago, graphite, or black lead is the only material in common use. It is carefully prepared for use by the removal of all earthy or other foreign substances, and is usually applied mixed with tallow or oil. It is best adapted for lubrication of bearings moving slowly under very heavy pressures. Tallow alone, or mixed with plumbago, or with red or white lead, is an excellent lubricant under similar conditions. Lard is sometimes applied in such cases. All of the animal and vegetable non-drying oils are good unguents. The best organic oil for heavy pressures is summer-strained sperm; winter-strained sperm oil is a good lubricant. The cost of sperm oil, however, usually makes it impracticable to employ it on ordinary machinery, or even in admixture with petroleums. Lard oil, although not capable of withstanding such extreme pressures as the preceding, is excellent for the bearings of machinery, and its comparative cheapness has brought it into common use. Neat's-foot oil is also used as an unguent. Of the vegetable oils, olive is one of the best, and is very extensively used in European countries, and sometimes has been imported into the U. S. for this purpose. Colza and rapeseed oils are good lubricants. The siccative or drying oils, of which linseed oil is an example, can not be used as unguents. Mineral oils are in extensive use as lubricants. They have less body than the best vegetable, and particularly than the best animal oils, but have enough for ordinary purposes, and possess the great advantage of neither drying like the siccative vegetable oils,

nor absorbing oxygen from the atmosphere and becoming gummy like the other animal as well as vegetable oils. They are prepared especially for this purpose, and are found exceedingly well adapted to the application. They are frequently mixed with the heavier lubricants, and the resulting compound is found better adapted than either of its constituents to the use for which it has been prepared; possessing at the same time the required body and the necessary lubricity, as well as the power of retaining its properties indefinitely in the presence of oxygen. The best mineral lubricating oils are those which, having been subjected to fractional distillation, have been freed from all of the more volatile constituents. These are at the same time the safest illuminating oils. Crude petroleum is a good unguent under light pressures. The majority of the lubricating oils sold under trade-names or trade-marks are mixtures of oils having a good body with others of less value. A mixture of mineral and lard oils is very commonly used, and is a good lubricator. A solid unguent, composed of 3 parts tallow, 3 parts palm oil, ½ lb. caustic soda, and a gallon of water, thoroughly mixed at a temperature of 140° F., is recommended for car-axles. A mixture of 2 parts paraffin, 1 of lard, and 3 of lime-water is said to work well under heavy pressures in rolling-mills. The organic oils of commerce frequently contain traces of the acids used in their purification. When this is the case, they are likely to injure delicate machinery if applied as a lubricant. They may be purified by chemical treatment, or they may be clarified by placing in the vessel containing them a quantity of rusty iron or of other neutral absorbent of acids. Soap is used as an unguent between surfaces of wood; water may answer a good purpose in dissolving any glutinous or mucilaginous substance, but it is not itself a true unguent. See *Friction and Lost Work in Machinery and Mill-work* (New York).

R. H. Thurston.

Lubricators [from Lat. *lubrica're*, make slippery, deriv. of *lu'bricus*, slippery]: apparatus by means of which lubricating materials are applied to rubbing surfaces in machinery. Lubricators intended for applying solid lubricants, such as tallow, lard, or axle-grease, consist frequently of a simple box above the part to be lubricated, with a hole of a size which is greater or less, according to the greater or less viscosity of the material employed and the freedom with which it is desired to apply it, leading down to the bearing, through which the lubricant gradually finds its way. With hard tallow it is sometimes found advisable to apply a plate above the mass, which, being pressed down by a spring, forces the lubricant downward more rapidly; as, for example, in the Weston box. On car-axles, where a peculiar compound of grease and lime-water is often used, the latter form is not required. A plain tallow-box, with a small oil-hole, answers for an unguent of slight viscosity. Fig. 1 exhibits a simple form of lubricator in which it is intended to use tallow or suet. The cock at A is used as a means of adjusting the rate of supply. This is only used upon steam cylinders, where the heat of the steam melts the unguent.

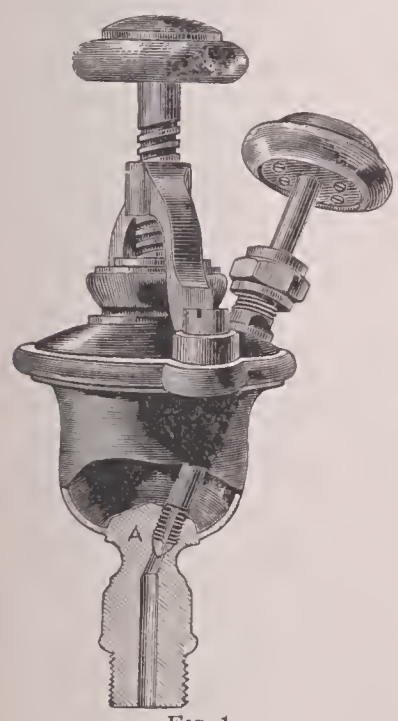


Fig. 1.

For the animal and vegetable oils, which are the most common lubricating materials, an entirely different style of lubricator is used. For ordinary journal-bearings the usual form consists of a brass or glass vessel (Fig. 2), of a capacity varying from less than a gill to sometimes a quart. It is screwed upon the cap of the journal-box or otherwise conveniently attached. At the bottom is a hole of from one-eighth to a quarter of an inch in diameter, into which is secured a vertical tube rising nearly or quite to the top of the oil-cup. A channel of proper size leads from the cup down to the bearing to be oiled. The cup is filled with oil, and a leader (A) made of loosely twisted lamp-wick is inserted partly in the vertical tube, and the remainder is allowed to fall into the oil within the cup. This wick thus acts as a siphon, drawing the oil up, and leading it then down into the tube, from which it finds its way to the bearing. This is the most generally used form of lubricator. By bending a small bit of wire into the form of a ∩, and lapping the wick around it, a removable siphon is made, which, being taken out when the journal is not moving, permits a considerable saving of oil in many cases, as on marine engines. These siphons are quickly reinserted.

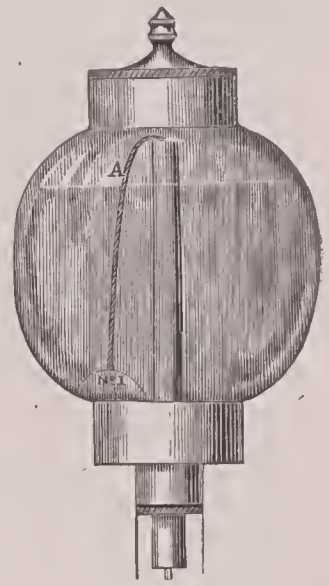


Fig. 2.

Where continuous lubrication over the rubbing surface is desired, an oil-pump is employed, drawing the oil from a reservoir and forcing it in a continuous stream through the journal; other engineers have attached to the revolving shaft a piece of mechanism operated by the movement of the shaft itself, which by means of small spoons dips up the oil and pours it upon the bearing. In these arrangements a reservoir is required, from which the oil may be taken, and to which it may return as it drips from the bearing.

Many ingenious and some very useful devices have been invented, having for their object the convenient and economical distribution of the lubricant. In the crank-pin lubricator of Howe the oil-cup is screwed into the strap of the connecting-rod from beneath; a wick is carried up to the surface of the pin, and kept in contact with it by a small wire or stick, around which it is wound, and which is held up against the bearing by a spring. The oil is drawn up by capillary force, and, reaching the bearing, lubricates it freely; the excess flows back into the oil-cup. In the needle oil-cup of Dreyfus (Fig. 3) there is no inner tube, but a small rod or needle (A) is inserted into the hole through which the oil descends, fitting it so closely that no oil can flow past it when at rest. Whenever the machinery is in motion, however, the jar and the friction of the shaft, against which the needle bears at its lower end, causes a slight but a sufficient tremor of the needle, and the oil is fed to the bearing uniformly and unceasingly so long as the machinery continues to move.

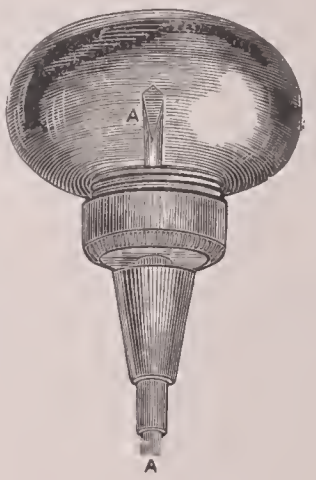


Fig. 3.

For lubricating the interior of the cylinders of steam-engines, where the unguent must be forced in against the pressure of the steam, two classes of lubricators are largely used. One consists of a small force-pump, sometimes with, and sometimes without, an attached reservoir. In the first case the pump has sufficient capacity to contain the full charge which it is desired to force into the cylinder at one time; in the other case the pump draws from the reservoir one or more charges as may be required. The second kind of lubricator consists merely of a reservoir for oil, connected at the top with the steam-pipe, and at the bottom with the steam-chest below it. Each small pipe is provided with a small cock, which may be used to close the communication with the steam-pipe. These cocks being closed, the reservoir is filled with oil, and the cocks are then again opened. Steam-pressure then comes upon both top and bottom of the oil in the cup, but no motion of the fluid takes place, as the lower pipe is at its highest point on a level with the surface of the oil. Gradually the steam condenses in the upper part of the reservoir, and, being of greater specific gravity than the oil, it settles to the bottom, displacing it and slowly filling the cup. It raises the oil until the latter flows out at the top of the reservoir, through the pipe for that purpose, and trickles down into the steam-chest.

On shafting reservoir-boxes are sometimes used. These "self-oiling boxes," as they are also called, have a reservoir formed within the journal-box, in which is placed a quantity of oil. On the shaft is a collar which dips into the oil,

and, as the shaft turns, takes up a portion, and this, trickling back over the shaft, produces a constant lubrication of the rubbing surfaces. These boxes only require filling at long intervals, as the oil is used over and over again. These compositions often contain plumbago, and thus substitute a solid for a liquid lubricant. See *Friction and Lost Work in Machinery and Mill-work* (New York) R. H. THURSTON.

Lucan, GEORGE CHARLES BINGHAM, G. C. B., Third Earl of: b. in London, Apr. 16, 1800; educated at Westminster; entered the army in 1816; accompanied the Russian army as a volunteer in the Turkish war of 1828–29; succeeded to the title and large estates in Ireland in 1839; became a representative peer in 1840; was commander of a cavalry division in the Crimea, and made himself memorable by his connection with the charge of the light brigade at Balaklava, Oct. 25, 1854. He became lieutenant-general in 1858 and general in 1865; field-marshal 1887. D. Nov. 10, 1888.

Luca'nia: an ancient division of Magna Græcia; extended from the Tarantine Gulf in the E. to the Tyrrhenian Sea in the W. The most remarkable of its cities were Sybaris, Heraclea, and Pæstum. It now corresponds to the provinces of Basilicata and Principato Ultra.

Luca'nus, MARCUS ANNÆUS: poet; b. at Cordova, Spain, in 39 A. D.; a nephew of the philosopher Seneca; went early to Rome; received an excellent education; distinguished himself by his poetical talent, and became a favorite with Nero, but happened to excite his jealousy, and was forbidden to recite in public. Thus stopped in the midst of a brilliant career, he joined the conspiracy of Piso, was betrayed, turned informer in order to save his own life, and began by denouncing his own mother; but was nevertheless ordered to be put to death by the emperor, and committed suicide in 65 A. D. Of his works, only the *Pharsalia*, or *De Bello Civili*, a heroic poem in ten books, is still extant, but it is either unfinished or incomplete; it treats of the civil wars between Cæsar and Pompey, and begins with the passage of the Rubicon, breaking off abruptly in the midst of the Alexandrian war. The tone is very unequal, first flattering and then reviling the emperor, and the style seems to indicate that it needed a last revision by the poet. The first book was translated into English by Christopher Marlowe in 1600; the whole by Rowe, in verse, and by Riley in 1853. There are French and German translations in verse and prose, and the poem has found warm admirers. The best editions are those by C. Fr. Weber (Leipzig, 1821–31, 3 vols.); Haskins, with notes and an introduction by Heitland (London, 1887); C. Hosius (Leipzig, 1892). Revised by M. WARREN.

Lucaris, CYRILLUS: See CYRIL LUCAR.

Lucas, Fr. pron. lü'kaa', PAUL: traveler; b. at Rouen, France, Aug. 31, 1664; son of a goldsmith; visited Greece, Asia Minor, Syria, and Egypt as a dealer in precious stones; engaged in the naval service of the Venetians; participated in the siege of Negropont 1688; became captain of an armed vessel which cruised against the Turks; returned to France 1698; again visited Egypt, and ascended the Nile 1700; went by sea to Tripoli; joined a caravan which traversed Armenia and Persia; was taken prisoner by a Dutch privateer; reached Paris 1703; published his adventures under the title *Voyage au Levant* (1704); traveled again in the East; published a second volume of his travels 1714; was sent by the Government on new antiquarian expeditions to the East 1714 and 1723; went to Spain 1736; was employed by Philip V. in arranging his cabinet of antiquities. D. in Madrid, May 12, 1737. Besides his principal work he published a *Voyage dans la Grèce, etc.* (1710), a *Voyage dans la Turquie, etc.* (1719), and left a MS. account of his last journey. His works are valuable in many respects.

Lucas van Leyden: See LEYDEN.

Lucayos: an old name for the BAHAMA ISLANDS (*q. v.*).

Lucca, Ital. pron. loo'kăa: formerly a duchy, which at some periods formed an independent republic and at others was given as a kind of pension to royal or semi-royal persons. It is now a province of the kingdom of Italy, comprising an area of 576 sq. miles, and keeps exactly its old boundaries, between Tuscany, Modena, Massa, and the Gulf of Genoa. Its soil is exceedingly fertile, and probably better cultivated than any other part of Italy. The principal products are wine, oil, and silks. Paper, glass, linens, and cottons are largely manufactured. Pop. (1891) 289,053. Capital, Lucca.

Lucca: city of Central Italy, the chief town of the province of Lucca (see ITALY); on the Serchio, about 15 miles N. E. of Pisa (see map of Italy, ref. 4–C). Lucca is situated in a most fertile plain, surrounded, except on the E., by spurs of the Apennines, and the views from the ramparts of the town are charming. The streets, generally narrow and crooked, are well paved, and the private dwellings are often spacious and elegant. The public buildings, highly interesting in themselves, contain many choice works of art, especially pictures by Fra Bartolomeo and other great masters. The cathedral was erected in the eleventh century; the rich façade was added in 1204. The town is supplied with water by a superb aqueduct, about 3 miles in length, begun in 1823 and finished in 1834. Lucca, originally Etruscan, passed first to the Ligurians, then to the Romans (about 180 years B. C.); it was governed by a duke under the Lombards, became a free state in 1055, was again under a duke (the renowned Castruccio Castracani) in 1327, and in 1370 once more recovered its liberty. Its territory then embraced a great part of what was the later duchy of Lucca —namely, the fertile district, abounding in grain, grapes, olives, chestnuts, etc., lying between Modena on the N. Tuscany on the E. and S., and the sea on the W. Though for the most part an independent republic until 1556, the history of Lucca during the Middle Ages is intimately connected with that of Pisa and Florence. In 1805 Napoleon made it a principality for the benefit of his sister Eliza, who had married a Bacciocchi, and in 1815 it fell to Maria Theresa of Spain, whose son ceded it to Tuscany. In 1860 it was annexed to Sardinia, and is now one of the fairest portions of the kingdom of Italy. Silk was manufactured here as early as the latter part of the eleventh century. In 1300 the republic had her emporiums of silken stuffs at Paris, Lyons, Bruges, etc., and somewhat later 30,000 of the inhabitants of Lucca, already known as the *Industriosa*, were said to live by this manufacture. Even to this day the silk and olive oil of Lucca are especially prized. Beautiful villas abound in the neighborhood, and the celebrated Bagni di Lucca, about 15 miles farther up the valley of the Serchio, in the midst of the most picturesque scenery, though no longer much frequented for medicinal purposes, are a favorite summer resort for foreign residents in Italy. Pop. of the commune (1893) 76,500.

Lucca, PAULINE: opera-singer; b. in Vienna, Austria, Apr. 25, 1842. The original name was LUCAS. Her parents were Jews of humble origin and condition. She owed her musical instruction to the kindness of a professional singer, made her first engagement at the Kärnthner Thor theater, and assisted in the choir at the Karls Kirche. In 1859 she appeared at the Olmütz theater as Elvira in the opera of *Ernani*, and at once became famous. At Prague she appeared as Norma, and as Valentine in *Les Huguenots*; she was the first to sing, at Berlin, the part of Selika in *L'Africaine*. In 1863 and 1865 she was enthusiastically received in London. She was particularly successful as Cherubino in *Le Nozze di Figaro*, Zerlina in *Fra Diavolo*, and Margaret in *Faust*. In Nov., 1865, she married Baron von Rhaden, who was killed in the Franco-Prussian war of 1870, and thenceforth divided her time between London and Berlin. In Sept., 1872, Lucca appeared in New York at the Academy of Music, and continued her triumphs. Her second husband was a major in the Prussian Life Guards. She had an illness in 1886 which impaired the quality of her voice, and her farewell performance in Vienna, in *L'Africaine*, in Jan., 1889, was a failure.

Revised by B. B. VALLENTINE.

Luce, STEPHEN BLEECKER: rear-admiral U. S. navy; b. in Albany, N. Y., Mar. 25, 1827; entered the navy as midshipman Oct. 19, 1841; was in action several times in 1864 and 1865, while commanding the monitor Nantucket and the steamer Pontiac of the South Atlantic blockading squadron; from Apr. 25, 1881, to June 30, 1884, was in command of the U. S. naval training squadron; Sept. 20, 1884, president of the U. S. naval war college, Coaster's Harbor island, R. I. Was appointed to the command of the North Atlantic station June 18, 1886; retired Mar., 1889. In 1892 he was commissioned by President Cleveland commissioner-general of the U. S. for the Columbian Historical Exposition in Madrid. He is the author of a work on seamanship, which is used as a text-book in the Naval Academy.

Lucera, loo-chā'răa [Ital. < Lat. *Luce'ria*, the ancient name]: a large town of Southern Italy; in the province of Foggia; 12 miles by rail N. W. of the town of Foggia (see map of Italy, ref. 6–G). The public and private buildings are handsome. The cathedral, erected by Charles II. on the

ruins of a splendid Saracen mosque, is a fine Byzantine-Gothic church. Lucera is an industrious and commercial town, the trade in home products being very active. The town possesses a large library, containing some rare books. *Luceria* was a town before the Pelasgic immigration. It retained its importance under the Lombards, the Greeks, and the Normans; and under Frederick II., who brought thither the Saracens from Sicily, its population rose to 77,000. It continued to flourish even after Charles I. and II. of Anjou drove out the Saracens, but Charles V. destroyed the prosperity of the town by his cruelty. Pop. 14,070.

Lu'cerne [cf. Fr. *luzerne*], or **Purple Medick** [*medick* is from Lat. *me'dica* = Gr. μηδική (sc. ποά, grass), medic, liter., Median grass or clover, so called because introduced from Media]: a leguminous forage-plant (*Medicago sativa*); a native of Europe, where, as in the U. S. and other regions, it is extensively sown. It should be planted in drills, and hoed to keep down the weeds. Considerable care is requisite in the early stages of its growth, but when well established, if sown on good but light soil, it will produce a greater amount of green forage than almost any other plant, and the quality is unsurpassed. It is perennial, and is cut several times in the season. In California it is known by the Spanish name of *alfalfa*, and is much prized.

Lucerne, Fr. pron. loo'sărn': canton of Switzerland; situated nearly in the center, bordering on the Lake of Lucerne and traversed by the Reuss. It comprises an area of 579 sq. miles, and is covered with mountains, which, however, rise only to the height of 6,900 feet. The soil is generally fertile, and much grain and more fruit are produced, but rearing of cattle is the main industry of the inhabitants, and is carried on to a greater extent in this canton than in any other part of Switzerland. Pop. (1888) 135,360, most of whom are of German descent and speak the German language; they are almost all Roman Catholics.

Lucerne (Germ. *Luzern*, or *Lucern*): one of the most beautiful cities of Switzerland; capital of the canton of Lucerne; on the Reuss; at the northern end of Lake Lucerne (see map of Switzerland, ref. 4–F). In the middle of the city rises an old tower which is believed to have been once a lighthouse, *lucerna*, and given name to the town. It has some remarkable churches and a celebrated monument called the Lion of Lucerne, carved in the solid rock after a model of Thorwaldsen, in remembrance of the Swiss guard butchered in Paris, Aug. 10, 1792. A very brisk transit trade is carried on here. Pop. (1888) 20,314.

Lucerne, Lake of (Germ. *Vierwaldstädter See*, liter., Lake of the Four Forest Cantons): a lake of Switzerland; inclosed by the cantons of Uri, Unterwalden, Schwytz, and Lucerne. It is 22 miles long, from ½ to 2 miles broad, and perhaps the most beautiful sheet of fresh water in Europe.

Lucia, St.: See St. Lucia.

Lu'cian, Saint: b. at Samosata, in Upper Syria, about 250; became a Christian teacher at Edessa and Antioch, inculcating a doctrine similar to that afterward known as Arianism; was three times excommunicated as a heretic; ultimately retracted his heterodox doctrines, and died a martyr at Nicomedia in the persecution of Maximin, in 312. He was the author of a revision of the Septuagint much valued by the Eastern churches.

Lucian (in Gr. Λουκιανός): Greek wit, humorist, satirist, essayist; b. at Samosata, in Syria, about 125 A. D. Little is known of his personal history except what can be gathered from his own writings. He was first apprenticed to his uncle, a sculptor, and though he abandoned the handicraft for letters, he never lost interest in matters of art, and some of his essays show remarkable insight in that domain. Greek was not his native tongue, and had to be acquired before he could enter upon the legal profession, which he practiced at Antioch. From law he turned to rhetoric and became a "sophist," or lecturer, traveling from city to city, through Asia Minor, Greece, Italy, and Gaul, and gaining both fame and fortune. At the age of forty he grew weary of this also, and betook himself to the study of philosophy, of which he appropriated only the negative side, contempt for the shams of life. "Vanity of vanities" is the burden of the dialogues and essays and sketches by which he is best known. His temper is Epicurean, but he belongs to no school and mocks at them all. It is as a free-lance that he "shoots folly as it flies" with mischievous glee and unequaled deftness, and his airiness, joyousness, sparkling wit and lambent humor, his mocking grace and inexhaustible inventiveness, make him the most modern of all the writers of antiquity. The impression of originality is doubtless heightened by the loss of his models and sources, by the loss of Menippus, by the loss of the Attic poets of the middle and the new comedy; but after making all possible deductions, Lucian is a remarkable figure in the history of literature. In his old age he returned to the futile sophistic business of his earlier career, and finally became an office-holder under Commodus, and died in Egypt toward the end of the century. No Greek author has been more copied than Lucian, and modern literature, from Rabelais to the present day, is full of imitations and adaptations of his work. Once much used as a school-book, Lucian is regaining popularity, but his Greek is not a faultless pattern. Of the eighty-two pieces attributed to him, among the best and best known are *The Dream*, *The Cock*, *The Dialogues of the Dead*, *The Dialogues of the Gods*, *Charon*, *Timon*, *The Auction of Philosophers*, *The Death of Peregrinus*, *Alexander the False Prophet*, *The Hireling Philosophers*, *How to Write History*, *The True Story*. The famous novel *Lucius, or the Ass* (see Apuleius) is not accepted as his by most Lucianic scholars. Collected editions of his works by Hemsterhuis and Reitz (1730–45, 4 vols.); Lehmann (1822–29); Jacobitz (1836–41), also in the Teubner Series; W. Dindorf (1840). Fritzsche's great critical edition (1882–85) is incomplete. Sommerbrodt's is in progress (1892). There are English versions by Francklin (1781) and by Tooke, and there is an admirable German translation with notes and introduction by Wieland. The best recent book is by M. Croiset, *Essai sur la vie et les œuvres de Lucien* (1882).

B. L. Gildersleeve.

Lu'cifer [= Lat., liter., light-bearer; *lux*, *lu'cis*, light + *fer're*, bear]: primarily, the planet Venus, as the morning star. By an error of the commentators the name has been often applied to Satan. The prophet Isaiah (xiv. 12) addresses the Babylonian king as the morning star, and commiserates him on his fall. Some of the early Christian writers imagined that reference was had to the fall of Satan, whence the error.

Lucifer: religious leader; was Bishop of Cagliari, Sardinia; appeared at the Council of Milan in 354 as the legate of Pope Liberius, but opposed the Arians in so violent a manner that the Emperor Constantius, much offended, threw him into prison and carried him from place to place for several years. After the death of Constantius he was liberated, and took up his residence in Syria, but here too he deepened, instead of healing, the controversy which took place in the Church of Antioch between the Catholic Church and the Arians. Disapproved by his own former friends, he left Antioch and retired to Sardinia, where he founded the sect of the Luciferians, and where he died in 371. He held, in opposition to the Synod of Alexandria (352), that no bishop who had in any way yielded to the Arians could enter the bosom of the Church without forfeiting his ecclesiastical rank, even though he repented and confessed his errors; and that all who admitted the claims of such persons to a full restoration of their privileges became themselves tainted and outcasts. The Luciferians, never numerous, died out soon after the death of their leader.

Revised by S. M. Jackson.

Lucifer Matches: See Matches.

Lucil'ius, Gaius: Roman poet; b. at Suessa of the Aurunci in 180 B. C.; served in the Numantine war under Scipio; lived on familiar terms with Africanus and Lælius, and died at Naples in 103 B. C. He was the founder, if not the inventor, of the *satira*, that peculiarly Roman form of poetry, in which Horace, Persius, and Juvenal excelled, and was highly appreciated in olden times; but of his thirty books of *Satiræ* only about 940 small fragments, mostly consisting of single lines, have come down to us. They were collected by R. and H. Stephens in 1564, in *Fragmenta Poetarum Veterum Latinorum*. See also the editions by L. Mueller (Leipzig, 1872); Lachmann and Vahlen (Berlin, 1876); and Baehrens's *Fragmenta Poet. Rom.*, pp. 139–266 (Leipzig, 1886); also L. Mueller, *Leben und Werke des Gaius Lucilius* (Leipzig, 1876). Revised by M. Warren.

Luci'na [= Lat., deriv. of *lux*, *lucis*, light]: the goddess of light, almost invariably used as an epithet of Juno as the goddess presiding over women in childbirth. See Juno.

Lücke, lü'ke, Gottfried Christian Friedrich, D. D.: theologian; b. at Egeln, near Magdeburg, in the Prussian province of Saxony, Aug. 24, 1791; studied theology at

Halle and Göttingen, and became professor at Bonn in 1818, and in 1827 at Göttingen, where he died Feb. 14, 1855. His most prominent works are *Grundriss einer neutestamentlichen Hermeneutik* (Göttingen, 1817) and *Commentar über die Schriften des Evangelisten Johannes* (Bonn, 4 vols., 1820–32), in part translated into English as *Commentary on the Epistles of St. John* (Edinburgh, 1837). His theological library was purchased for Harvard College.

Luckey, George W. A.: See the Appendix.

Luckner, lŏŏk'ner, Nicolaus, Count: marshal of France; b. at Kampen, Bavaria, Jan. 12, 1722; adopted very early a military career, and served first in the Bavarian army, then in the Prussian army, distinguishing himself in the Seven Years' war, especially in the battle of Rossbach, and at last in the French, which he entered in 1763 as a lieutenant-general; in 1791 was made a marshal of France, and in Feb., 1792, was appointed commander, first of the army of Alsace, then of that of the North. In June he took Menin and Courtray, but retired then suddenly to Lille, none understood why. In July he was appointed commander-in-chief of the corps of Biron and La Fayette, and fought successfully against the Austrians at Longwy (Aug. 19), but a few days afterward he was replaced by Kellermann, for reasons unknown, and called before the bar of the Convention, because he had not punished Gen. Jarry, who, when evacuating Courtray, had set fire to the city. He was ordered not to leave the city, and lived quietly for some time; but in Sept., 1793, the payment of his pension of 36,000 francs was suspended, and when he made demands for his money, he was dragged before the revolutionary tribunal, convicted of conspiring with Louis XVI. and the foreign foe against France, and guillotined Jan. 4, 1794.

Lucknow [from Hind. *Laksmanavate*, the native name]: city of British India; the capital of the province of Oudh; in lat. 26° 53′ N., lon. 80° 58′ E.; on the Gumti, an affluent of the Ganges, 610 miles from Calcutta, at an elevation of 360 feet above the sea (see map of N. India, ref. 6–F). At some distance the city presents a magnificent aspect, but it disappoints on a nearer approach. The whole central part of it consists of narrow and crooked streets, sunk several feet into the ground, and lined with huts of mud or bamboo, thatched with straw or palm-leaves. The commercial part of the city along the river, which here is 100 yards wide, navigable for large boats, and crossed by three bridges, is better built; it has brick houses surrounded with gardens. In the east quarters are several mosques and palaces, among which the Imambara is the most remarkable; it is an extensive structure, containing a mosque, the sepulcher of Asof-ud-Dowla, a college, etc.; but several parts of it are of a most beautiful architecture. The buildings erected under the auspices of Claude Martin, a Frenchman, who went to India as a poor soldier, but rose to great power in the former kingdom of Oudh, such as the Constantia, Martinière, etc., are very gorgeous. Lucknow manufactures much gold and silver brocade, and its muslins and other fabrics are held in high esteem. Its jewelry was once famous, and its glass-work is still prized. It is a railway junction. From 1775, and to the incorporation of the kingdom of Oudh with the British dominions, Lucknow was the capital of the country. The mutiny of 1857 broke out at Lucknow early in May, and from July 1 to Sept. 25 the feeble garrison of European forces under Sir Henry Lawrence withstood the large besieging party of mutineers, during which time Sir Henry was killed. On the latter date they were relieved by the forces under Gen. Outram and Gen. Havelock, who cut their way in, but were in turn themselves besieged by the still greatly superior force of the natives; and it was not until Nov. 17 that Sir Colin Campbell arrived to their relief with re-enforcements. The city, however, could not be held, and was secretly evacuated on the 22d. Three days later Gen. Havelock died of dysentery. It was not until Mar. 19, 1858, and after much hard fighting, that the city, which had been fortified by the insurgents, was repossessed by the British. Pop. (1891) 273,090.

Revised by Mark W. Harrington.

Lucre'tia: a daughter of Spurius Lucretius Tricipitinus, and the wife of Lucius Tarquinius Collatinus; celebrated as much for her virtue as for her beauty. Sextus Tarquinius, a son of Tarquinius Superbus, the King of Rome, and a kinsman of her husband, became passionately enamored of her, and once, having been hospitably received in her house during the absence of Collatinus, he entered her bedchamber in the night with a drawn sword, threatened to lay a slave with his throat cut beside her, and say that he had killed him in order to avenge her husband's honor, thus compelling her to yield to his wishes. As soon as he had departed she sent for her father and husband, told them what had happened, made them swear to avenge her, and then stabbed herself. When the infamous deed became known it aroused the whole people, and Lucretia's funeral became the occasion of a general revolution, by which the Tarquins were expelled from Rome and the republic was established.

Lucre'tius, Titus Lucretius Carus: poet; b. probably in 97 B. C. and died 53 B. C. His death seems to have been sudden, and is supposed to have been by suicide, through derangement occasioned by the effects of a philter administered to him. (For the current theory on the motives of this, see Tennyson's poem, *Lucretius*.) Very little is known in regard to his education, career, residence, or fortune. He was a Roman citizen of noble extraction, and probably studied at Athens, obtaining there his intimate acquaintance with the Greek poets and philosophers. His poem, *De Rerum Naturâ*, which received Cicero's revision, has come down to us entire, although apparently unfinished by its author. It has been called the greatest of didactic poems, on account of the scientific precision and clearness of its statements and the grandeur and beauty of its poetic dress. The poem contains six books, with upward of 7,000 lines in all, and is dedicated to C. Memmius, prætor 58 B. C., as a personal friend of the author. It is regarded as the completest exposition of the physical system of Epicurus, and embodies the theories of Democritus, together with the hedonic doctrine of Aristippus. Lucretius was the representative apostle of *éclaircissement* in the ancient world, and he has remained the favorite poet of rationalism to this day. His great object was to free mankind from the fear of death, arising, as he thought, from superstition inherent in the popular religion. He fills with poetic fire the dry atomistic physics of his master, and there naturally arises an inconsistency between his scientific conviction and the form of his exposition. This has been pointed out by Bayle, Montaigne, and others. He denies all design in nature, and accounts for the universal prevalence of law and arrangement in the universe through the so-called "theory of natural selection": "Atoms wrought on by impulse and gravity, and excited in every mode to cohere, and having been tried in all possible aggregations, motions, and relations, *fell at last into those that could endure*." His sublime poetic feeling, however, led him on from the use of trope and metaphor to the employment of mythological machinery and allegory. He apostrophizes Venus as the personification of nature, but does not forget her mythological relation to the Roman people. He also recognizes the other gods as existing, although different from the popular representation of them. The following brief analysis of his poem will indicate to the reader his chief views: Book I. opens with an invocation of Venus, and is followed by an invective against superstition; the logical consequence of his doctrine is the destruction of mythology and allegory—in fact, of all sensuous embodiment of ideas. The principles of his cosmogony are (*a*) nothing comes from nothing; (*b*) matter is eternal; (*c*) its elements are the atom and the void; he repudiates Heraclitus with his doctrine of fire, and also Empedocles and Anaxagoras. Book II. treats of atoms, their form, number, and development into life and generation, growth, and decay. Book III. treats of the soul, making it to be identical with the body, explicitly denying immortality, and offering his consolations thereon. Book IV. treats of sensations and perceptions, explaining their origin in physical emanations from bodies, causing images to arise in the sensory of the one who perceives; sleep, dreams, and love are explained. Book V. gives his views of the origin of the world, and of the rise of the institutions of human civilization: (*a*) marriage and the family, (*b*) society, (*c*) the state, (*d*) religion, (*e*) music and poetry. This book is the most impressive part of his poem, inasmuch as it deals with human relations. Book VI. treats of meteorology, phenomena attributed directly to the agency of the gods being shown to have a natural cause—e. g. thunderbolts, instead of being the weapons of Jove, are developed by the friction of clouds, and the thunder is the noise occasioned by their (i. e. the clouds) flapping together, etc. A poetical rendering of the story of the plague at Athens, as told by Thucydides, closes his work. Lucretius was greatly admired in the fifteenth and sixteenth centuries, and traces of his influence are found in the works of the best English poets; for example, Spenser in the fourth book of his *Faerie Queene*

paraphrases the address to Venus already mentioned. His influence upon Giordano Bruno was extraordinary; also upon Immanuel Kant, notwithstanding the contrast between the ethical theory of Kant and that of Epicurus. The edition of this poem with notes and prose translation by H. A. J. Munro (Cambridge, 1886), is especially to be mentioned. See also Lachmann's ed. (Berlin, 1871); Martha's *Le poëme de Lucrèce* (Paris, 1885); and Schanz, *Röm. Lit. Geschichte*, pp. 135–141 (Munich, 1890).

WILLIAM T. HARRIS. Revised by M. WARREN.

Lucul'lus: the surname of a plebeian family of the gens Licinia, which first appears in history at the close of the Second Punic war. The most famous member of this family was Lucius Licinius Lucullus, the conqueror of Mithridates. The exact dates of his birth and death are not known, but he was still a young man when he distinguished himself in the Social war and gained the favor of Sulla, whom he accompanied as quæstor to Greece and Asia on the breaking out of the First Mithridatic war, in 88 B. C. On the return of Sulla, in 84, he was left in charge, and for four years administered affairs so successfully that Sulla, on his deathbed, confided to him his *Commentaries* and appointed him guardian of his son Faustus. In 79 he was made curule ædile, in 77 prætor, and in 74 consul. Although the new province of Bithynia and the conduct of Eastern affairs had fallen to Cotta, the colleague of Lucullus, the latter was called in to share these responsibilities on the renewal of the conflict with Mithridates, etc. Mithridates, who had invaded Bithynia, defeated Cotta and besieged him at Chalcedon. Lucullus, who in an astonishingly short time had reorganized and thoroughly disciplined his army, hastened to the support of his colleague, threw Mithridates back into Pontus, routed his army at Cabira in 72 B. C., and his fleet at Tenedos in 71 B. C., took Eupatoria, Amisus, and Sinope, compelled the king to seek refuge with his son-in-law, Tigranes, King of Armenia, and brought his country under Roman authority. The troops were tired of the war, and intrigues at Rome secured a decree placing Acilius Glabrio in command; but Glabrio was inefficient, and Lucullus was subjected to the mortification of seeing Mithridates once more in possession of the territory. In 66 he was recalled, and the credit of bringing the war to a successful close was given to Pompey; but Lucullus was given a triumph in 63, though he never again entered into the active affairs of political and military life. He had amassed enormous wealth, and now gave himself up to a life of luxury. His gardens in the suburbs of Rome were fitted up with extraordinary splendor, and his villas at Tusculum and Naples were of such magnificence as to become proverbial. He collected a valuable library, and was the generous patron of letters. D. about 57 B. C. Revised by C. K. ADAMS.

Lu'den, HEINRICH: historian; b. at Loxstedt, near Bremen, Germany, Apr. 10, 1780; studied theology, philosophy, and history at Göttingen, and was appointed Professor of Philosophy in 1806, and of History in 1810, at Jena, where he died May 23, 1847. His *Ansichten des Rheinbundes* (1808) attracted much attention, and exercised some influence on public opinion in Germany concerning Napoleon's policy. His later and larger works, *Allgemeine Geschichte des Alterthums* (1814), *Allgemeine Geschichte des Mittelalters* (1821–22), and *Geschichte des deutschen Volks* (12 vols., 1825–37, reaching only to 1237), have also had influence, though the views which they propound have led to much controversy.

Lü'ders, ALEXANDER NICOLAJEVICH, Count: general; b. in 1790 of a German family settled in Russia; entered the Russian army in 1807; was made a brigadier-general in 1826; distinguished himself in 1831 at the storming of Warsaw; fought in the Caucasus from 1844–45 against Schamyl, and took Dargo; put down the revolution in Roumania in 1848; fought in Hungary in 1849, and won a complete victory over Bem, which rapidly led to the pacification of the country; was commander-in-chief in the Crimea when Sevastopol was taken; and was appointed lieutenant-general of Poland in 1861, but was recalled in 1862, on account of his too severe disposition. Before he left Poland an attempt was made to assassinate him, but he only received a severe wound. He retired from service, was made a count, and died at St. Petersburg, Feb. 13, 1874.

Ludhiana, loo-dĕĕ-aa'na: district of British India; Umballa division, Punjaub; on the eastern bank of the Sutlej; comprising an area of 1,375 sq. miles, with 620,000 inhabitants. Its capital, Ludhiana, lies in lat. 30° 55′ N. and lon. 75° 54′ E.; has large manufactures of shawls of an inferior quality, and carries on a considerable banking business and transit trade. Pop. about 44,000.

Ludington: city; capital of Mason co., Mich. (for location of county, see map of Michigan, ref. 5–H); on Lake Michigan, and the Flint and Père Marq. Railroad: 84 miles N. E. of Milwaukee, with which it has regular steamboat connection. It is in a fruit and salt region, and has an excellent lake harbor, numerous lumber-working establishments, foundry and machine-shop, union school library, and a daily and four weekly newspapers. Pop. (1880) 4,190; (1890) 7,517; (1900) 7,166.

Ludlow, lŭd'lō: town; in the county of Shropshire, England; at the confluence of the Corve and Teme; 28 miles S. of Shrewsbury (see map of England, ref. 10–F). Its castle, formerly an important stronghold against the Welsh, was the residence of Henry VII. (1485–1509), and of Mary Tudor before her accession to the throne, and is still more memorable as the scene of the representation of Milton's *Comus*. It was held for Charles I. (1646), but surrendered to the parliamentary forces, soon after fell into decay, and is now a ruin. There is a grammar school, founded in 1282. Pop. (1891) 4,460.

Ludlow, EDMUND: statesman and soldier; b. at Maiden-Bradley, Wiltshire, England, in 1620; was educated at Oxford; entered the parliamentary army as a volunteer on the outbreak of the civil war; became a colonel of cavalry; was one of the members of the high court which condemned Charles I.; protested against Cromwell's assumption of the protectorate, and agitated against him in favor of a republic; retired to Switzerland at the approach of the Restoration, and spent the remainder of his life there, returning to England only for a brief period in 1688; resided at Vevay, where he wrote his valuable *Memoirs* (3 vols., 1698–99), and died in 1693.

Ludlow, JAMES MEEKER, D. D., L. H. D.: minister and author; b. in Elizabeth, N. J., Mar. 15, 1841; was educated in the College of New Jersey and Princeton Theological Seminary; was pastor of the First Presbyterian church of Albany, N. Y., 1865–69; of the Collegiate Reformed Dutch church of New York 1869–77; of the Westminster Presbyterian church, Brooklyn, 1877–86; and since 1886 of the First Presbyterian church, East Orange, N. J. He devised and constructed the *Concentric Chart of History* (1885), and has published *The Captain of the Janizaries* (1886); *A King of Tyre* (1891); *That Angelic Woman* (1891); *My Saint John*; addresses, and many contributions to periodicals.

Ludlow, WILLIAM: See the Appendix.

Ludol'phus, JOB: Orientalist; b. at Erfurt, in the Prussian province of Saxony, Jan. 15, 1624; studied languages in his native place and at Leyden; traveled in 1647 in France and England; accompanied Queen Christina of Sweden in 1649 to Rome, where he made the acquaintance of some Abyssinians, by whose aid he studied the Ethiopic language; visited Sweden and Denmark; settled in 1652 in Gotha; and died Apr. 8, 1704, at Frankfort. He wrote *Historia Æthiopica* (1681, and often since); *Amharic Grammar and Dictionary* (1698); *Lexicon Æthiopicum* (2d ed. 1699); and *Æthiopische Grammatik* (1702). He was the founder of the study of Ethiopic in Europe. Revised by C. H. TOY.

Ludwig (lood'vich) **I.**, KARL AUGUST: King of Bavaria; b. at Strassburg, Aug. 25, 1786; was highly educated, and while prince gave his time and attention to literature and art instead of politics. The famous collection of sculpture, the Glyptothek, was made by him, and many of the finest buildings of Munich were constructed under his direction. He came to the throne in 1825, and, though he introduced some economic reforms and continued his patronage of fine arts, his subjection to ultramontane influence, his disregard for constitutional rights, and the scandal caused by his *liaison* with Lola Montez made his rule most unpopular. After the revolutionary disturbances in the spring of 1848 he resigned in favor of his son, Maximilian Joseph. D. at Nice, Feb. 29, 1868.

Ludwig II., OTTO FREDERICK WILLIAM: King of Bavaria; b. at Nymphenburg, Aug. 25, 1845; succeeded his father, King Maximilian II., Mar. 10, 1864. He was a man of romantic nature, an artist, with very fantastic ideas of his personal dignity as a king, and rather capricious opinions concerning political questions. In the affairs of Germany, however, he played an important and noble part. At the outbreak of the Franco-German war in 1870 he sided imme-

diately with Prussia, and during the negotiations concerning the new organization of Germany he spoke with enthusiasm for the establishment of the German imperial throne. He showed considerable insight into internal politics, but he disliked to devote himself steadily and with consistency to the daily business of governing. He showed himself very seldom to his people, and public festivities were disagreeable to him. He lived mostly in solitude in his magnificent palaces, of which he seemed to prefer Hohenschwangau, situated amid beautiful mountain scenery, and here he busied himself with art, especially with music. On account of this passion for music he became the patron and admirer of Richard Wagner; but there broke out among the people frequent riots against Wagner, and in 1866 the king was compelled to send the composer from the court. Another peculiarity was his enthusiasm for Louis XIV. After the war with France he visited Paris and Versailles, in order to study their works of art, and especially the remembrances they contain of Louis XIV. He also sometimes arranged great theatrical performances in the most expensive style, at which he himself was the sole spectator. At length it became evident that he was insane. He was deposed, June 10, 1886, and drowned himself three days afterward.

Ludwig, KARL, M. D.: physiologist; b. in Witzenhausen, Germany, Dec. 29, 1816; was educated in the Universities of Marburg and Erlangen; became professor in the University of Marburg 1846, of Zurich 1849, of Vienna 1855, and of Leipzig 1865; and published several investigations of great importance. D. Apr. 25, 1895. His chief work is *Lehrbuch der Physiologie des Menschen*.

Ludwig, OTTO: dramatist and Shakspearean critic; b. at Eisfeld, in the principality of Saxe-Meiningen, Germany, Feb. 11, 1813; studied music at Leipzig under Mendelssohn-Bartholdy, but was compelled by ill-health to give up his career; devoted himself to literature, and settled in 1855 at Dresden, where he died Feb. 25, 1865. His tragedies, *Der Erbförster* (1853), *Die Makkabæer* (1854), and *Agnes Bernauer* (1857), were enthusiastically received, since they disclosed a poet of unusual dramatic power, who had carefully schooled himself by the study of Shakspeare. Ludwig was equally successful as a writer of fiction, his tale *Zwischen Himmel und Erde* (1856) being one of the best stories in the German language. The results of his studies of Shakspeare are embodied in a series of essays under the title *Shakspeare-Studien* (1871), and contain probably the best analysis of Shakspeare's dramatic art that was ever written. See Gustav Freytag, *Gesammelte Aufsätze*, i., 20; Adolf Stern, introduction to the *Gesammelte Schriften von Otto Ludwig* (Leipzig, 1892). Revised by JULIUS GOEBEL.

Ludwigsburg, lood'vichs-boorch: town of Würtemberg, 8 miles from Stuttgart; with an immense palace, beautiful parks and promenades, a military academy, and barracks (see map of German Empire, ref. 7–D). It is the second royal residence of Würtemberg, and was founded in the beginning of the eighteenth century, as a rival to Stuttgart, by the Duke Eberhard Ludwig. It was greatly enlarged by his successor, Duke Charles, who resided there from 1764 to 1785, but it never acquired very great importance beyond that of being a royal residence and a military dépôt. Some manufactures, however, of woolen and linen cloth, of japanned tinware, picture-frames, organs, etc., are carried on. Pop. (1890) 17,418.

Ludwigshafen, -haa'fen: town of Germany, in Rhenish Bavaria, on the left bank of the Rhine, opposite Mannheim; founded in 1843 by Louis I. of Bavaria (see map of German Empire, ref. 6–D); has direct railway communication with Paris, Mentz, and Frankfort. In 1802 it was simply the *tête-du-pont* of Mannheim and grew up very slowly. In 1843 it received its present name, and in 1859 it was made a town. It is a rapidly growing manufacturing and commercial place, producing wagons, aniline dyes, soda, tartaric acid, alum, artificial manures, and lime. Pop. (1890) 28,768. In 1895 the population was 39,801.

Lugano, loo-gaa'nō: town; in the canton of Tieino, Switzerland; on the northern shore of the Lake of Lugano, whose southern part stretches into Italy. It is one of the three alternating capitals of the canton, and carries on a considerable transit trade between Switzerland and Italy (see map of Switzerland, ref. 8–H). The inhabitants, numbering (1888) 7,097, are Italians by descent, and Italian is the language exclusively spoken. During the Italian struggle for independence (1848–66) Lugano was the headquarters of Mazzini.

Lugano, Lake of: a body of water situated on the frontier between Switzerland and Italy, and between Lago Maggiore and Lago di Como. It is of a very irregular shape, 20 miles long, but nowhere more than 1½ miles broad. The surrounding scenery is grand and wild. The lake is fed by a number of short torrents which issue from the surrounding mountains, and through the river Tresa sends its waters into Lago Maggiore, which lies 200 feet lower.

Lugo, loo'gō: a town in the province of Ravenna, Italy; about 14 miles W. of the city of Ravenna (see map of Italy, ref. 3–D). It lies in a very fertile plain between the Senio and the Santerno, and is connected by good roads with the chief towns of the Romagna. The great square of the Padiglione presents a lively appearance during the annual September fair, when dealers from every part of the Romagna gather to trade in grain, wine, cattle, hemp, silk, etc. It possesses a savings-bank, and a town library partly composed of books from suppressed convents. Pop. 9,200.

Lugo: province of Spain, bordering N. on the Atlantic; comprises an area of 3,787 sq. miles, with (1887) 431,644 inhabitants. The northern part is mountainous, rich in iron and lead, and covered with forests; the southern part is a large and fertile plain, producing wheat, wine, fruits, etc.

Lugo: capital of the province of Lugo, Spain; on the Miño; 72 miles by rail S. E. of Corunna (see map of Spain, ref. 12–B). It is an old but regularly and substantially built town, with a fine cathedral of the twelfth century, and celebrated sulphur springs. There are manufactures of linen and leather. Pop. 19,952.

Lugworm, or **Lobworm**: a popular name for the worm known to science as *Arenicola marina*, which is found in European waters and upon the northeastern coast of the U. S. In Europe it is used extensively for bait.

Luini, loo-ee'nĕe, BERNARDO: Italian painter; b. at Luino, on Lago Maggiore, in 1470; erroneously said to have been a pupil of Leonardo da Vinci. He is supposed to have visited Rome, because at Santa Croce in Lombardy frescoes of his have been discovered, representing the story of Europa, quite Raphaelesque in grace and style, and also some monochromes, which show a knowledge of Roman statues, of which some are represented, the Laocoön, for instance. His most important frescoes are at Lugano, in the Capuein church, at Saronno, and the Monastero Maggiore in Milan. Many from other churches are now to be seen in the Brera Gallery of Milan. He worked with less ease in oil, but the *Magdalen*, at the Ambrosiana, the *Madonna*, and also a *St. John Caressing a Lamb*, are masterpieces. There are many of his easel-pictures in private collections in Milan. His *Madonna of the Rocks*, in the Brera, as also his *Herodias*, in the Louvre, and *Modesty and Vanity*, lately in the gallery of Prince Seiara, Rome, have been erroneously ascribed to Leonardo da Vinci. He was a poet and wrote a treatise on painting. His fame was not great in his own time, as he remained in Lombardy all his life, and Vasari writes of him briefly. He was still living in 1530. W. J. STILLMAN.

Luitpold, lwĕĕt'polt, Prince CHARLES JOSEPH WILLIAM LUDWIG: regent of Bavaria; b. at Würzburg, Mar. 12, 1821; married Apr. 15, 1844, Princess Augusta, Archduchess of Austria; was appointed regent June 10, 1886, on the deposition of the insane King Ludwig II. Prince Otto, the nominal successor of Ludwig, was also insane, and Luitpold continued as regent.

Lukaszewicz, loo-kaă-shev'itch, JÓZEF: historian; b. at Krąplewo, Poland, Nov. 30, 1799; studied at the gymnasium of Posen; 1829 became librarian to the Count Raczyński, for whom he examined the archives and libraries of Warsaw, Cracow, Breslau, Königsberg, Dantzic, Thorn, etc., and especially the archives of the Bohemian Brethren at Leszno, in search of rare books and MSS. For several years he taught Latin at the gymnasium of Posen, and, with Popliński, edited two journals, *Tygodnik Literacki* (1838–40) and *Orędownik Naukowy* (1840–46). He became, in 1852, owner of the Targoszyce estate, to which he retired, giving up his position as librarian, yet continuing his literary labors until his death, Feb. 18, 1873. Most of his works are devoted to the history of Protestantism in Poland. They are *Wiadomość historyczna o Dyssydentach w mieście Poznaniu w XVI i XVII wieku* (The Protestants of Posen in the Sixteenth and Seventeenth Centuries, Posen, 1832; German trans. Darmstadt, 1843); *O kościołach Braci Czeskich w dawnéj Polsce* (Churches of the Bohemian Brethren in Ancient Poland, Posen, 1835); *Dzieje kościołów wyznania hel-*

weckiego na Litwie (History of Calvinist Churches in Lithuania, 2 vols., Posen, 1841–43; German trans. Leipzig, 1848; same, in Little Poland, 1853). His history of the Catholic Church in Posen is given in *Krótki opis historyczny kościolów parochialnych . . . w dawnéj dyecezyi poznańskiéj* (2 vols., 1858–63). His master-work is a history of schools in Poland and Lithuania, *Historya szkól w Koronie i W. Ks. Lit. od najdawniejszych czasów do 1794 r.* (2 vols., 1849–51). He also wrote an historico-statistical sketch of Posen, *Obraz historyczno-statystyczny miasta Poznania* (2 vols., 1839; German trans. Leszno, 1845); a geography of ancient Poland, *Geografia starożitnéj Polski* (1842, under the pseudonym *J. Andryszowicz*); and translated Pliny's *Natural History* (1845). J. J. KRÁL.

Luke, SAINT [from Lat. *Lu'cas* = Gr. Λουκᾶς]: the author of the third Gospel. He was the only author of Gentile descent who took part in the composition of Holy Scripture. In the Epistle to the Colossians (iv. 10–14) Paul distinguishes him, together with Epaphras and Demas, from all his assistants of Jewish descent, Aristarchus, Marcus, and Justus. An old tradition, mentioned by Eusebius and Jerome, maintains that he was from Antioch, the capital of Syria, where for the first time Christianity took root in a heathen country, which became the cradle of the mission to the Gentiles. It has been assumed, though unjustly, that this tradition was only a misunderstanding of Acts xiii. 1, in which a certain Lucius, with whom Luke might have been confounded, is mentioned as one of the prophets and teachers of Antioch; but Eusebius and Jerome must have written carelessly, in order thus to confound the name of Luke (Lucas, abridged from *Lucanus*) with that of Lucius (derived from *lux*), and still more so to conclude from a passage, in which Lucius is mentioned as descending from Cyrene, that Luke was from Antioch. The narrative of the foundation of the church of Antioch (Acts xi. 19–26) is written with so much vividness and freshness that we seem to recognize the emotion of a personal remembrance; and it is quite remarkable that in a work of the second century, which probably still contains some authentic traditions, "the most excellent Theophilus," to whom the two writings of Luke are dedicated, is mentioned as a man living in Antioch: "Thus Theophilus, the most powerful man of the city, consecrated to the worship and under the name of a church the palace which he inhabited." Paul calls Luke (Col. iv. 14) "the beloved physician." This expression proves that Luke belonged to the lettered class of the people, and was possessed of a certain amount of scientific knowledge. It is, indeed, certain that at this epoch there existed in the empire a medical superintendence quite severe. A supreme authority, *collegium archiatrorum*, awarded the diploma of medicine, and examined in every city those who exercised the medical art. The cures were rigorously scrutinized, and grave mistakes were punished by the loss of the right of practicing. Of all Paul's companions Luke was probably the only one who was possessed of a scientific and literary education.

Some old writers maintain that Luke had been a disciple of Jesus, and was one of the seventy disciples whom the Lord sent to the places of Galilee in order to prepare for his own visit (Luke x. 1, *seq.*); but the introduction to the Gospel is not in favor of this supposition. In i. 2 Luke ranks himself among those who owe their knowledge of the gospel history to the teachings of eye-witnesses, which proves that he was not an eye-witness himself; but it is possible that, in accordance with an old supposition, he was one of the two disciples whom Jesus accompanied to Emmaus on the day of his resurrection. One of them is mentioned by name, Cleopas. The anonymity of the other may indicate that he is the author himself; and this circumstance would correspond well with the dramatic character of the whole narrative, and especially with the following words, which seem to refer to a personal experience: "Did not our heart burn within us, while he talked with us by the way, and while he opened to us the Scriptures?" (Luke xxiv. 32). If, as the whole tradition testifies, Luke is the author of the Acts, and if he always speaks of himself in this book when he says "we," we meet him for the first time at the moment when Paul, having arrived at Troas on his second missionary voyage, prepares to cross over to Europe and undertake a missionary journey through Greece, beginning with Macedonia (Acts xvi. 10): "And after he had seen the vision, immediately we endeavored to go into Macedonia." It is improbable that Luke thus should have placed himself as immediately co-operating with the mission from the very beginning, and the supposition has been made that the author of the Acts here inserts a fragment of a journal of one of the companions of Paul; as, for instance, Timotheus or Silas; but it is not probable that the author of the Acts, who shows himself an able writer in both his books, should have committed such an awkwardness as to insert in his own work a passage from another one in this way, though it would be very easy for him to change the "we" to "they." He who speaks thus in this passage is evidently the same as he who calls himself "I" in the first words of the book: "The former treatise have I made, O Theophilus" . . . (Acts i. 1). The exact study of the style of the Acts has proved that this book was written from the beginning to the end by the same hand, and that this hand is the same which composed the third Gospel. The objection raised falls if we admit that Luke was originally from Antioch, a member of the church of that city, and long acquainted with St. Paul. It seems as if, after the foundation of the church in Philippi, Luke remained in that city, probably in order to take care of the young church, while Paul, Silas, and Timotheus continued their journey; for the "we" disappears in the narrative of the mission from this moment, and until the epoch when toward the end of his third journey St. Paul passed once more through Philippi, on his way to Jerusalem. At this point it reappears. "These going before," it reads in the Acts xx. 5, with reference to the deputies of the churches of Greece and Asia who accompanied Paul to Jerusalem, "tarried for *us* at Troas." The "we" then continues until the arrival at Jerusalem; and as it begins again at the moment when Paul, after two years' imprisonment at Cæsarea, departs for Rome, it is natural to conclude that Luke had remained in Palestine during these two years of Paul's captivity. It was during this time that he gathered on the very theater of the evangelical history the information and the materials with which he composed his two works. He alludes himself to this information in his Gospel (i. 1–4). After these two years he went with Paul to Rome, and participated in the shipwreck, which he has described in a graphic manner in Acts xxvii.; and he arrived at Rome with the apostle in the spring of 62. In the Epistles to the Colossians and to Philemon, which probably are the first letters written by Paul from Rome, he addresses salutations which prove that Luke lived with him during the first period of that captivity, with which the book of the Acts ends. The Epistle to the Philippians, written toward the close of these two years, contains no salutation from Luke to this church, with which he was so closely connected; from which circumstance we must infer that he had left Paul and returned, for the time being, to the Orient. We find him once more in company with Paul, and as a prisoner, in the Second Epistle to Timothy (iv. 11), where the apostle says of him: "Only Luke is with me." Probably the second captivity is here referred to, which Paul suffered in the year 66 or 67, and which terminated with his martyrdom, the first having ended in the beginning of 64. According to a tradition mentioned by Jerome, Luke preached the gospel in Achaia and Bœotia. Gregory Nazianzen speaks first of his martyrdom, and Nicephorus Callistus in the fourteenth century asserts that he was hanged on an olive-tree in Greece at the age of eighty years. From the testimony of Jerome it seems certain that his ashes, as well as those of Andrew, were brought from Achaia to Constantinople by orders of Constantius in 356. Thus we may consider Luke as an educated Greek, and as one of St. Paul's most faithful assistants among the Gentiles of Greek nationality.

Works.—Christian antiquity has ascribed to Luke the Acts of the Apostles as well as the third Gospel. As these writings have never borne the name of any other author than that indicated by the title given them by the primitive Church, there is no reason for doubting the tradition. As Luke is for us one of the most conspicuous and most frequently mentioned of Paul's companions, one might perhaps think that on this point the Church has proceeded by way of supposition. This is not so, however. It is only on account of his works that the name of Luke is so well known in the Church. The rarity of this name in the writings of the New Testament speaks in favor of the truth of the tradition. It is incontestable that the author of the third Gospel and the Acts must be sought among the assistants of St. Paul. To prove this the striking analogy suffices between the form of the institution of the Lord's Supper in Luke and in Paul (1 Cor. xi.). There is, furthermore, the closest relation between the enumeration of the appearances of Jesus

after the resurrection in Luke (xxiv.) and in Paul (1 Cor. xv.). The whole history of Jesus by Luke is a demonstration of the reality of those two great principles which form the basis for all of St. Paul's preaching—namely, the universality of the salvation and its entire gratuity. That is the reason why Luke traces the genealogy of Jesus to Adam, the father of mankind, and not only to Abraham, the father of the Jews, as Matthew does; why he loves to tell the parables of grace (ch. xv., the lost sheep; the piece of silver; the prodigal son) and other narratives of a similar bearing, as, for instance, the forgiven sinner (ch. vii.) and the Pharisee and the publican (ch. xviii.); why, furthermore, he has completed the narrative of the Gospel by a picture of the foundation of the Church by the apostles, especially by St. Paul, whose grand missionary labor among the Gentiles he follows until his arrival at Rome, the center of the empire. From the fact that the writings of Luke give a support to the ideas of Paul it has been inferred that in several points he has modified the teaching of Jesus in favor of this particular aim, but that is to lower the intention of the sacred writer in a strange manner. In his two writings he defends a cause much higher than that of St. Paul: he pleads the cause of God himself. In chaps. ix. and xi. of the Epistle to the Romans we are told that the Jews even claimed that God had not the right to withdraw the salvation from them and give it to the Gentiles, since he had bound himself to them by inviolable promises. The aim of the whole work of Luke is to demonstrate that God has faithfully accomplished his promises, by the apostles preaching first to the Jews and then to the Gentiles, and that, consequently, it is not God who has broken his engagements with his people, but the people who have rejected their God.

Among all the assistants of St. Paul, Luke the physician was probably the only one who was able to write such a work. The introduction, contained in the four first verses of ch. i., presents a striking analogy to the introductions of the great Greek historians; as, for instance, Herodotus and Thucydides. The style of these verses is classical, but from verse v. Arameanisms abound, which show from this point that the author is reproducing certain documents in that language, and reproducing them with scrupulous exactness. The pure Greek of the author, although always with certain forms of language of his own, does not reappear until the second part of the book of the Acts, where it comes in quite naturally, as at this point he begins to narrate what he has seen and heard himself. All these traits correspond perfectly with the character designated by tradition—a friend of Paul, and a Greek of classical education. Luke must have composed this Gospel for the Gentiles at nearly the same time when St. Paul founded the Church of the Gentility. This circumstance also proves the purity of the traditions which are given here, and which in no point resemble those legends which we meet in the Fathers even from the beginning of the second century; as, for instance, in Papias. Most admirable is the manner in which Luke knows how to place the words of Jesus so as to make them striking—a quality which proves the exactness of the information he had gathered concerning the circumstances under which the words were spoken. Clemens of Alexandria places the composition of the Gospel of Luke even before that of the Gospel of Mark, according to a tradition due to the ancient presbyters. With respect to the locality in which the composition took place, we have only a tradition stated by Jerome, according to which it was in the countries of Achaia and Bœotia, but this tradition has nothing certain; Macedonia or Antioch would be as probable a supposition, as Greek literature and language reigned in both countries. The question has often been raised why Luke ends the book of the Acts with the two years' captivity of St. Paul in Rome. Why did he not relate the martyrdom of the apostle if thus his captivity terminated, or if not, then his liberation? To these questions it has been answered that he may have treated this subject in a third book, which has not come down to us, or that he died before finishing his work. More generally it has been supposed that the reason why he did not continue his narrative further was that he finished his book just when the imprisonment of the apostle terminated. This supposition is the least improbable. It is nevertheless not certain. The idea of the book of the Acts is by no means to give the biography of Peter or Paul, or any other man. Like the whole Scripture, the book refers to the great subject of the *reign of God*. It contains the history of the apostolical foundations: (1) the foundation of the Church among the Jews by Peter (i.–v.); (2) the providential preparation for preaching among Gentiles (vi.–xii.); the foundation of the Church among Gentiles by Paul (xiii.–xxviii.); and these foundations had been accomplished at the end of Paul's first captivity, with which the Acts end. Thus the plan of the two works is—from Nazareth to Capernaum; from Capernaum to Jerusalem; from Jerusalem to Antioch; and from Antioch to Rome. Luke traces the progress of faith in Christ from the individual to the Church, and from the Church to the center of the world's scene. FREDERIC GODET.

Lukens, HERMAN T.: See the Appendix.

Lul, Lull, or **Lully**, RAIMON (in Lat. RAIMUNDUS LULLIUS): philosopher and poet; b. at Palma, in Majorca, in 1235. His father (of the same name) had accompanied Jaime I. of Aragon in 1229 on his expedition for the conquest of the Moslems of Majorca, and when this was accomplished had received as a fief lands confiscated from the Arab possessors. The peculiar conditions of life in the midst of a large conquered but still unconverted population without doubt had a considerable influence upon the development of the son's mind. The young Raimon, however, received an indifferent education, and to the end of his life, and after his death, his ignorance of Latinity was used as a reproach against him. Up to the age of thirty, as he himself tells us, he was dissolute, to put a stop to which his parents married him to a certain Doña Blanca Picany. Even this, however, did not check him, and it was not until he had five times seen a vision of the crucified Christ that he turned from his evil ways. From this time on (anno 1266) the facts of Lull's life are known to us in the main from a brief autobiographical piece, which seems to have been prepared by him shortly before the Council of Vienne (1311), and which has been several times printed (best edition by Salzinger, *Lulli Opera*, i., prol.). In this he tells us that convinced of his iniquity he sold most of his possessions, and gave himself to Christ. For nine years he devoted himself to ascetic practices and to the study of Arabic, buying a Saracen slave for the latter purpose. At the end of this time, as a curious document shows us, he had entirely ceased to interest himself in the affairs of ordinary life. This document is a petition of his wife for the appointment of an administrator of his property for her benefit and that of her children. This was in 1275, and the petition was granted. At this very time Lull was formulating the two dominant ideas of his life. The first of these was the conversion of the Moslems to Christianity through an appeal to their own higher reason, in pursuance of which we find him in 1276 obtaining the establishment of a college for thirteen Minorite friars at Miramar, in Majorca, in which they should be taught Arabic and fitted for missionary work. The second idea was the invention of a universal and infallible intellectual method, by means of which doubtful questions in regard to the faith might be solved. This was no other than the famous *Ars Major* (later *Ars generalis*), which Lull believed to have been revealed to him by God upon the Mount of Randa, to which he had retired for contemplation. To the exposition and diffusion of this a large part of his later life was given, and his name is indissolubly connected with it still. It is impossible here to give even a faint idea of its character, but the curious will find an outline of it in Prantl's *Geschichte der Logik* (vol. iii., p. 145–177, Leipzig, 1867). Lull himself believed it to be destined to supersede the puerilities of scholastic logic; but he had had no real intellectual training, and failed to see that he had essentially kept all the fundamental notions of the schoolmen, but made confusion worse confounded by his juggling methods.

For about ten years he seems to have remained at Miramar, writing much in Catalan, Arabic, and perhaps Latin. He has left a description of his spiritual joys in the curious romance in Catalan, *Blanquerna*. Now also he began to compose those devotional poems in Catalan which are perhaps the only abiding part of his enormous production (ed. by G. Rosselló, *Obras Rimadas de Ramon Lull*, Palma, 1859); but at last he began to dream of a larger field, and about 1285 we find him setting out for Rome, in order to persuade Pope Honorius IV. to establish other colleges like Miramar. The pope had just died, however, and so Lull went to Paris to expound his *Art*. Now began that incessant wandering that was to fill the rest of his days. After two years in Paris (1287–89) we find him at Montpellier; then at Genoa (1291), whence he made an unsuccessful expedition to Tunis, to convert the Moslems. Leaving Tunis in 1292 he went to Naples, whence in 1294 he was

called to Rome by the election of Celestine V., whom he hoped to interest in his scheme for colleges. He tarried in Rome till 1296, trying, after Celestine had made *il gran rifiuto*, to win Boniface VIII. to his plans. All was in vain, as we learn from the pathetic poem *Desconort*; so, by way of Genoa and Majorca, he returned to Paris (1298), only to go back to Majorca in 1299. In 1300 events stirred in him the desire to visit the East; and from this time till his death his journeyings become too intricate to follow. He visited Cyprus, Armenia, then Genoa again, Majorca, Paris, Vienne (during the council of 1311), Montpellier, Messina; and finally in 1315, having ventured once more to try the conversion of the Moslems in Africa, he was stoned to death by a mob at Tunis or at Bougiah, in Algeria, June 29 of the same year.

The number of Lull's works in Arabic, Catalan, and Latin is enormous. In vol. xxix. of the *Histoire littéraire de la France* (Paris, 1885) no less than 313 are analyzed, though many of these are undoubtedly spurious. Those dealing with alchemy, in particular, were almost certainly of later composition, and simply issued by their authors under cover of his name, as was the case with many similar works bearing the great names of the Middle Ages. The authentic treatises, however, are very numerous, though they fall into comparatively few groups. The chief of these naturally has to do with the exposition of the wonderful *Ars Magna*. Then we have a group dealing more directly with theology proper, though always with reference to the *Art*. Next come treatises upon various aspects of logic and the discipline of the schools, medicine, physics, etc.; then edifying works of a more popular kind; then the devotional works in Catalan already mentioned; and, finally, a number of very curious books in Catalan, showing the results of Lull's familiarity with Arabic literature. Among these last the most remarkable is the *Libre de les maravelles*, based largely upon the *Kalilah and Dimnah* (ed. by Aguiló in the *Biblioteca catalana*, and in part by K. Hofmann, *Ein Katalanisches Thierepos*, Munich, 1872). The Latin works of Lull, collected and edited by Salzinger, were printed at Mayence, 1721–42, in an edition which was to contain ten folio volumes, but the seventh and eighth seem never to have been issued. A new and complete edition, edited by G. Rosselló, is being issued at Palma, in Majorca (1886, *seq.*). For the bibliography of the Catalan works, see A. Morel-Fatio, *Katalanische Literatur* (in Gröber's *Grundriss der romanischen Philologie*, ii., 2, p. 105, *seq.*, Strassburg, 1893).

Besides the works already cited, see Helfferich, *R. Lull und die Anfänge der Katalanischen Literatur* (Berlin, 1858); F. de P. Canalejas, *Las doctrinas del Doctor iluminado Raimundo Lulio* (Madrid, 1870); Erdmann, *Grundriss der Geschichte der Philosophie* (Bd. i., § 206, 2d ed. Berlin, 1869). A. R. Marsh.

Lully, lü'lee', Jean Baptiste: composer; b. at Florence in 1633; went early to Paris as scullion in the household of the Princess of Montpensier; made himself noticed by his skill on the violin; received some regular instruction by the aid of the princess, and obtained a place in the orchestra of Louis XIV., the famous *bande de vingt-quatre*. Having gained the favor of the king by some airs he composed, a new orchestra, *les petits violons*, was organized and placed under his direction, and he managed it so well that it soon entirely eclipsed its elder rival. He was made director of music at the court, composed all the ballets, a sort of entertainment for which Molière often wrote the text, and in which the king himself often performed, and gained such an ascendency over the taste of the king that no other music was heard at the court than his. In 1672 he obtained the privilege of opening an opera theater at Paris. Académie Royale de Musique, and by the success of this enterprise he became the founder of the French Opera. He wrote nineteen large operas, to which Quinault generally furnished the text, and for nearly a century—up to the time of Gluck—he was considered the greatest opera composer. At present his music is practically never heard—not because it lacks musical inspiration, but because the technics of the art have so developed that his manner of instrumentation, harmonizing, etc., would appear awkward. His *Miserere*, written for the funeral of Séguier, his *Bisogna Morire, peccatore*, and some minor pieces of sacred composition, are still heard in France occasionally. D. in Paris, Mar. 22, 1687, leaving an immense fortune. Revised by Dudley Buck.

Lumba'go [= Lat., deriv. of *lumbus*, loin, whence Eng. *loin* (viâ O. Fr. *logne* < Lat. **lum'bea*)], or **Crick in the Back**: a very painful ailment; a kind of subacute rheumatism, often very severe, and seated in the lumbar region. Strong liniments, rubbing with the hand, the application of the electrical brush, and cupping are all useful. A mild diaphoretic often affords relief.

Luminais, lü'mĕĕ'nā', Evariste Vital: genre and historical painter; b. at Nantes, France, Dec. 14, 1822; pupil of Léon Cogniet and of Troyon; was awarded third-class medals at the Salon 1852, and Paris Exposition 1855; decoration of the Legion of Honor 1869; first-class medal, Paris Exposition, 1889. Many of his subjects are taken from early French history and from legends of the Gauls. His style is vigorous and broad. Works by him are in the museums in Angers, Nantes, Bordeaux, Laval, and Nancy.

Luminescence: See the Appendix.

Lummi: See Salishan Indians.

Lummis, Charles Fletcher: See the Appendix.

Lumniczer, loom'nits-*er*, Alexander, M. D.: surgeon; b. at Kapuvár, in the county of Sofron, Hungary, in 1821; pursued his professional studies in the Universities of Budapest and Vienna, and in Berlin, Paris, and London; became surgeon in the Hungarian revolutionary army, and eventually director-in-chief of the field hospitals. In 1861 he was appointed second surgeon to the Rochus Hospital in Budapest, and in 1864 chief surgeon. In 1868 he became docent, in 1872 professor extraordinary, and in 1880 full Professor of Surgery in Budapest University. In 1880 he was chosen president of the Royal Medico-Chirurgical Society of Budapest. In 1885 he was appointed a member of the House of Magnates. In 1869 he was elected chief physician of Budapest. His most important publication is *Chirurgische Erfahrungen* (Budapest, 1878). D. Jan. 30, 1892.

Lumpfish, or **Lump Sucker**; also called the **Sea-owl**, or **Cock-paddle**: a fish (*Cyclopterus lumpus*) found in the North Atlantic, from Long Island and France northward. It has an elevated ridge along the back, which is covered with a notched and tuberculated skin not unlike the comb of a cock. It is of clumsy shape, and has its ventral fins formed into a sucker, by means of which it can cling to any solid substance so firmly that it can with difficulty be removed. Its flesh is edible. It is asserted by fishermen that the lumpfish makes a kind of home, clearing out a hollow in the stony bottom, in which it deposits its eggs, and that it remains hovering about the spot until the eggs are hatched, for the purpose of guarding them against enemies. When thus engaged it becomes combative, permitting no other fish to pass near its charge, and in cases of necessity biting fiercely with its short but sharp teeth. When freshly taken from the sea the colors of the lumpfish are very bright. Revised by D. S. Jordan.

Lumpkin, Joseph Henry, LL. D.: jurist; b. in Oglethorpe co., Ga., Dec. 23, 1799; graduated at Princeton in 1819; was admitted to the bar in Oct., 1820, and opened an office in Lexington, Ga.; in 1825 was a member of the Legislature, and sustained Gov. Troup in his controversy with the Federal authorities growing out of the conflicts between the "old" treaty and the "new," as they were termed, with the Creek Indians. He was most successful in his profession, and in 1845 was elected associate justice, and afterward chief justice, of the State Supreme Court, which was then for the first time organized. The term of office was six years, but receiving three successive re-elections without opposition, he continued to hold this position as long as he lived. He was for many years a trustee of the State University, and founded the Lumpkin Law School, connected with the university. In 1860 he was elected chancellor of the university, but declined this position owing to his strong attachment to the Supreme Court, over which he had so long presided. D. at Athens, Ga., June 4, 1867.

Lu'na [= Lat. for earlier *luc'na*, deriv. of *lux, lucis*, light: Teut. *liuh-* > Goth. *liuhaþ* : Eng. *light*]: the Latin name for the moon, and in Roman mythology the goddess of the moon. Her worship was common to the Romans with other Italic peoples. At Rome there were two old temples to Luna, one on the Palatine, called *Noctiluca* (i. e. which is illuminated by night), and another on the Aventine above the Circus Maximus, founded apparently by Servius Tullius. As the goddess of the months, Luna was worshiped on the last day of March, which was the first month of the old Roman year. G. L. Hendrickson.

Luna, Alvaro, de: courtier and politician; b. in Spain about 1390; was educated with the infant king, John II., with whom he escaped from the custody of the Infante of

Aragon in 1418; headed a successful revolution in behalf of the rights of the crown; was made constable of Castile 1423; received ample endowments, and became the favorite minister of the king; was temporarily driven from court in 1426, and again in 1439, by the efforts of his enemies; was victorious in a war against the Infantes of Aragon 1445, and was rewarded with the grand-mastership of Santiago, which he held in addition to the dukedom of Truxillo and the lordship of sixty towns and fortresses. The powerful favorite was at last overthrown by means of intrigue, condemned to death, and executed at Valladolid in June, 1453. He was a patron of letters, and wrote poetry and plays. See *La Cronica del Condestable Don Alvaro de Luna* (1546).

Luna, Pedro, de: antipope. See Benedict XIII.

Lunacy: See Insanity.

Lunacy Laws: See the Appendix.

Lunalilo, loo-naă-lee'lō: King of the Hawaiian islands 1873–74; b. in 1835. With his cousins, Kamehameha IV. and Kamehameha V., he received a good education, but afterward his dissipated life made him unfit for offices of trust. His tendencies were to great liberality in government—greater than the intelligence and general condition of his people fitted them for. Soon after the establishment of his administration his health failed, and he became indisposed to give much attention to important business. D. Feb. 3, 1874, without an heir and without appointing a successor.

Lunar Caustic: See Nitrate of Silver.

Lund, loond: city of Sweden; 25 miles E. of Copenhagen (see map of Norway and Sweden, ref. 14–D). In 1060 it was made the seat of a bishopric, and in 1104 of an archbishopric. It has a cathedral, built in 1145, a university, founded in 1668, a library of 150,000 volumes, and a gymnasium. Pop. (1896) 15,735.

Lund, loont, John Reinhold: musician; b. in Hamburg, Germany, Oct. 20, 1859; was educated at Leipzig Conservatory; was chorus-master at the Opera-house, Bremen, Germany, 1880–83; musical director, Opera-house, Stettin, Germany, 1883–84; assistant musical director, German opera, Metropolitan Opera-house, New York, 1884–85; director of Orpheus Singing Society and Symphony Orchestra, Buffalo, N. Y., 1886; is author of several songs and pieces for orchestra and piano.

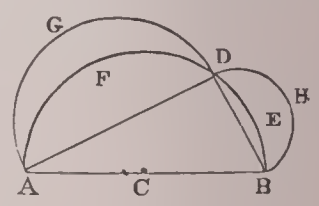
Lund, Troels: historian; b. in Denmark in 1840. His *Danmarks og Norges Historie i Slutningen af det 16de Aarhundrede* (History of Denmark and Norway at the Close of the Sixteenth Century, Copenhagen, 12 vols., 1880–92) was at first viewed with suspicion by critics, but it is now generally recognized as the most valuable contribution to the *Culturhistorie* of that period. It combines keen insight and careful investigation with a finished and brilliant style. D. K. D.

Lundgren, loond'gren, Egron Sellif: painter; b. in Stockholm, Sweden, Dec. 18, 1815. He studied in France, Italy, and Spain. In Spain he began painting in water-colors. The sale of some of his aquarelles in England led him to visit that country in 1851. He executed several works for Queen Victoria, and in 1858 was urged by her personally to go to India to paint scenes from the war being waged there. He consented, and accompanied Lord Clyde's army to Lucknow, returning to England the following year with about 500 sketches. In 1860 he was elected one of the thirty members of the Society of Painters in Water-colors. Nearly all of Lundgren's works are in England. D. in Stockholm, Dec. 16, 1875. He was the author of an autobiographical work called *En Målares Auteckningar* (Notes of a Painter), published after his death. R. B. Anderson.

Lundy, Benjamin: anti-slavery agitator; b. in Hardwich, Sussex co., N. J., Jan. 4, 1789. His parents, as also their ancestors, were members of the Society of Friends. After receiving a limited education he served an apprenticeship at the saddler's trade in Wheeling, Va.; and the frequent spectacle of slave-coffles driven through the place impelled him to consecrate his life to the work of abolishing chattel slavery in the U. S. He settled in St. Clairsville, O., where he pursued his trade as a saddler for a little more than four years, accumulating a competency for his growing family; but the thought of the wrongs of the bondmen in the Southern States continued to destroy his peace of mind. He accordingly formed, with five others, the Union Humane Society, which in a few months enrolled nearly 500 members. This was followed by an appeal from his pen to the philanthropists of the U. S. on the subject of slavery, recommending the formation of kindred societies for mutual conference and action. Soon afterward he became a contributor of original and selected anti-slavery articles to a paper published at Mt. Pleasant entitled *The Philanthropist*. In the fall of 1819 he took his entire business stock to St. Louis, Mo., that by its sale he might give himself to the cause which he had so disinterestedly espoused, but he lost by the venture nearly all the property he had accumulated. It was at that time that the Missouri question was agitating the nation, and he devoted himself to an exposition, in the newspapers of Missouri and Illinois, of the evils of slavery, in the hope of averting the impending calamity. Returning to St. Clairsville, he removed to Mt. Pleasant, and there began a monthly publication, *The Genius of Universal Emancipation* (Jan., 1821), then the only anti-slavery periodical in the U. S. It was afterward transferred to Jonesborough, Tenn., and thence (in 1824) to Baltimore, Md., where it became a weekly. In the latter part of 1825 Lundy visited Haiti to make arrangements with the Haitian Government for the settlement of such manumitted slaves as might be sent thither. In the winter of 1828–29 he was assaulted and nearly killed in Baltimore by Austin Woolfolk, a slave-dealer, for an editorial reproof of his conduct. In the spring of 1829 he went a second time to Haiti, taking with him a number of slaves emancipated for that purpose. In 1836 he started a weekly anti-slavery journal in Philadelphia entitled *The National Enquirer*. In 1837 he relinquished the charge of *The Enquirer*, intending to go to one of the Western States; but previous to his leaving Philadelphia all his papers, books, clothes, etc., deposited in one of the rooms of Pennsylvania Hall, were destroyed by fire—an act of pro-slavery incendiarism. In the winter of 1838–39 he removed to Lowell, La Salle co., Ill., intending to publish *The Genius* in that locality, but died on the 22d of the ensuing October. See *The Life, Travels, and Opinions of Benjamin Lundy* (Philadelphia, 1874). Revised by C. K. Adams.

Lundy's Lane, Battle of: called also that of Bridgewater or Niagara; fought in Canada near Niagara Falls, between the British and American forces, July 25, 1814. Col. Winfield Scott, who had been sent by the American Gen. Brown to make a demonstration before Queenstown, met at sunset the British Gen. Riall with a superior force and a battery of seven, afterward nine, guns in a strong position 1½ miles from Niagara Falls. Scott attacked, turned the British left, captured Riall and his staff, and succeeded in holding his ground in the face of a heavy fire from the battery until Brown came up at nightfall, increasing the American force to 3,000. The battery was captured, and three attempts by the British to regain it were repelled; but the guns were finally left for want of horses to drag them off. Brown and Scott were wounded, as was also Gen. E. W. Ripley, who succeeded to the command. The American loss in killed and wounded was 743; that of the British 878.

Lune [from Lat. *lu'na*, moon, named from its resemblance, in perspective, to a crescent. See Luna]: in spherical geometry, the portion of a spherical surface included between two great semicircles. The two semicircles are the sides of the lune, and the angle of the lune is the angle between the planes of its sides. This angle may have any value between 0° and 360°. In plane geometry a lune is the portion of a plane included between the arcs of two circles that intersect. The lune of Hippocrates is famous as being the first curvilinear space whose area was exactly determined. The construction of the lune of Hippocrates is as follows: On a line A B as a diameter describe a semicircle A D B, and in it inscribe a right angle A D B; then on the sides A D and D B as diameters describe the semicircles A G D and D H B. The two figures A G F D and D H B E are lunes, and the sum of their areas is equal to the area of the triangle A D B. For the areas of any two semicircles are to each other as the squares of their diameters, and from the right-angled triangle A D B we have $\overline{A\,B}^2 = \overline{A\,D}^2 + \overline{D\,B}^2$; hence the sum of the semicircles on A D and D B is equal to the semicircle on A B; diminishing both members of this equality by the sum of the segments A F D and D E B, we have the sum of the lunes equal to the triangle. If we make A D = D B, the lunes will be equal to each other, and the triangle will be equal to half the square on either. Revised by R. A. Roberts.



Lüneburg, lü'ne-boorch: a town of Prussia, Hanover; on the left bank of the Ilmenau, 14 miles from its confluence with the Elbe, and at the foot of a small hill called the Kalkberg (see map of German Empire, ref 3–E). It is an old town surrounded with walls, contains many characteristic buildings, and was an important member of the Hanseatic League. It still has a considerable trade. The Kalkberg is remarkable on account of its large gypsum and lime quarries, and still more on account of the salt-springs at its base, from the waters of which 20,000 tons of salt are yearly manufactured. Pop. (1890) 20,665.

Lu'neuburg: a town on the east coast of Nova Scotia; capital of Lunenburg County and terminus of a branch railway from Middleton (see map of Quebec, ref. 3–B). It is a thriving German town of 5,000 inhabitants, and, though settled in 1753, the German language and customs still prevail. The chief interests are ship-building, mining, and fishing. The gold-field of Ovens Head Peninsula is about 10 miles distant. Ovens Head is a sea-face with remarkable caverns, called the Ovens. M. W. H.

Lunéville, lü'nā'veel': town of France; in the department of Meurthe; at the confluence of the Vezouse and the Meurthe (see map of France, ref. 3–H); is one of the largest cavalry stations of France; the former palace of the Dukes of Lorraine has been transformed into cavalry barracks. It is historically notable from the Peace of Lunéville (Feb. 9, 1801), by which the Rhine became the frontier of France. Aug. 15, 1870, it was the headquarters of the Crown Prince of Prussia. It is noted for its manufactures of gloves and cotton, and has an extensive trade in corn, wine, brandy, and hemp. Pop. (1891) 20,906; (1896) 22,599.

Lung-chow: a town of Kwangsi, China; on the frontier of Tonquin; opened by treaty to foreign trade June 1, 1889. Pop. 20,000.

Lung Fever: See Pneumonia.

Lungfishes: See Dipnoi.

Lungs [plur. of *lung* < O. Eng. *lunge*: Icel. *lunga*: Germ. *lunge*]: the organs by which, in air-breathing vertebrate animals, the blood is aërated and certain gaseous impurities are removed from it. In the Invertebrata and fishes and the larvæ of Batrachia the lungs are functionally represented by Gills (*q. v.*) and by other analogous organs. In many fishes there is in addition to the gills a "swim-bladder," which structurally represents the lungs, and which, in a few species, appears to share in the function of the true respiratory organs. In the perennibranchiate batrachians there are both gills and lungs. The true reptiles all have sacculated lungs, and many of them breathe by gulping down a large quantity of air by a kind of swallowing process not much like the breathing of mammals. The left lung of serpents is either wanting or very rudimentary. In birds the respiratory function appears to be shared by the lining membranes of the extensive air-chambers in the bones, etc. The lungs of all the Mammalia are in plan much like those of man. The human lungs (*pulmones*, *pneumones*) are two, one being placed in each of the lateral cavities of the thorax, and they are separated from each other by the mediastinum and its contents. The apex of each lung extends above the first rib. The right lung is larger and broader, but shorter, than the left. It has three lobes—the left but two. The blood-vessels, air-tubes (bronchi), nerves, lymphatics, etc., enter each lung at a point called the *hilum*; and these structures, with the connective tissue, constitute what is called the *root* of the lung, a part of the mediastinum. The lungs are of light, spongy texture. The *outer* covering is a reflection of the pleura, and is a *serous* membrane. The *inner* membrane of the air-passages and cells is embryologically derived from the alimentary canal, and hence is a *mucous* membrane. The substance of the lungs is composed of a parenchyma consisting of lobules, each containing a branch of the bronchial tube and a cluster of air-vesicles or *alveoli*. The function and minute structure of the lungs are further illustrated in the articles Histology and Respiration (*qq. v.*).

Lungwort, or **Oak Lungs**: a lichen found in North America and Europe on trunks of trees in mountainous regions, sometimes almost entirely covering them with its shaggy, leathery, spreading thallus, which, when fresh, has an olive-green color, but becomes brown when dry. Its scientific name is *Sticta pulmonaria*. It derives its name from a fancied resemblance of the spotted thallus to diseased lungs, for which reason, upon the doctrine of signatures, it was formerly employed as a remedy in pulmonary diseases. It is nutritious, and when properly prepared affords a light diet capable of being used as a substitute for Iceland moss; yet it is bitter enough to be used as a substitute for hops. There is another plant (*Pulmonaria officinalis*) with the name lungwort, a perennial flowering herb of the borage family, also found in the northern parts of Europe, where it is used as a pot-herb. It is cultivated in gardens, has a creeping root and rose-colored flowers changing to blue. It is mucilaginous and slightly emollient. It contains niter in considerable abundance. It, too, was at one time extensively used as a remedy in pulmonary diseases. Revised by Charles E. Bessey.

Luperca'lia [= Lat., liter., neut. plur. of *luperca'lis*, pertaining to *Luper'cus* (who as guardian deity of shepherds kept the wolves from the flock); *lu'pus*, wolf]: an ancient Roman festival, celebrated on Feb. 15, in honor of a god whose name is given variously as Faunus, Inuus, and Lupercus, with ancient rites of peculiar character, the significance of which is for the most part a matter of conjecture, though in general it may be said that they are those of a primitive pastoral people, performed for the sake of securing fertility to human beings, flocks, and lands. On the day of the festival the members of the two colleges of the Luperci met at a cave on the Palatine called the Lupercal, and there offered sacrifices of goats and young dogs and cakes, made of the first fruits of the last harvest. Then the foreheads of two young men were smeared with the fresh blood of the victims, which was wiped away again with a piece of wool dipped in milk, whereupon the young men were required to laugh. The sacrificial feast followed, after which the Luperci, naked, ran around the Palatine hill, striking women who placed themselves in their path with thongs cut from the skins of the slaughtered victims—a rite efficacious, it was believed, to remove the curse of barrenness. These thongs were called *februa* (from an obsolete verb, *februare*, to purify), and hence the month was called February. G. L. Hendrickson.

Lupine [from Lat. *lupi'nus*, lupine, deriv. of *lu'pus*, wolf. Cf. Germ. *wolfsbohne*, lupine, liter., wolf's bean]: any herb of the large genus *Lupinus* of the family *Leguminosæ*. There are numerous species in the U. S., chiefly found W. of the Rocky Mountains. These species are prized mostly in cultivation for their handsome papilionaceous flowers. Many of the Old World species are cultivated as forage-plants, and their seeds are used as food for man. The cultivation of the lupine in Portugal (*Lupinus albus*) has proved a national blessing, and has regenerated great tracts of worn-out land. It is given to cattle as food, and also plowed into the ground as a fertilizer.

Lupuline, or **Lupulite**: See Hops.

Lu'pus [from Lat. *lu'pus*, wolf: Gr. λύκος: Eng. *wolf*]: a term comprising two distinct diseases of the skin, which most commonly attack the face, and begin as red and slightly or considerably elevated spots, afterward growing slowly to considerable dimensions. Both forms are found most frequently in youthful females. The benign form, *Lupus erythematosus*, occasions red and well-defined areas of slight elevation, and causes little local or general disorder. It is amenable to treatment. The severer disease, *Lupus vulgaris*, is now known to be simply tuberculosis of the skin, but its effects on the general health are far less severe than are those of tuberculosis of internal organs. It is characterized by dull-red nodules, which later break down and cause destructive ulcers. The treatment in both cases consists in the use of tonics and the application of stimulating remedies to the diseased areas in the milder, or of caustics in the severer. In the severer form it is often advisable to scrape out or remove the diseased tissues with the knife. William Pepper.

Lupus Servatus: See Servatus Lupus.

Luray: village; capital of Page co., Va. (for location of county, see map of Virginia, ref. 4–G); near the Shenandoah river, on the Norfolk and Western Railroad; 100 miles S. W. of Washington, 136 miles N. W. of Richmond. It is in a picturesque valley; has become a noted summer resort; and contains two seminaries for girls, an academy for boys, a large sole-leather tannery, woolen-factories, and three weekly newspapers. About a mile W. of the village is a remarkable cavern, discovered in 1878. The whole area occupied by the cavern, with its innumerable chambers, often arranged in tiers, is about 100 acres, of which, however, only a

comparatively small part has been fully explored; but such parts as have been opened to the public are illuminated by electric lamps, and the effect of the stalactitic display is very fine. The temperature is uniformly 54° F., and the air is pure. Though there are no streams or true springs, there are hundreds of basins, varying from a foot to 50 feet in diameter, and from 6 inches to 15 feet in depth. The water is pure, but destitute of life. A few bats, rats, mice, spiders, flies, and small centipedes are found in the chambers; and when first entered the floors of the cavern showed thousands of tracks of raccoons, wolves, and bears, probably made centuries ago. A single human skeleton was found, embedded in stalagmite; also some pieces of charcoal, flint, etc. Pop. of village (1880) 632; (1890) 1,386; (1900) 1,147.

EDITOR OF "PAGE COURIER."

Lurgan: town; in the county of Armagh, Ireland; 20 miles S. W. of Belfast by rail (see map of Ireland, ref. 5–I). It is a neatly built town, and has extensive manufactures of linens, muslins, and damasks. Pop. (1891) 11,447.

Luristan' (i. e. country of the Louri): a Persian province, adjoining Turkey, with Kurdistan on the N., Khuzistan on the S., and Irak-Ajami on the W. Area, 15,100 sq. miles. Pop. estimated at 300,000. The capital is Burujird, on the borders of Irak-Ajami. The chief element of the population is the Luris, a people closely related to the Kurds. The country is mountainous, but grows less rugged toward Mesopotamia. M. W. H.

Lusa'tia (in Germ. *Lausitz*; Fr. *Lusace*): an ancient territory of Germany, bounded by Bohemia, Saxony, Brandenburg, and Silesia. Originally it formed two independent margraviates, Upper and Lower Lusatia, which in 1635 came into the possession of Saxony, but by the Congress of Vienna in 1815 the greatest part of the territory was transferred to Prussia, Saxony retaining only the portion which forms the present circle of Bautzen.

Lushington, STEPHEN, D. C. L.: jurist; b. in London, England, Jan. 14, 1782; was second son of Sir Stephen Lushington; was educated at Eton and Oxford; called to the bar at the Inner Temple in 1806; admitted advocate at Doctors' Commons in 1808; appointed judge of the consistory court in 1828, and of the high court of Admiralty in 1838. He sat in Parliament many years between 1807 and 1841, in the Liberal interest; was counsel for Queen Caroline in 1820, and legal adviser of Lady Byron upon her separation from her husband the poet. He retired from the bench in 1867, and died Jan. 19, 1873. He is not to be confounded with his relative, Stephen Rumbold Lushington, D. C. L., governor of Madras, b. 1776, d. Aug. 5, 1868.

Lusita'nia: the name of the southwesternmost of the three provinces into which the Iberian Peninsula was divided by the Romans, comprising the present Portugal S. of the Douro and a considerable portion of the adjacent provinces of Spain. It derived its name from the Lusitani, who dwelt between the Tagus and the Douro, and were turbulent and warlike.

Lusk, WILLIAM THOMPSON, A. M., M. D.: obstetrician; b. at Norwich, Conn., May 23, 1838; entered Yale College in 1859, but remained only one year; studied medicine in Heidelberg and Berlin 1858–61; returned to the U. S., and during the civil war served in the Union army 1861–63; graduated M. D., Bellevue Hospital Medical College, in 1864; subsequently studied in Edinburgh, Paris, Vienna, and Prague; began to practice in New York city in 1865; was Professor of Physiology in the Long Island College Hospital from 1868 to 1871; was lecturer on Physiology, Harvard Medical School, 1870–71; appointed Professor of Obstetrics and Diseases of Women in Bellevue Hospital Medical College in 1871; was visiting physician to Charity Hospital 1870–71; held a similar position in Bellevue Hospital since 1871; was coeditor of *The New York Medical Journal* 1871–73. He was a member of various medical societies in the U. S. and Europe. His principal work, *The Science and Art of Midwifery* (New York, 1882), has passed through several editions, and has been translated into several foreign languages. Yale College conferred the degree of A. M. on him in 1872. D. in New York, June 12, 1897.

Lustration [from Lat. *lustra'tio*, purification, lustration, deriv. of *lustra're*, purify, deriv. of *lus'trum*, lustrum, a purification]: among the ancient Romans, ceremonial purification by water, blood of sacrificial victims, or other means. Similar rites were performed by the Greeks (κάθαρσις) and other peoples of antiquity. Such symbolical purificatory rites have their origin doubtless in the requirements of bodily ablution, a relation which appears very clearly in some of the most important forms of lustration, such as were undertaken after bloodshed, burial, or childbirth. Of the various occasions of lustral rites reported by Greek and Roman writers, some of the most important were purifications from blood-guiltiness, purificatory rites performed at momentous epochs in the individual or family life, such as marriage, birth, death, as well as purifications of people, city, and fields by officers of the state (see LUSTRUM) or by individuals. G. L. HENDRICKSON.

Lus'trum [= Lat. Cf. LUSTRATION]: a ceremonial purification (see LUSTRATION) of the Roman people, performed by the censor every five years with peculiar rites, as follows: All men of military age were collected in the Campus Martius, and about them was carried on spears a sacrifice consisting of a boar, a sheep, and a bull (*suovetaurilia*), which was then offered to Mars by the censor in fulfillment of the vows made by his predecessor. The completion of this rite, including the deposit of a register of citizens in the public treasury and the driving of a nail into the wall of the temple of Mars as a record of the event, was looked upon as necessary to give validity to the acts of the censor. From the fact that the lustrum was performed every five years the word came to mean a similar period.

G. L. HENDRICKSON.

Lute [from O. Fr. *leut* (> Fr. *luth*) : Ital. *liuto* : Span. *laúd* : Portug. *alaúde*, from Arab. *al'ūd*; *al*, the + *'ūd*, trunk, wood, stick, lute]: an ancient instrument consisting of a table, a body, a neck (for fingering) with frets, a head with screws for tuning, and a bridge on which ran the strings, from six to twenty-four in number. The frets were touched with the left hand, the strings with the right. It was long a favorite instrument in nearly all parts of Europe.

Lutes [from Lat. *luta're*, bedaub with mud, deriv. of *lu'tum*, mud, clay, whence Eng. *lute*, kind of clay cement]: compositions used for two purposes—the one being the making gas-tight or vapor-tight joints in apparatus used for holding or conveying gases or vapors, as in processes of distillation; and the other the coating externally of fragile vessels that are to be exposed to high heats. For the first use modern chemists are enabled to substitute almost altogether tubes, bands, and sheets of India-rubber, so that luting compositions are seldom used. There is one highly important case, however, in the arts in which they are still employed. This is for the lids of gas-retorts. (See GAS-LIGHTING.) In the laboratory, in cases in which the heat to be applied is below 400° or 500° F., *linseed meal* is much used; with water it makes a very plastic adhesive mass; with *glycerin*, instead of water, this mass will not dry and crack. If pressure is to be resisted, the composition may be applied in some mass to the joint, a band of cotton cloth rolled around it, and the whole then bound around with twine. Clay and glycerin make a useful lute also. Great numbers of similar compositions are known in the laboratory. See the *United States Dispensatory* of Wood and Bache, pp. 928, 929, for comprehensive and reliable information on this head.

Luthardt, loot'haart, CHRISTOPHER ERNST, D. D.: Lutheran theologian; b. at Maroldsweisach, Bavaria, Mar. 22, 1823; studied at Erlangen and Berlin; after beginning his career as theological instructor at Erlangen, was for two years professor extraordinary at Marburg, and in 1856 became Professor of Systematic Theology and New Testament Exegesis at Leipzig. He is editor of the *Allgemeine Ev. Luth. Kirchenzeitung* and the *Theologisch-Literaturblatt*, is distinguished as a popular lecturer and preacher, and is a voluminous author of sermons and works on exegesis (especially on the Gospel of John), apologetics, dogmatics, and ethics. H. E. JACOBS.

Luther, Germ. pron. loo'ter, MARTIN: religious reformer; b. Nov. 10, 1483, at Eisleben, Saxony. He has himself stated that all his ancestors were peasants. His father was a miner of the better class, who acquired some property, and was one of the council of the town of Mansfeld. Both father and mother were severe disciplinarians. The straitened circumstances of his father during Luther's youth rendered his education a matter of no little sacrifice and struggle. He attended school in Magdeburg in 1497; the next year he was transferred to Eisenach. His resort to singing at the doors of citizens in order to gain the necessary support, and his introduction thereby into the house of the

Cotta family, belong to this period. In 1501 he entered the University of Erfurt, where he devoted himself chiefly to philosophy and the study of the classics, Trutvetter having been his chief instructor, and Spalatin, afterward one of his most faithful colaborers, one of his fellow students. At the same time he cultivated music, which was almost his sole recreation. His first degree was taken in 1502, and his second, or the master's degree, early in 1505. He then began the study of law, but was interrupted by a change in his inner religious life, and, without his father's consent, entered the Augustinian monastery July 16, 1505. His two years' course there was distinguished by his rigid observance of every rule, his conscientious efforts to meet every demand of the confessional, the diligent study of Holy Scripture under the impulse of the Vicar-General Staupitz, and the still further reading of later scholastics, especially Occam. He was ordained priest in 1507. The next year he was called by Staupitz, then dean of the recently (1502) founded University of Wittenberg, to a professorship of philosophy. In 1509, after becoming bachelor in theology, he was called to the University of Erfurt; but eighteen months later returned to Wittenberg as Professor of Theology. In 1511 he was sent to Rome on business connected with the Augustinian order, and remained there for one month. In 1512 he became Doctor of Theology, and instead of lecturing, as was the custom, on the School Theology, expounded first the Psalms, and afterward the Epistles of St. Paul to the Romans and Galatians. Besides performing his professional work, he became in 1515 provincial vicar of his order for Meissen and Thuringia, having the supervision of eleven convents and conducting the customary visitations, preaching regularly in the convent at Wittenberg, and during the disablement of the town priest, preaching a course of sermons on the Lord's Prayer and the Ten Commandments in the town chapel. His reading brought him at this period under the influence of such mystical writers as John Tauler and the author of *The German Theology*.

His conflict with the ecclesiastical authorities was not self-determined. The Dominican Tetzel, acting as the agent of Archbishop Albert of Mayence and Magdeburg, had been pushing the sale of indulgences at Jüterbok, on the borders of Saxony, where the elector forbade his entrance. Among those who confessed to him Luther found persons who had bought indulgences. He preached against the practice and he protested to the bishops, but in vain. Then proposing a public discussion, Oct. 31, 1517, he nailed ninety-five theses to the door of the castle church in Wittenberg. Their moderation, and the mediæval dogmas they still approve, must surprise all who know their history, before undertaking to read them; but the result was as unexpected as it was important. In fourteen days they were diffused throughout all Germany, finding advocates everywhere, and also encountering just as violent condemnation. The discussion was more public than Luther intended. Assailed not only by Tetzel, but by Prierias, he promptly replied, growing still more confident, and receding further from the mediæval principles as the controversy progressed. His regard for the pope was as yet not shaken, when May 30, 1518, he wrote a humble letter of apology, without receding from his position; nor even, Mar. 3, 1519, when he wrote a second letter. The Elector of Saxony interposed his authority against his citation to answer at Rome for his course, demanding that he be tried on German soil. The breach widened with the Diet of Augsburg of Oct., 1518, where Luther appeared before the papal legate Cajetan, and with the Leipzig disputation, where Luther and Eck were pitted against each other from July 4 to 13, 1519. Then in 1520 (June 16) came the excommunication, and the burning in various places of Luther's writings, followed on Dec. 10 by Luther's burning of the bull in the presence of his students near the Elster gate at Wittenberg. On the succeeding Apr. 17 and 18 he appeared before the Emperor Charles V. at the Diet of Worms, and refused to recant, ending with the words: "Here I stand. I can not do otherwise. God help me." On his return from Worms (May 4) he was seized by friends in disguise and carried to the Wartburg Castle for security, where he employed his time in preparing various works for publication, chiefly his lectures on the Gospels and Epistles, until Dec. 1, when he appeared among his most intimate friends at Wittenberg for much-needed conference, and remained for three days. On his return to the Wartburg Castle he devoted himself to the translation of the New Testament, finishing it before he left in the beginning of March. A fanatical outbreak had occurred at Wittenberg in consequence of the radical measures of Carlstadt and the arrival of "prophets" from Zwickau. Luther, feeling that his presence was necessary, reached Wittenberg Mar. 5, 1522, and, after preaching every day, succeeded in quelling the disorder. Besides resuming his duties in the university, he devoted himself diligently, with Melanchthon's aid, to the revision of his translation of the New Testament, the first edition of which was published Sept. 21; but before it had left the press Luther was at work on the translation of the Old Testament, finishing the Pentateuch before Christmas. During the same time he wrote his vigorous answer to the attack that was made upon him by King Henry VIII. of England. In 1523 began Luther's efforts for the reformation of the mass, or public church service, which are embodied in his *Formula Missæ*, published that year. This was followed by his publication of hymns, translated and original, for public worship, twenty-four out of his thirty-six hymns having appeared in 1524. The next year he was occupied in suppressing more outbreaks of fanaticism and in opposing the war of the peasants. He married Catherine von Bora (b. 1499), who had been a nun, June 13, 1525. The plague at Wittenberg, during which he remained, although the university was removed to Jena, and the visitation of the Saxon churches under the direction of the elector were prominent events of 1527. The visitation was the occasion of new literary work. New volumes of sermons were published as models for the pastors, as well as for the edification of laymen. The two catechisms originated from Luther's discovery of the great ignorance among both pastors and people. The "large" catechism was first written, but it was unwieldy, and the short catechism embodies the best effort of Luther in this sphere. Both were published in 1529. In Oct., 1529, an unsuccessful attempt to form a union between Luther and Zwingli took place at Marburg. (See MARBURG, THE CONFERENCE OF.) Luther co-operated with his colleagues in the Wittenberg faculty in the preparation of the memoranda to be presented at the Diet of Augsburg (Torgau Articles). During the Diet he remained at Coburg in close communication with Melanchthon at Augsburg, and revised the confession during the progress of its preparation. In succeeding years repeated negotiations were held among the Protestant parties, in which Luther participated. Prominent among these were the negotiations with Bucer and others at Wittenberg in 1536, resulting in the so-called Wittenberg Concord, in which Bucer acknowledged the doctrine of the real presence, but not the communion of the unbelieving. There were also conferences with the Anglican theologians Fox, Heth, and Barnes, at Wittenberg in 1536, which, while attaining no immediate result, powerfully influenced both the confession and reformation of worship in the English Church (see Jacobs, *The Lutheran Movement in England*, Philadelphia, 1890); and at Schmalkald in 1537, in anticipation of the promised general council, resulting in the Schmalkald Articles, in which he discarded all irenic methods, and determined to dispel forever any hopes of reconciliation with the papacy. He continued incessantly active until the end of his life in the completion and revision of his translation of the Bible (the Old Testament having been completed in 1534, and a thorough revision of the entire translation having been made in 1541, with other corrections in 1545), in the preparation of Church orders, in the writing of various practical, exegetical, and controversial treatises, and in adjusting various Church difficulties and disputes. He died Feb. 18, 1546, at his birthplace, Eisleben, while absent from home, acting as arbitrator between the Counts of Mansfeld. His remains are buried in front of the pulpit in the castle church at Wittenberg.

The leading principles of Luther's theology are: (1) The entire corruption of human nature by sin, the consequent divine wrath and condemnation, and natural inability for self-recovery or response to the first approaches of divine grace. (2) God's grace and mercy proceed entirely from his free will, and not from any preceding disposition of sinful man. In his earlier years Luther taught absolute predestination. (3) The vicarious sufferings of Christ as the price of man's redemption, the suffering of the human nature having acquired infinite efficacy by its union with the divine nature in the one divine human person. (4) Justification is not an internal change in man, but is an external act of God alone, whereby, for the sake of Christ's merits received by faith, he forgives sin and pronounces sinful man righteous. (5) Faith is a work of the Holy Ghost in man wrought through the means of grace, and its essential factor is per-

sonal confidence in the merits of Christ. (6) The means of grace are the Word and sacraments, which are inseparably attended by the Holy Spirit; so that they are never without efficacy, although this efficacy does not work so as to save those who repel the Spirit's approaches. (7) Baptism is a means both of regeneration and renewal. Those who, after baptism, fall from baptismal grace, return by faith to the covenant first made in baptism. All repentance is a return to baptism. (8) The presence of the body and blood of Christ and its reception with the bread and wine are the surest pledge of the accomplished fact of redemption and its application to the individual believer. Like absolution, its effect is the individualization of the general promise of the Gospel; only the Lord's Supper accompanies the individualization, with the elements, and with the heavenly gifts attending them, as seals and pledges of the promise. (See EUCHARIST.) (9) The Holy Scriptures of the Old and New Testament are the final judge of all controversies; but everything in the constitution and worship of the Church not contrary to Scripture is to be retained and thankfully used. (10) In the New Testament, besides the priesthood of our High Priest, Jesus Christ, there exists only the spiritual priesthood of all believers since they have access to Christ directly and without the mediation of saints, angels, or any priestly order. (11) The ministry and the priesthood are therefore distinct institutions. The ministry belongs to the whole Church, but its duties are to be exercised only by those who are duly called and set apart to this purpose. In exceptional cases, however, the power inherent in any Christian congregation may admit of the ministry arising anew from within.

The principal editions of his collected works are that of J. G. Walch (1740–53), 24 vols. 4th ed. (German), which is in process of reprint at St. Louis, Mo.; the Erlangen (12mo), the German portion of which in 67 vols. was completed in 1857, but the Latin portion, of which 33 vols. have been published, is not yet complete; the Weimar edition (large 4to), which is very critically edited, and is being published in a luxurious form, by the generosity of the King of Prussia. The best edition of Luther's *Letters* is that edited by de Wette (Berlin, 1825, 5 vols.), to which a sixth volume, edited by Seidemann, was added in 1856.

The best biography of Luther is that by Julius Köstlin (Elberfeld, 1875; 2d ed. 1883; 3d ed. since but unchanged). A briefer and more popular *Life* by the same author, profusely illustrated, was published in 1883. Two translations into English appeared the same year, one in London and New York, and the other, by Dr. J. G. Morris, in Philadelphia. See also Krauth's *Conservative Reformation and its Theology*, and vol. vi. of Dr. Schaff's *History of the Christian Church*, both for biographical data and also for the literature of the subject. Prof. Köstlin has written an excellent and thorough treatise on Luther's theology (2 vols., Stuttgart, 1863; 2d ed. 1883). Th. Harnack has also written on the same subject (vol. i., Erlangen, 1882; vol. ii., 1886). Monographs on particular doctrines treated by him have been written by Köstlin, Weisse, Luthardt, Monckeberg, and Dieckhoff. The Luther jubilee in the U. S. especially called forth the eloquent oration of Dr. J. A. Seiss, published in book form, *Luther and the Reformation* (Philadelphia, 1884), and a very interesting volume of *Tributes to Luther*, edited by Rev. P. C. Croll (Philadelphia, 1884).

H. E. JACOBS.

Lutheranism and the Lutheran Church: The result of the union of the conservative with the progressive in reformation, as distinct from revolution, was the Lutheran Church, whose essential characteristics constitute *Lutheranism*. Lutheranism is the system of faith and life taught in God's word and confessed in the Augsburg Confession and in the creeds consonant with it. The Lutheran Church has never by any general official act taken the name Lutheran. Art, history, and popular usage have practically determined its title. Said the Marquis of Brandenburg when ridiculed as a Lutheran: "If I be asked whether with heart and lip I confess that faith which God has restored to us by Luther as his instrument, I have no scruple, nor do I feel a disposition to shrink from the name Lutheran. Thus understood, I am, and shall to my dying hour remain, a Lutheran." This is the only sense in which any Lutheran tolerates the name.

DISTINCTIVE CHARACTERISTICS OF LUTHERANISM AND OF THE LUTHERAN CHURCH.—The distinctive characteristics of Lutheranism, as over against the Church of Rome, belong to PROTESTANTISM (*q. v.*). A searching analysis of the elements which characterize it in opposition to the Reformed or Calvinistic portions of Protestantism has been made by both friend and foe.

They may be stated and numbered thus:

1. The material principle or foundation of the matter of Lutheran Protestantism is the saving truth of Christianity as it lies centered in the doctrine of justification for Christ's sake alone (*propter . . . um willen*), by faith alone (*per . . . durch*).

2. The formal principle, that which prescribes the form in accordance with which the material is shaped, is the sole authority of Holy Scripture as the rule of faith and guide of life.

3. The Lutheran method of using the rule of faith is historical. The pure Church catholic, or Christian Church, is the living witness of the truth.

4. The doctrines of God's word, the means of establishing which Holy Scripture contains within itself, and of which the Church is witness, shape the individual assurance of faith and the confession of the Church, and originate and develop her polity, worship, and practical life.

5. The Protestantism of the Reformed or Calvinistic Churches, on the other hand, has laid as its fundamental doctrine the absolute and sole primary causality of God. In it there is but one real cause of whatsoever comes to pass, the foreordination of God. Election is therefore the material principle. "The Lutheran doctrine," says Schneider, "comes, through the Gospel, to God—the Reformed, through God to the Gospel."

6. While Calvinistic Protestantism holds with the Lutheran Church that Holy Scripture is normative, it has yet isolated the Scriptures from the historic development of the Church, and subjected its interpretation far more to an undefined subjectivism.

7. "In Reformed Protestantism the formal principle is controlling—in Lutheranism, the material. In the Reformed system Scripture is regarded more as the exclusive source of doctrine—in the Lutheran system, as the norm of the doctrine, which grows out of the analogy of faith. In consequence of this, a pure tradition possesses in Lutheranism a greater validity." Goebel (Reformed), *Die relig. Eigenthümlichkeit*, 1837; Nitzsch (Consensus), *Prakt. Theolog.*, 1847, i., § 74, *seq.*; Heppe (Melanchthonian Reformed), in *Studien u. Kritiken*, 1853, 3.

8. "Lutheran Protestantism is the antithesis to the Judaism of the Roman Church, and thereby the doctrine obtained a Gnosticizing character; the Reformed is the antithesis to the paganism of the Romish Church, and thus the doctrine received a Judaizing ethical character." Herzog (Reformed).

9. "Reformed Protestantism is the protestation against all deification of the creature. Hence it emphasizes the absoluteness of God and the exclusiveness of His will—its material principle—with which coheres the exclusive emphasizing of Scripture as the positive normal principle." Schweizer (Mediating Reformed), *Glaubenslehre*, 1844.

10. "The material principle of Zwingli is the glory of God; his formal principle is the Scripture, yet in such sense that he explains that the internal word is independent of the external, and denies all creaturely causality on the part of the creature in salvation." Dorner (Mediating Lutheran), *Prinzip.*, 1841; *History of Protestant Theology*, 1867.

11. "The Reformed system begins at the top, and goes downward; the Lutheran begins below, and ascends." . . . The center of gravity in the one was the objective, in the other the subjective. . . . Calvinism is the proper Protestant counterpart of Catholicism. The whole system of the dependence of the individual on a power which absolutely determines him in his willing and doing, the system which is set up by Catholicism in its doctrine of the Church, is bound up by Calvinism in its absolute decree. In the one everything saving and salutary lies in the Church; in the other, it lies in the decree. The Lutheran system, with its faith reposing on the historical fact of the redemption, holds the mean between Calvinism and Romanism—between the transcendent idealism of the one, the external realism of the other." *Baur, F. C.*

12. "All these diverse presentations," says Luthardt, "have as their basis the common supposition that the difference is not merely an external one, is not one which turns merely on particular doctrines—as, for example, the Lord's Supper—but pervades the systems and is a difference in principle. The essential part of the difference hinges upon

the elements of the Reformed doctrine, which reciprocally condition each other: the absolute causality and the sole primary causality of God, which excludes means of grace in the strict sense, on the one side, and on the other side an assurance of a state of salvation, grounded in an inscrutable decree—an assurance reached by the individual actual life as the result of the divine operation." Hundeshagen, *Der Deutsche Protestantismus* (1847; 3d ed. 1850); Lücke (*On the True Formulating of the Distinction and Union of the Lutheran and of the Reformed Churches*), *Deutsche Zeitschr.* (1853, 22–53); Schneckenburger, *Vergleich. Darstell. d. Luther. u. reformirt. Lehrbeg.* (Güder, 1855); Baur, F. C., *Lehrb. d. Dogmengesch.* (2d ed. 1858, § 92, 284); Seiss, *Ecclesia Lutherana* (1868); Krauth, *Conservat-Reform.* (1871, 122–128); Luthardt, *Komp. d. Dogmat.* (4th ed. 1873, § 11); Kurtz, *Lehrb. d. K. G.* (7th ed. 1874, § 140); Kahnis, *Innere Gang d. Deutsch. Protestantism.* (3d ed. 1874, i. 26–39); Kahnis, *Principien.* (1865); Kahnis, *Christenthum u. Lutherthum* (1871).

Rise and Early History of the Lutheran Church.—The earliest annals of the Lutheran Church are interwoven with the personal and official history of Luther. His internal conflicts, his theses, the meetings with Cajetan and Miltitz, the Leipzig disputation, the attraction of Melanchthon into his mighty orbit, his era of storm and pressure (1520–21), the bull, the efforts of Charles V. at repression, the Diet of Worms, the hiding at the Wartburg, the outbreak of radicalism at Wittenberg under Karlstadt (1522–25), the Peasant war and Anabaptist sedition (1529), the controversies with Henry VIII. and Erasmus (1523–26)—all had within them potencies for the future of the Church, on which Luther's name, in the face of his protest, was to be fixed. The Lutheran Reformation showed its unfolding strength in the empire at the Diet of Nuremberg (1522–23); in the extension of the evangelical doctrine (1522–24); at the second Diet of Nuremberg (Jan. 14, 1524); at the convention of Ratisbon (1524), called to resist it; in the growing decision of the evangelical states (1524); in the Torgau confederacy (1526). With the year 1526 the estates began to use the right, successfully claimed at the Diet of Spires, to regulate ecclesiastical matters in their own territories. In the years following (1526–29) a number of the Lutheran state churches began to be established and organized. Electoral Saxony, by Luther's advice, began with a thorough visitation of the churches. The church constitution and Luther's two catechisms (1529), which grew out of this visitation, became guides in the organization and training of other state churches. The first martyrs were two young Augustinian monks of Antwerp (1523), whose memory is kept green by Luther's hymn.

Early Ecclesiastical Conflicts.—The Reformation in German Switzerland, under the leadership of Zwingli, had been advancing with many elements of generic affinity with the work of Luther, and with no few marks of specific diversity from it. It was not the purely personal peculiarities of the two leaders, but the origin and internal tendencies of their systems, which led to the sacramental controversy (1525–29). The Lutheran doctrine of the Lord's Supper is one which depends upon methods of interpretation with whose validity the whole distinctively Lutheran system, and indeed the entire biblical churchly system, stands or falls. (See Eucharist and Luther.) The Catholic party hoped at the Diet of Spires (1529) to regain what they had lost three years before. The bitter anger which had been aroused by the affair of Pack (1527–28), the excitement of their fears by the rapid progress of the Reformation, the stimulation of their hopes by the improved political prospects of the emperor—which he largely owed to the Lutherans, to whom he was about to show himself so ungrateful—encouraged them to revoke the decision of the Diet of 1526, and to roll back the wave of Reformation as completely as the new decision of a diet could do it. Against this the evangelical (Lutheran) princes made their solemn protestation (Apr. 19, 1529), which gave them the name of *Protestants*, and appealed to the emperor, to a free council, and an assembly of the German nation. For the Diet of Augsburg and the confession which resulted, see Augsburg Confession.

Political and State Movements (1530–55).—The Protestants now formed a defensive alliance at Schmalkald (1530) to last six years. This aided in bringing about the religious Peace of Nuremberg (July 23, 1532). Würtemberg became Lutheran 1534–35. The Reformation was carried through in Anhalt, Pomerania, and Westphalia in 1532–34. The Schmalkald League was enlarged so as to embrace the new Lutheran states; subscription to the Augsburg Confession was the indispensable condition of reception into the league. Bucer brought the Oberland cities to subscribe. The way for this had been prepared by the Wittenberg Concord (May 25, 1536). Paul III. (1534–49) professed to call that general free council which had been so ardently desired. It was convoked for May 23, 1537, at Mantua. In anticipation of the possibility of a council there or elsewhere, Luther, by order of the elector, drew up certain articles of the points which were not or were to be held above all concession—the Lutheran ultimatum. These were considered at Schmalkald, and take their name from it (Feb., 1537). The Schmalkald Articles form the third of the distinctive confessions of the Lutheran Church. The council was never held, and was never meant to be held. The Nuremberg Holy League (July 10) of the Catholic princes might have brought on a bloody war had not the political difficulties of the emperor made it absolutely necessary that he should conciliate the Protestants. There is no denying that the Turk, who threatened Christendom, was often the best friend Protestantism had on earth. All processes against the Protestants were arrested for eighteen months by the Frankfort Suspension (1539). A profound confidence in the ability of Protestantism to maintain itself began to fill the minds of men. The Reformation in Albertine Saxony had been violently held in check by Duke George (1500–39). On his death without issue, his brother Henry was received with jubilation, and the Reformation swept all before it. The March of Brandenburg and several of the neighboring territories received the Reformation in 1539.

All hope of a better understanding, of a possible union between the conflicting parties, had not yet vanished. Many colloquies were held (Worms 1540, Ratisbon 1541), but they served only to show more clearly the invincible character of the cause of separation. Politically, the prospects of the Lutheran states were very brilliant (1539), but the guilty passions and follies of some of the princes were preparing the way for their own humiliation and for deadly injuries to the cause of truth. Under the lowering of the great storm which was coming Luther died Feb. 18, 1546. The pope had finally consented to call a general council in Trent, a German city, but as little German as possible. The emperor was earnestly desirous of a Reformation in some important particulars, but was determined that it should be in accordance with his own ideas. He used the rivalry and unholy ambition of some of the Protestant princes to separate them from the Schmalkald confederacy. The power which would have been ample to overthrow him was divided. The war of Schmalkald was sprung upon the Protestants. The campaign on the Donau (1546) left the emperor master of all South Germany. Hermann of Cologne was deposed, and the country of the Rhine was lost (1547). The campaign of the Elbe (1547) ended in the overthrow and imprisonment of John Frederick and the landgrave Philip. Then came the imposition of the humiliating and distracting Interim (1548), and the political prospects of the Lutheran Church in Germany reached their hour of profoundest darkness. At this hopeless crisis deliverance came from the man who more than any other was responsible for the evil. In the heart of the Elector Maurice, the betrayer for a time of the Reformation, the slumbering sense of honor was aroused. The German and Protestant feelings to which he had been so treacherous again asserted themselves. He was indignant at the continued confinement of his father-in-law. Breaking from the bonds of the emperor, who had used him as his right hand in the repression of Protestantism, he turned fiercely upon him. Like a hunted fox the emperor fled for his life, in darkness, through pelting rain, on the snow-covered mountains. The treaty of Passau (1552) guaranteed the Lutheran states equal rights with the Catholic till a new council should be convened. The religious Peace of Augsburg (Sept. 25, 1555) withdrew the limitations as to time. The Lutheran Reformation had proved itself incapable of repression alike by the arts and arms of Rome, by the sagacity of its foe, and the follies of its friends. See Walch, *Geschichte* (History of the Evangelical Lutheran Religion as a Proof that it is the True Religion, 1753); Koecher, *Wahrheit*, chaps. xix., xx. (Truth and Perfection of the Evangelical Lutheran Religion, 1755); Ranke, *Deutsche Geschichte im Zeitalter d. Reformation* (4th ed. 1867–68, 6 vols. 8vo); Weber, *Das Zeitalter der Reformation* (1873); Horn, *The Three Interims* (1893).

The Lutheran Reformation Outside of Germany.—Had the conflict been one of purely moral means, the Reformation would have triumphed throughout Europe. Even the resources of courts and the terrors of persecution could not prevent its wide acceptance. In Northern Europe the Lutheran Confession found a home among the Scandinavian races. In Eastern Europe Lutheranism and Calvinism reached the Slavic and Magyar races together. The causes of the preference for the one or the other type of reformation were partly personal and local, but were far more associated with national, race, and political characteristics, which corresponded with the more radical tendency of Calvinism on the one side, and the more conservative character of Lutheranism on the other. The Lutheran Reformation was triumphant in Sweden (1527) under the influence of Gustavus Vasa. In Denmark and Norway the Lutheran organization was confirmed by the Diet of Odense (1539), and by the middle of the century the lands of the Baltic coast and Courland, Livonia, and Esthonia were embraced in the great Lutheran family. See Münter, *Kirchengeschichte v. Dänemark und Norwegen* (1834); Fryxell, *Gustav Wasas Leben* (1831); Weber. *Zeitalter d. Ref.* (530–573).

Doctrinal Controversies in the Lutheran Church in the Sixteenth Century.—See articles Adiaphorites, Antinomians, Crypto-Calvinists, Major, Osiander, and Predestination. For literature, see Kurtz, *K. G.*, 1874, § 141, and see the works of Dorner (1867), Frank (1862–63), Heppe (1852 s.), Planck (1791–98), Loescher (1722–24), Thomasius (1848), Walch (1730–39), Krauth. *C. Ref.*, 147. The internal questions which agitated the Lutheran Church were determined in the Formula of Concord (1577), which closes the collection of the confessions which appeared under the title of Book of Concord (1580). See both these articles.

Church Polity.—In her ecclesiastical constitution the aim of the Lutheran Church was to avoid the hierarchical subjection of the State to the Church, and the Cæsareopapal lording of the State over the Church. The former, which depended on herself, she perfectly secured; in the latter, which was influenced by state plans, she was not always so happy, and in various ways the political complications of the time embarrassed the practical application of her principles. (See the articles Consistory and Episcopal System.) Consult also *Die Kirchenordnung* (The Church Order of the Evangelical Lutheran Church of Germany in its First Century, 1824); Richter, *Geschichte* (History of the Evangelical Church Polity in Germany, Leipzig, 1851); Stahl. *Die Kirchenverfassung* (Erlangen. 1862); Haupt, *Der Episcopat der deutschen Reformation* (Frankfort-on-the-Main, 1863).

Worship and Art.—The worship and the range of art in the Church were meant to meet the wants both of the judgment and of the emotions. A perfect freedom was claimed for the Church in all the purely human regulations of worship. She could add, drop, or change, prudently and in love, according to her judgment of what was best. Her essential unity was that of faith, not of forms; but the spirit of her faith pervaded all her forms. A thorough conservatism was observed. The legitimate results of the historical growth of the Church were treasured. The expressive ornaments of the altar and the innocent usages dear to the people were retained. The Romish perversion of the mass, all rites that taught or insinuated unsound doctrine, were thrown out, and the evangelical mass, the pure communion service, remained. The pulpit became a power. The people took part everywere in worship, which as of old was responsive. They heard God's Word and uttered his praises in their own tongue. The biblical festivals of the Church year were retained. Painting (Cranach, the Holbeins, Dürer) and statuary hallowed their gifts for the sanctuary. See Jacoby, *Liturgik d. Reformation* (1871); Kliefoth, *Ursprüngl. Gottesdienstordnungen in l. K.* (1847); *Liturg. Abhandlungen* (1854, *seq.*); Schöberlein, *Ausbau* (1859); Krauth, *Evangelical Mass and Romish Mass*; *Sunday Services according to the Liturgies of the Churches of the Reformation*; *Jubilee Service* (1867); Köstlin, *Geschichte des christlichen Gottesdienstes* (Freiburg, 1887); Jacobs, *The Lutheran Movement in England* (1890); Horn, *Outlines of Liturgies* (1891); also articles in *Lutheran Church Review* and *Lutheran Quarterly* (1890–93), by Horn, Wenner, and others.

Hymns.—The hymns for the people were one of the grandest achievements of the Lutheran Reformation. They are full of simplicity, unction, and divine objectivity. Holy song was as wide-reaching, as incapable of exclusion, as soft and wooing, as mighty and irresistible, as the air on whose pulsations it spoke heart to heart. Among the greatest hymn-writers are Luther; Speratus, d. 1554; Decius; Eber, d. 1569; Spengler, d. 1534; Mathesius, d. 1565; Alber, d. 1553; Weisse, d. 1540, of the first half of the century; in the latter half we have Ringwaldt, d. 1597; Selnecker, d. 1592; Herberger, d. 1627; Nicolai, d. 1608. "In worship the austere Old Testament psalmody of the Reformed presents a striking contrast with the cordial internality of the Lutheran Church song, gushing from the living spring of the spirit of poesy." (*Baur.*) See Koch, *Geschichte* (History of Hymns and Church Song, especially in the Evangelical Church, 3d. ed. 7 vols., 1866, *seq.*); Wackernagel, *German Hymns from Luther to Hermann* (1841); *From the most Ancient Times to the Beginning of the Seventeenth Century* (1867, *seq.*).

Church Music.—The congregational singing was a revival of the Ambrosian choral over against the priestly Gregorian chant. It was choral, for the people and the choir blended into one in this noble form of song. Among the composers of this era are Luther and his familiar friends Rhau and Walter. Eccard (d. 1611) did much for church music.

Practical Life.—The Christian life was one of humble, joyous assurance. The clergy were marked by devotion to the pastoral work, and by fidelity in the pulpit and in the religious instruction of the young. Without a severe Church discipline they trained the people in the fear of God, in personal honor, and in the domestic and civil virtues. "In the administration of Church discipline the Lutheran Church is beyond dispute very much behind the Reformed; on the other hand, the moral life in the Lutheran Church has a character of greater freedom, of more heart and soul, resting more on internal motives." (*Baur.*) "That there were painful exceptions is not only the necessary general result of the common infirmities of human nature, but is connected with this fixed law, that the times following great struggles, warfare, and change, even of the most hallowed character, are times of reaction and relaxation. The immediate sequence of a successful war for truth and virtue is a revival of the potency of many elements of falsehood and vice."

Theological Science.—The nature of the times gave great prominence to polemic theology. Whatever part of theology was taken up was handled with special reference to its availableness as a means of defense or enlargement of the restored truth. The plowshares were beaten into swords. Luther, Melanchthon, Flacius, Brentius, Chemnitz, and the co-workers in the *Magdeburg Centuries* are still unforgotten names. The centers of theological culture were the Universities of Wittenberg, Tübingen, Strassburg, Marburg (1527), and Jena (1557). See Dorner, Frank, Gass, Heppe.

Transitions of Lutheran Established Churches in the Sixteenth Century.—The Crypto-Calvinistic designs had contemplated a general removal of the Lutheran Church from its first foundations. Crypto-Calvinism was concerned mainly with the sacramental doctrines. It was really further from what is now considered as by pre-eminence Calvinism than Lutheranism itself had been. It was unionism, deriving its special features from the times. Its designs were thwarted, yet the Palatinate under Frederick III. (1560), Bremen (1562), and Anhalt (1597) were transferred by their civil rulers to the Calvinistic communion.

The Lutheran Church in the Seventeenth Century.—1. Hesse-Cassel (1604), the earldom of Lippe (1602), the court (but not the people) of the electoral house of Brandenburg (1613), became Calvinistic. Various attempts at union (Leipzig, 1631; Thorn, 1645; Cassel, 1661) accomplished nothing. The ardor for union was so great that its representatives drove Paul Gerhardt and others from their flocks into poverty and exile for declining to treat the distinctive faith of the Lutheran Church as a thing indifferent.

2. The peril of peace is the peril of stagnation. The Lutheran Church had undergone the ordeal of a war of polemics; she was to undergo the trial of a comparative internal repose. She now reached her mediæval period, rich in construction, comparatively poor in origination, not by declension, but by the ordinary law of historic progress. Within the determined orthodoxy rose various questions, but in many of them the interest was confined to theologians. The controversy on syncretism originated in the views of George Calixtus. With pietism in its early stages are associated the names of Spener and Francke.

3. In theological literature are found among the names still treasured Glassius, Pfeiffer, the Schmidts (Erasmus

and Sebastian), Baier, Calovius, Hutter, Gerhard, Quenstedt, Hunnius, and Musæus.

4. The age is brightened also by the works of many of the noblest representatives of a living, internal Christianity. Among them are Arndt (*True Christianity*), Gerhard (*Meditations* and *Schola Pietatis*), Heinrich Müller, Scriver, and Andreæ. The lovers of mysticism and theosophy treasure Jakob Böhme and Gottfried Arnold.

5. The century was rich in hymn-writers. Those of the earlier part were marked by the old objectivity—those of the later, by the growing tendency to subjectivity. There was an intermediate school, whose greatest representative, Paul Gerhardt, harmonizes both tendencies. Church music was nobly represented by the great composers Crüger, d. 1662; Rosenmüller, d. 1686; Hammerschmidt; Ahle, d. 1673.

The Lutheran Church in the Eighteenth Century.—1. *Before "the Illumination."* After the death of Spener (1705) and Francke (1727) pietism degenerated very rapidly. That this was not the absolutely necessary outgrowth of the principles of the great leaders in the pietistic movement is shown by the fact that out of Halle there also went forth forces into the Church the beneficence of which is beyond all dispute. There arose a generation of Lutheran divines as pious as the pietists, as orthodox as their opponents—who neither arrayed piety against orthodoxy nor orthodoxy against piety, but showed by pen and life that true piety is orthodox, and that true orthodoxy is pious. Of this school, though not in equal degrees, may be named Hollazius, Starck, Buddeus, Cyprian, J. C. Wolff, Weismann, Deyling, J. G. Carpzov, J. H. and C. B. Michaelis, J. G. Walch, Pfaff, Mosheim, Bengel, and C. A. Crusius. Of the philosophical Leibnitzo-Wolfian school were S. J. Baumgarten, Reinbeck, Carpov.

2. *Church Polity.*—The (politico-) episcopal system of polity had claimed at first to be simply a necessity. This transmuted itself into the assertion of a principle (Carpzov, 1645). It was supplanted by the territorial system (Thomasius and Böhmer, beginning of the eighteenth century). A third system, the collegial, was the outgrowth of Spener's views, and found an able exponent in Pfaff (1719). (See Polity, Ecclesiastical.) Also see Richter, *Gesch. d. ev. Kirchenfass* (1851, 208); Lechler, *Gesch. d. Presbyt. und Synod. Verfassung* (1854, 228); Stahl, *Die Kirchenverfassung* (1862).

3. *Worship.*—The hymn-writers of this era show the influence of the spirit of Spener in the earnest piety which is their strength, and in the individualism which is their weakness. The early hymns were hymns for men to sing together—the later hymns were hymns to be sung by men in separateness, and sometimes of the sort that men are not likely to sing at all. The degenerating pietism corrupted the music of the Church. This tendency was met by John Sebastian Bach, who in many of the highest attributes of his art was "the greatest master of all times," the lover and the glorifier of the ancient choral. Handel (d. 1759) gave his ripest years to oratorio, and in his *Messiah* reached by the inspiration of music a height Milton had failed to attain in *Paradise Regained.*

4. *Missions.*—The new life of the purer pietism showed itself in establishing missions among the heathen. At the Danish mission at Tranquebar (1704) labored Ziegenbalg (d. 1719). From Halle went forth Schwarz (d. 1790). Callenberg founded at Halle (1728) an institution for the conversion of the Jews. Hans Egede (1721) went to Greenland, and when in 1736 he returned to Denmark and established a mission seminary for Greenland, his son Paul took his place. On Lutheran missions, see Francke, *Berichte d. dän. Miss. in Ostind.* (1708–72); Egede, *Description of Greenland*, transl. from the Danish (London, 1745); Wiggers, *Gesch. d. evang. Miss.* (2 v., 1845); Wiggers, *Statistik* (2 v., 1842–43); Plitt, *Kurze Gesch. d. luth. Miss.* (1871).

5. *The Rationatistic "Illumination."*—From the middle of this century rationalism, claiming the title of "Illumination," or enlightment, made rapid progress. Rationalism, arising from the abuse of the freedom of investigation demanded by the nature of Christianity, and enunciated as a vital principle by Protestantism, has coexisted in some shape with the Church from its first hour to the present. In the eighteenth century it was intensified by causes of wide extent and great potency, and revealed itself in every great communion of Western Christendom. Lutheranism had been charged by Rome with giving undue weight to human reason—not indeed as over against the Word, but as against Church authority—and Rome was assailed through the whole Reformation, by both the great Protestant parties, as rationalistic and Pelagian in many of her doctrines. The great leader in rationalistic criticism of the eighteenth century was the Roman Catholic Oratorian, Simon, who died 1712, nearly ten years before Semler, the father of rationalism in the Lutheran Church, was born. The Reformed tendency was resisted by Lutheranism as unconsciously rationalizing; but the unequivocal tendency had been shown first in Socinianism, and afterward in the advanced Pelagianism of Arminians of the school of Le Clerc (d. 1736). England contributed her deistic writers. In France, naturalism and atheism became fashionable, and Frederick the Great helped to domesticate them in Germany. Freemasonry as it had been transferred from England in 1733, the Wolfian philosophy, and the perversions of philosophy in general, the later pietism, and the separatism it engendered, aided in the work of mischief. Rationalism is infidelity in various degrees, under the forms of Christianity. The supranaturalism which met it was more or less under the latent influence of the thing it combated, as the English apologetics of the century showed tinges of the deism with which it fought. The higher philosophy and national literature, though in seeming affinity with rationalism on the surface, were yet in their antagonism to its prosy doctrines, its plausible shallowness, emptiness, and self-sufficiency, its invincible foes in their deepest and final workings. See Rationalism and Philosophy, German.

6. *Opponents of Rationalism.*—In the darkest time some were "among the unfaithful faithful found." Imperfect as was the work of the supranaturalists, the best of them did noble provisional service. They at least kept a polar twilight where there might have been a midnight. Outside of the ranks of the theologians, Claudius, Hamann, and Oberlin, the pastor of the Ban de la Roche, are among the unforgotten names. Under a common pressure the faithful hearts of the separate communions were drawn closer to each other.

7. *Influence of Rationalism.*—Under the baleful influence of rationalism every sacred interest declined. The pulpit lost its power; no living hymns were produced, and the old were unsung. In music the ancient beauty and glory of the choral vanished; men sought the concert-room and the theater, for which the music of the time was better suited than for the church. The oratorio gave way to the opera. The conservation of Rome itself yielded, and Palestrina's noble school sank before the self-sufficiency of operatic organists and choirs. The liturgies which were offered, too frequently with success, for the historical services of the Church, are beneath the ludicrous. They are too dreary to awaken the smile which their absurdity seems to challenge. Rationalism had shown that its problem is not as between forms of religion, but as between religion and irreligion.

The Lutheran Church in the Nineteenth Century.—1. *Reaction of Church Life.*—The revolutionary excesses of France, and the awe-inspiring providences growing out of them by development or counteraction, which marked the fifteen opening years of the nineteenth century, had tended to sober men, to turn their eyes to God, and to show them how poor are the substitutes which had been offered for the simple, deep, and earnest faith of the olden times. All deep thinking tends as a finality against skepticism. Reason is the cure of unreason. Kant, Fries, the Fichtes, Schelling, Hegel, Herbert, Schopenhauer, Ulrici, Lotze, von Hartmann, in simple virtue of helping to earnest thinking, work in one school. The earnest thinking instantly showed itself as a better thinking. Pietism renewed its better youth. The ninety-five theses of Claus Harms (1817, the close of the third centenary of the Lutheran Church) recalled the Reformation to the minds of all, to the hearts of many.

2. *Union and Separation.*—Frederick William III. began in 1817 the movements looking to the union of the Lutheran and Reformed in one state Church. Strong opposition rose on the side of many earnest Lutherans. Among them may be mentioned Scheibel (d. in exile, 1843), H. Steffens (1831), Kellner, whose church was opened by military force for the Agenda (1834), Guericke (1835). Frederick William IV. released the clergymen who were imprisoned, and a free Lutheran Church was organized 1841, and received the royal concession 1845. Separation also arose within the separated, on questions affecting the constitution of the Church. A decision of the general synod of 1859 adverse to the view of Diedrich led to his separation from the

synod (1861). A free Lutheran conference of the friends of separation from the unionistic state churches was held Oct. 28, 1874, at Eisenach, the object of which was to promote a better understanding and a more perfect sympathy and mutual support. In the discussion of the questions raised by the union, see Rudelbach, *Reformat. Luth. u. Union* (1839); Müller, *Evang. Union* (1854); Nitzsch, *Urkundenbuch* (1853); Stier, *Unlutherische Thesen* (1854); Schenkel, *Unionsberuf* (1855); Schulz, *Die Union* (1868). See citations under § II. of this article.

3. *Confederations.*—Various confederations attempted to co-operate with or supplement the union, so as to bring into practical co-working the elements which had been joined but not united in it. Among them are the Gustavus Adolphus Association (Oct. 31, 1841), the Evangelical Church Diet (1848), at whose meeting in Berlin (1853) the Augsburg Confession received a qualified recognition as the common confession of Protestant Germany; the Eisenach Conference (1846, 1852).

4. *Distinctive Lutheranism within and without the Union.*—Within the union distinctive Lutheranism still remained a great and active power. Many Lutherans remained within the union to fight the battle for truth there, and to obtain, if possible, a restoration of the solemnly guaranteed rights of the Church. Lutheranism outside of the union was represented in the general Lutheran conference, among whose distinguished names are Harless, Kliefoth, and Luthardt. Its chief organ is Luthardt's *Kirchenzeitung* (1868).

5. *Hymns and Music.*—The awaking consciousness of the Church led to noble and successful efforts to correct the wretched state into which the rationalistic Vandalism had brought the hymns, the music (the choral has been the pulse of the Church), the service, and the popular religious literature. Moritz Arndt, von Raumer, Bunsen, Stier, A. Knapp, Daniel, Layritz, the Eisenach Conference (1853), and Waekernagel have labored in the revival of hymnology. Natorp, Thibaut, Grüneisen (1843), Winterfeld (1843), and V. Tucher (1848) have done valuable service in restoration.

6. *The theology of the nineteenth century* could only have risen in a land which had received the ineffaceable impression of Lutheran life and thought. The grandeur of the wildest perversions of this theology and the ruins of its most unsparing destructiveness were only possible on the presupposition of eras of gigantic building. The ancient Lutheran theology, after the storm of war had swept over it, stood like Tadmor in the wilderness. Its ruthless foes could not build, and could only destroy because the greater generations had builded; but they could not perfectly destroy—they could only dismantle what was too massive to be overthrown. The Protestant theology of Germany is represented (1) in the older and in the historico-critical rationalism; (2) in the old supranaturalistic schools, embracing rational supranaturalism, the strieter or suprarational supranaturalism, and the pietistic supranaturalism; (3) the mediating theology whose father is Schleiermacher. Among its representatives from the Lutheran side have been Lücke, Bleek, Nitzsch, Muller, Ullmann, Twesten, Dorner, Liebner, Martensen, Ehrenfeuchter, Beyschlag, and Köstlin; (4) *Lutheran Theologians of the Confession.* The patriarch among these was Claus Harms (d. 1855). Among its representatives in what might be called a first generation have been Sartorius, Rudelbach of Denmark, and Guericke. The divines of a second generation show certain divergencies of view on parts of the theory of the ministerial office and of the Church, and on the construction, spiritualistic or realistic, of prophecy, especially on the parts in which Chiliasm is involved. In a first group may be placed Harless, Höfling, Thomasius, Keil, Caspari, Krabbe, Philippi, Dieckhoff, Zöckler, Wuttke, Harnack, Oettingen, Frank, and Grau. In a second group, distinguished by its strong views of the Church and ministry, have been Löhe, Vilmar, Kliefoth, and Zezschwitz. In a third group, distinguished by its realistic tendency in the interpretation of prophecy, are placed C. K. v. Hofmann, Drechsler, Delitzsch, Luthardt, M. Baumgarten, and Oehler. In their earlier position Kahnis and Thiersch were strictly confessional. See GERMAN THEOLOGY.

The great jurists Gösehel (d. 1862) and Stahl (d. 1861) were also theologians of the Lutheran Confession. The works of the great writers on Church polity, Eichhorn (d. 1854), Jakobson, Puchta, Richter (d. 1864), Dove, Bickell, and others, are of great importance in many of the discussions which have been specially characteristic of the Lutheran Church in the nineteenth century—whose problem is the embodiment of the soul of her doctrine in a sound polity, a constitution which shall as adequately conform to her common life as her confessions to her common faith.

7. *Practical Life.*—With the reviving doctrinal life came the spirit of missions. The outgrowths of the life of inner missions are so numerous that their names would fill pages. Wichern founded the Rauhe Haus 1833, the institute for girls at Berlin 1858, and has been the father of a great number of beneficent institutions and reforms. With the deaconess institutions are associated the names of Fliedner, Löhe, and Th. Schäffer. Among the associations and schools for foreign missions may be mentioned the Society of the Rhein (1829), the North German (1836), Jänekes (1800), and Gossner's, all of which have a predominantly Lutheran character. The Dresden Missionary Society has a positive Lutheran character (1836). It transferred its seminary in 1848 to Leipzig, to give its pupils the advantages of the university. It has taken up again the ancient mission-work of the Lutheran Church in India. All the Lutheran lands have mission societies. The Hermannsburg Mission Institute, under the direction of Louis Harms (d. 1865), has developed great energy. See MISSIONS.

8. *Statistics.*—The total number of Lutherans is probably about 52,000,000, including the Lutherans in the union churches. The purely *local history* and *statistics* of the Lutheran Church properly belong to the different countries and states in which the Church exists—America (North and South), Anhalt, Austria, Baden, Bavaria, Belgium, Bohemia, Bremen, Brunswick, Carinthia, Carniola, Darmstadt, Denmark, England, France, Hamburg, Hanover, Hesse-Cassel, Holland, Hungary, Iceland, Lippe, Lubeck, Moravia, Mecklenburg, Norway, Oldenburg, Poland, Prussia, Russia, Saxony, Styria, Silesia, Sweden, Thuringia, Transylvania, Westphalia, Würtemberg. In all these the Lutheran Church has a historical record. For confessions, see the article CONCORD, BOOK OF, and the creeds there enumerated. For special doctrines and controversies, see CONCOMITANCE, SACRAMENTAL; CONSUBSTANTIATION, EUCHARIST, SACRAMENT, SYNCRETISM, SYNERGISM, etc. See also the articles POLEMICS, PROTESTANTISM, and REFORMATION.

Revised by H. E. JACOBS.

Lutheran Church in the United States: *The Era of Beginnings.*—The earliest Lutherans in America came from Holland, and were among the first settlers of New Amsterdam. Their worship was at first in private houses, and their nonconformity with the Calvinistic religion of the large majority of their countrymen subjected them to severe penalties. J. E. Götwater, their first pastor, was promptly sent back by the city authorities, in 1657, to Holland. They obtained religious freedom only with the capture of the city by the English in 1664. They had congregations along the Hudson and in New Jersey, where some of their descendants are still found in the English Lutheran churches. There were Dutch Lutherans on James Island, S. C., in 1674.

Swedish Lutherans followed in 1536–37, in connection with the Swedish settlement on the Delaware. Torkillus was their first pastor (d. 1641). His successor, Campanius, began mission work among the North American Indians, and translated Luther's Catechism into the Delaware language. His labors enabled William Penn, in after years, to carry out his pacific policy. The first Lutheran church in Pennsylvania was built in 1646. For a century and three quarters the six Swedish Lutheran congregations on the Delaware were served by thirty-five pastors, the last of whom died in 1831. As the Swedish was replaced by the English language, they were gradually transferred to the Episcopal Church. The most prominent of these churches is Gloria Dei, built in 1700 in Philadelphia, and the church at Wilmington, Del., built in 1699. Three of the Swedish pastors in 1703 ordained Rev. Justus Falkner, a minister of German congregations in Montgomery County.

The German emigration to Pennsylvania began in 1680. Lutheran Palatinates settled at Newburg, N. Y., in 1708, and Newbern, N. C., in 1710. Others settled about the same time in Schoharie, N. Y. Three of the congregations in Pennsylvania sent a deputation to Germany in 1733, in order to procure pastors. The result was the sending in 1742 of Henry Melchior Muhlenberg, who is very appropriately called the patriarch of the Lutheran Church in America. Meanwhile, in 1734, a large number of Salzburger refugees had colonized Ebenezer, Ga. By the middle of the eighteenth century a foothold had also been gained in the Shenandoah valley and in Madison co., Va.

Era of Synodical Organization.—Muhlenberg's arrival was followed by a succession of faithful colaborers from Halle (Brunnholtz, Kurtz, Schaum, Handschuh, Hartwig, Bager, Helmuth, Schmidt, Kunze), and an era of great activity among the scattered churches. An attempt had been made by Berkenmeyer to found a synod, and a session, with three pastors and representatives from nine congregations, had been held, beginning Aug. 20, 1735, at Raritan, N. J., but it had failed to become a permanent organization. The Lutheran Synod of North America, afterward known as The Evangelical Lutheran Ministerium of Pennsylvania and adjacent States, was organized in Philadelphia, Aug. 14, 1748, comprising in the beginning both Swedish and German pastors. Another synod was founded in New York in 1785. The entire number of synods now in existence is 61. Their sizes are very unequal, from the Joint Synod of Missouri with 1,237 ministers and 330,000 communicants in 1893, to the Rocky Mountain Synod with 11 ministers and 297 communicants. The Synod of Missouri has had a most significant influence in the development of the Lutheran Church in the U. S. It originated in a colony of Saxon Lutherans who emigrated in 1839 to Perry co., Mo., in order to carry out the separatistic Church ideas of their leader, Martin Stephan. He was accompanied by six earnest and devout pastors and followers, who sincerely believed that they were following a Divine call in leaving their old home for conscience sake. When Stephan was found to be a deceiver, there was no hesitation in excommunicating and renouncing him. C. F. W. Walther, one of the young Saxon pastors, was next regarded as their leader, and, with wonderful ability as preacher, theologian, author, debater, and church organizer, guided the synod through an unparalleled career of development until his death in 1887. The synod is divided into 14 districts, extending from Canada to Texas. The Joint Synod of Ohio, with 353 ministers, founded in 1818, as the result of mission work by the Synod of Pennsylvania, is also divided into districts extending over many States, from Washington to North Carolina. The German Iowa Synod, with a similar organization and nearly 400 ministers, was founded in 1854 by German missionaries sent from the seminary of Löhe at Neuendettelsau, after an estrangement had occurred between Löhe and the Missouri Synod. The three Norwegian synods in the West have together 566 ministers, 1,748 congregations, and 171,595 communicants. The Norwegian emigration to the U. S. began about 1835. Their oldest synod was founded in 1846, and for years was closely connected with the German Synod of Missouri, their students having been educated at the seminary of the latter synod. The largest of the Norwegian bodies is the recently formed United Norwegian Church, the result of a union of three synods. It has its center at Minneapolis, Minn., and numbers very nearly 100,000 communicants. Swedish immigration began about 1845. The Swedes first belonged to an English Synod (Northern Illinois). Afterward, with Norwegians and Danes, they formed in 1860 the Augustana Synod; but it was finally deemed best for the nationalities to be separate, and the Norwegians and Danes withdrew. The Swedish Augustana Synod, with its chief institutions at Rock Island, Ill., extends over the entire country, and numbers 370 ministers, 719 congregations, and 95,068 members (1893). Besides these, the Danes, Finns, and Icelanders have their own synods. The last named have over 7,000 members in North Dakota and Manitoba.

Efforts at General Organization.—Most of these synods have united in general organizations. Of these the oldest is the *General Synod*, formed by the efforts of the Ministerium of Pennsylvania in 1821, of which it has been a member only for two short periods (1821–23, 1853–66). Its strength is mainly in the Middle States. Its congregations are mostly thoroughly Anglicized. It has theological seminaries at Gettysburg and Selinsgrove, Pa., Hartwick, N. Y., Springfield, O., and Chicago, Ill. (German). It accepts the Augsburg Confession, but with a diversified degree of strictness in adhering to it. The latest statistics give the General Synod 1,226 ministers, 1,568 congregations, and 194,442 communicants—i. e. about one-eighth of the whole number of Lutherans in America.

The General Council was organized in 1866, and includes the two oldest synods in the U. S., viz., the Ministeriums of Pennsylvania and New York, the Pittsburg, Texas, Detroit, Ohio, Swedish Augustana, Canada, Indiana, and Northwest Synods. Its congregations are almost equally divided among the three languages, German, Swedish, and English. Its theological seminaries are at Philadelphia, Rock Island, Ill., and Chicago, Ill. Its doctrinal position is set forth in its *Fundamental Principles of Faith and Church Polity.* "The unaltered Augsburg Confession in its original sense" is declared to be "throughout in conformity with the pure truth, of which God's Word is the only rule," while the other confessions included in the *Book of Concord* are indorsed as "in the perfect harmony of one and the same scriptural faith" with the Augsburg Confession. There has been some controversy concerning the degree, according to which consistency with this subscription required a renumeration of all pulpit and altar fellowship with other denominations, and a succession of declarations on the subject which are mutually interpretative was adopted at Pittsburg (1868), Akron (1872), Galesburg (1875), and Pittsburg (1889). The General Council has been the center of protracted discussions, largely from its attempt to bring into one body the representatives of different nationalities who had to learn to know and to respect each other, and the historical development through which each element has passed. As a consequence the General Council lost in 1869 the Illinois and Wisconsin, in 1871 the Minnesota, and in 1886 the Michigan synod—all German bodies—because of alleged dissatisfaction with the exceptions permitted within the other synods to the strict confessional position of the council. For the same reason the German Synod of Iowa has held only an advisory relation. Of late years much missionary activity has been developed. It embraces 1,156 ministers, 2,019 congregations, and 370,409 communicants (including congregations in the Dominion of Canada), about one-fourth of the membership in the country.

The Synodical Conference, organized in 1870, consists of the large synods of Missouri and Wisconsin, with the small synods of Minnesota, English Missouri, and Michigan—all German. It is the most rigid in its confessional requirements. A controversy on the subject of predestination, in which the Missouri Synod maintained that believers are "elected to faith" and not "with respect to faith," occasioned the withdrawal from the conference of the Joint Synod of Ohio and the Norwegian Synod, and the separation of the latter body into two sections. It embraces 2,029 ministers, 2,650 congregations, and 581,029 communicants, about one-third of the sum total in the U. S.

The United Synod of the South, formed in 1886, is composed of the English-speaking synods of the South that were cut off from the Northern General Synod by the civil war, together with the Tennessee Synod. Its confessional basis is the same as the General Council, with less consistency in practice. The United Synod has 215 ministers, 390 congregations, and 38,639 communicants.

A movement was begun in 1878 in the General Synod South, the predecessor of the United Synod, to provide a common order of service for all Lutherans who use the English language. After considerable difficulty the General Synod and General Council accepted the proposition, and the service appeared in 1888. Since then other bodies have joined in the work of providing ultimately one common book of worship. The meetings of the joint committee which are convened biennially are attended by representatives from all the general bodies and the chief Independent synods, thus securing a practical co-operation between the various synods.

Church Work.—All these bodies are active in various forms of benevolent and missionary work. There were in 1900 43 orphanages, 19 homes for the aged, 18 hospitals, 8 deaconesses' institutions, and 11 immigrant and seamen's missions. The chief of these is the Milwaukee Hospital, under the directorship of Rev. Dr. Passavant, and the magnificently equipped Mary J. Drexel Home, erected and furnished by John D. Lankenau at an expense of over half a million. They reported 115 educational institutions with 12,854 students. The General Synod sustains a very prosperous mission among the Telegus in India, founded in 1842 by Rev. C. F. Heyer, as well as a misson on the west coast of Africa. The General Council has a misson-field in India among the Telegus, adjacent to that of the General Synod. The United Synod has two missionaries in Japan. The Synodical Conference, in addition to an enormous work among the German immigrants, is prosecuting missions among the Negroes.

Organization.—The organization of the congregations differs somewhat in the various bodies. Ordinarily there is a church council, composed of lay elders and deacons, or deacons alone, and the pastor, who are charged by the congregation with the administration of its affairs. The lay

eldership was accepted by Muhlenberg and defended by Walther, but rejected by the General Council, under the leadership of Krauth. In the Synodical Conferences the government approaches that of the purer forms of Congregationalism, while in the General Synod, United Synod, and a large part of the General Council it has more points in common with Presbyterianism. Synods have, according to the Missouri conception, a purely advisory power; but outside of the Synodical Conference greater weight is placed upon their decisions. The oversight of the pastors and congregations belongs to the president of the synod, and is exercised in many of the synods through visitors whom he appoints, and who report the result of their visits. Missionary superintendents and missionary presidents are charged by some synods with the care of home missions.

Worship.—The worship is approaching a higher degree of uniformity than has previously been found. The Lutheran churches on the continent of Europe exhibit great diversity, which was intensified by the influence of other denominations in the U. S. Muhlenberg provided a full liturgical service, even for the country congregations in their rude beginnings, and diligently followed the Church Year, as his letters in the Halle *Reports* show. During the beginning of the nineteenth century there was an almost universal disuse of all liturgical forms except for ministerial acts; but since 1850 a movement has gradually progressed, until the common service has practically united the various Lutheran bodies in the formal adoption of the "consensus of the pure Lutheran liturgies of the sixteenth century." The immediate use in all congregations of what has been thus adopted can not, in the nature of the case, be expected, especially as it is well known that in parts of Germany (e. g. Würtemberg), from which many of the Lutherans in the U. S. come, there is much antagonism to read prayers.

The following table exhibits the growth of the Lutheran Church in the United States.

YEAR.	Ministers.	Congregations.	Communicants.
1862	1,366	2,575	270,780
1872	2,175	3,826	458,607
1882	3,299	5,865	838,302
1893	5,302	9,069	1,293,163
1900	6,710	11,123	1,665,878

Historical Sources.—The chief sources for the early history of the Lutheran Church in the U. S. are Acrelius's *History of New Sweden* (1759, translated by Reynolds, 1874); the Halle *Reports* (1728–87; reprint with extensive notes by Mann, Schmucker, and German, 1886–92); the *Urlsperger Reports*, from the Salzburg pastors in Georgia (1744); Mann's *Life and Times of Muhlenberg* (1887); Nicum's *History of the New York Ministerium* (1888). The history by Wolf (1899), and its translation into German with extensive additions by Nicum (1891), and the extensive work of Prof. Graebner of St. Louis (1892); the Danish history by Andersen (1890); the *History of the German Settlements in North and South Carolina* (1872); the *History of the Tennessee Synod*, by Henkel (1890); and numerous articles in *The Evangelical* and *Quarterly Reviews* of Gettysburg and *The Lutheran Church Review* of Philadelphia, and the *Proceedings of the First and Second Lutheran Diets* (1878–79) contain much information. Cf. *History of Lutheran Church in the United States*, by Jacobs (1893).

Revised by H. E. Jacobs.

Luther League of America: See the Appendix.

Lütke, lüt'ke, Fedor Petrovitch: explorer; b. in Russia in 1797; was educated in the Russian navy; accompanied Capt. Golownin on his circumnavigation of the earth 1817–19, and undertook from 1821 to 1824 four expeditions to Nova Zembla, of which he published a description in 1828. From 1826 to 1829 he explored Bering's Strait and the Sea of Kamchatka, of which he gave a description (1834–36); in 1835 was made an admiral and appointed tutor to the Grand Duke Constantine; in 1850 was made military governor of Revel, and in 1853 of Cronstadt. He was the founder of the Russian Geographical Society, and attained the seat in the French Institute which had stood vacant since the death of Franklin. D. Aug. 20, 1882. A biography in Russian of Lütke, by Besobrasow, was published in 1889.

Lu'ton: town; in Bedfordshire, England; on the Lea, near its source, and 31 miles N. W. of London (see map of England, ref. 11–J). It has a fine Gothic church, dating from the fourteenth century, and is the principal seat of the straw-plait manufacturing industry in England. Pop. (1890) 30,000.

Lutti, loo'tĕe, Francesca: poetess; b. at Campo, near Trent, in the Italian Tyrol, in 1831. The daughter of the Cavaliere Vincenzo Lutti, she began early to write, though with more impetuosity than correctness. Later, however, she fell under the influence of her fellow Tyrolese, Andrea Maffei, and the beauty as well as the power of her work gave her an honorable place in Italian literature of the nineteenth century. She published first, under the title *Cantiche*, the poetical tales *Giovanni*, *Maria*, and *Rosa e Stella*. Then in 1851 appeared the charming narrative poem *Alberto*, with an introduction by Maffei. Later she published *Novelle e Liriche* (2 vols., 1862) and *Un Proverbio* (1874). D. at Brescia, Nov. 6, 1878. A. R. Marsh.

Luttringhausen, loo'tring-how-zen: town of Rhenish Prussia; 5 miles S. E. of Elberfeld (see map of German Empire, ref. 4–D); manufactures silk, woolen, linen, and cotton fabrics, cutlery, hardware, and brandy. Pop. (1891) 10,498.

Lutuamian Indians: a family of North American Indians, so named from the Pit river or Achomawi word lutuami, *lake*, because the Modocs had their habitat on Modoc or Tule Lake. There are but two tribes in this family—the Klamath Lake Indians or E-ukshikni, E-ukshikni maklaks, and the Modoc Indians or Modokni, Moatokni maklaks, which signifies Southern Indians. They live in Southwestern Oregon, E. of the Cascade Range and N. of the California boundary, the Klamath Lake Indians upon upper Klamath Lake and in Sprague river valley, the Modocs in the same valley on Lost river and the lakes south of it. Some Modocs, who took part in the revolt of 1872–73, were exiled to the Indian Territory. They are a healthy, warlike nation of mountaineers, who in former times held in terror several of the circumjacent tribes. The Klamath Lake Indians are taller and of lighter complexion than the Modocs. The most important event in their history is the Modoc war against the U. S. Government in 1872–73, which ended with their defeat. Including the 140 Snake Indians upon the Klamath reservation, the whole population amounts to about 1,000. (See Indians of North America.) See Gatschet, *The Klamath Indians of Southwestern Oregon* (2 parts, quarto, Washington). A. S. Gatschet.

Lützen, lüt'sen: small town of Prussia; about 10 miles S. E. of Merseburg, province of Saxony; famous for the two battles which were fought in its vicinity (see map of German Empire, ref. 4–F). On Nov. 16, 1632, the Swedish king Gustavus Adolphus fell here in a battle with Wallenstein, the general of the imperial army; the Swedes were victorious. (See G. Droysen, *Die Schlacht bei Lützen in Forschungen zur deutschen Geschichte*, Göttingen, 1862.) On May 2, 1813, Napoleon defeated the Prussian and Russian armies near Lützen. Pop. (1890) 3,564.

Luverne: village (founded 1872); capital of Rock co., Minn. (for location of county, see map of Minnesota, ref. 11–A); on the Rock river, and the Chi., St. P., Minn. and Om., and the Burl., Cedar Rap. and N. railways; 30 miles E. by N. of Sioux Falls, S. D. It is in an agricultural region, has several quarries of building-stone, and contains 7 churches, high school, several public schools, water-works and electric-light plant, owned by the village, and a monthly and 2 weekly newspapers. Pop. (1880) 679; (1890) 1,466; (1900) 2,223. Editor of "Rock County Herald."

Luxation: See Dislocation.

Luxembourg, lük'saăn'boor', François Henri de Montmorency-Bouteville, Duke de: marshal of France; b. in Paris, Jan. 8, 1628; the posthumous son of François de Montmorency, Count de Bouteville, who was beheaded June 27, 1627; was educated by his aunt, the Princess of Condé; entered early on a military career under the auspices of the great Condé, and distinguished himself so much in the battle of Lens (Aug. 20, 1648) that Anne of Austria made him a *maréchal-de-camp*. In the wars of the Fronde he sided with the aristocracy and fought against the court, but after the Peace of the Pyrenees (Nov. 7, 1659), which ended these wars, he was pardoned, and through the mediation of the Prince of Condé he married (Mar. 17, 1661) the heiress of the house of Luxembourg, whose name he assumed. In the wars against Spain and Holland he fought under Turenne; was made a lieutenant-general, and displayed great military talent, though also great severity. He was one of the eight marshals created after the death of Turenne in 1675, and, having received an independent command, captured Va-

lenciennes and Cambrai, and defeated William of Orange at Mont Cassel, Apr. 11, 1677, and at St.-Denis, near Mons, Aug. 24, 1678. After the Peace of Nymwegen, Louvois, who was jealous of his talent, and still more of his influence, removed him from service, and accused him of having sold himself to the devil and attempting to poison his wife. The case lasted fourteen months, during which time the marshal was treated with the utmost harshness, and although he was acquitted (May 14, 1680), yet he was banished from the court and from Paris. After nearly ten years of disgrace he was appointed commander-in-chief of the army of Flanders (Apr. 19, 1690), and made three brilliant campaigns, defeating the Prince of Waldeck at Fleurus, July 1, 1690, and William III. of England at Steenkerke, Aug. 3, 1692, and at Neerwinden, July 29, 1693. The campaign of 1694 brought no great results, and on Jan. 4, 1695, he died at Versailles. With him ceased the victories of Louis XIV.

Lux'emburg: a territory situated between Rhenish Prussia, France, and Belgium; consisting of an elevated tract on the slope of the Ardennes, with a rugged surface covered in many places with dense forests of oaks, and with a soil not very fertile. The region is rich in minerals; coal, iron, copper, and lead are mined; marble, slate, and freestone are quarried. Tolerably good crops of corn, flax, hemp, hops, and wine are raised, and horses, cattle, and sheep of good breed are reared; cloth, earthenware, nails, and leather are manufactured, and much cheese, oak-bark, and timber exported. This territory formed originally a duchy which alternately belonged to Burgundy, Spain, Austria, France, and Holland. By the Congress of Vienna, in 1815, it was made a grand duchy, and, forming a part of the Germanic confederation, it was given to the King of the Netherlands as a compensation for Nassau. When (in 1830) Belgium organized itself into an independent kingdom, a large part of the territory was transferred to this kingdom, of which it now forms a province. The Belgian province of Luxemburg contains the three districts of Arlon, Neufchâteau, and Marche, and comprises an area of 1,706 sq. miles, with (1890) 212,041 inhabitants, most of whom speak French. The grand duchy of Luxemburg comprises an area of 998 sq. miles, with 211,088 inhabitants, most of whom speak German. It was joined to Holland by a personal union, the King of the Netherlands being also Grand Duke of Luxemburg. On the death of William III., Adolphus, Duke of Nassau, became Grand Duke of Luxemburg. It is governed by a chamber of deputies consisting of forty-two members elected directly by the districts for six years, and by a governor appointed by the king. For commercial purposes it is included in the German Zollverein. In military respects it was declared neutral territory by the Treaty of London in 1867. In 1891 the revenues amounted to 11,519,924 francs, and the expenses to 9,000,824 francs. There is a public debt of 16,170,000 francs.

Luxemburg: capital of the grand duchy of Luxemburg; on the Else or Alsette; 42 miles by rail N. of Metz (see map of German Empire, ref. 6–C). It was at one time the strongest fortress in Europe, next to Gibraltar. The main part of the city stands on a rocky table-land which rises abruptly 200 feet from the valley of the Alsette, while the modern suburbs, Pfaffenthal, Clausen, and Grund, are situated below, on the shore of the river. This location, so remarkable both for its natural beauty and for its military strength, was early used for fortifications—probably from the tenth century—and since the days of Vauban all the resources of modern engineering art have been employed to make it impregnable. By the Treaty of London in 1867 it was declared neutral ground, the fortifications were demolished, and the space was laid out in streets and promenades. The city has cotton-manufactures, distilleries, tanneries, and trade in leather and woolen goods. Pop. (1890) 18,187.

Luxemburg, Adolphus William Charles Augustus Frederick, Grand Duke of: b. at Biebrich, July 24, 1817. He was Duke of Nassau and became Grand Duke of Luxemburg on the death of William III. of Holland in 1890. He is one of the wealthiest princes in Europe. His children are Prince William Alexander, the only son, born in 1852, and Princess Hilda, married in 1885 to the Crown Prince Frederick of Baden.

Luxor [Arabic, *el-Kaṣr*, plur. *el-Kuṣur*, the castles]: a considerable village in Upper Egypt, on the east bank of the Nile, at which steamers stop to allow tourists to visit the site of ancient Thebes. It contains one of the five large temples for which Thebes was noted, but its splendor is overshadowed by its greater neighbor at Karnak, 2 miles to the N. E. Both temples were dedicated to the god Amon, and are the results of the architectural labors of several Pharaohs. To this fact and to reasons of symmetry in the case of the temple at Luxor is due the irregularity of its plan, seen in the three axial directions upon which it is constructed. The north extensions of the original building are inclined away from the river in order to bring them more into line with the temple at Karnak, with which Luxor was connected by an avenue of sphinxes. The sanctuary at the south end of the temple at Luxor was built originally by Amenhotep III. (eighteenth dynasty), and, having been damaged or destroyed, it was restored in the reign of Alexander. Next to the N. is a hypostyle hall, 20 yards deep and 35 wide, containing two sphinxes, bearing the name of Sebekhotep (thirteenth dynasty). Adjoining is a peristyle hall, 48 yards long by 58 broad, with a double row of columns on three sides. At this point the first change of direction occurs, and the succeeding colonnade, 58 yards long, turns at an appreciable angle toward the E. It also dates from the eighteenth dynasty. The most northern portion is the great peristyle court, 185 feet long, built by Ramses II. (nineteenth dynasty), and it inclines still more to the E. It contains a double row of columns, and formerly the obelisk now in Paris stood in this court. Inside the same inclosure stands a mosque. At the entrance to this court is a great pylon 75 feet high, with a doorway in the middle 55 feet high. The whole edifice is 284 yards in length. The outer wall of Ramses's court is inscribed with the so-called *Poem of Pentaur*, which records the valiant deeds of the builder in his war against the Hittites and the capture of Kadesh. The same epic is found on the temples at Karnak and Abydos, and in two papyri, one in the Louvre (*Raifet*) and the other in the British Museum (*Sallier II.*).

Charles R. Gillett.

Luynes, lü'een', Charles d'Albert, Duke de: b. at Pont St.-Esprit, department of Gard, France, Aug. 5, 1578; was descended from a Florentine family, Alberti by name, which having bought the estate of Luynes in Touraine had assumed its name and title. Having been educated as a page at the court of Henry IV., he became the favorite of the dauphin, afterward Louis XIII., and it was at his instigation that the young king gave orders for the imprisonment of Marshal d'Ancre and the queen Apr. 14, 1617. After this court revolution Luynes was made a duke and peer of France. He married the daughter of the Duke of Montbazon, was made constable and chancellor, and exercised for a short time absolute control over the whole Government. He was fortunate enough, however, to die Dec. 15, 1621, before the king became aware of his incapacity and avarice.—One of his descendants, Honoré Théodoric Paul Joseph d'Albert, Duke de Luynes (b. in Paris, Dec. 15, 1802, d. in Rome Dec. 14, 1867) became celebrated for the liberal and judicious support he gave to science and art, of which he was himself a cultivator. He wrote *Metaponte* (1836); *Description de quelques Vases peints* (1840); *Essai sur la Numismatique des Satrapies et de la Phénicie* (1846); *Voyage d'Exploration à la Mer Morte* (published after his death). In 1854 he superintended the publication of the catalogue of the National Library of Paris.

Luys, lü'ee', Jules Bernard, M. D.: alienist; b. in Paris, France, in 1828; graduated at the Paris School of Medicine in 1857; passed the *concours* in 1862 for the position of physician to the hospitals; in 1863 became physician to Salpêtrière hospital and to the Ivry asylum. At those institutions he paid particular attention to the structure of the brain, and published in 1872 an atlas, *Iconographie photographique des centres nerveux*. In 1881 he founded a journal of nervous and mental diseases, *L'Encéphale*, and was one of its editors until 1888. Among his works are *Études de physiologie et de pathologie cérébrales* (Paris, 1874); *Le cerveau et ses fonctions* (Paris, 1878), a work that has been translated into English and German; and *Traité clinique et pratique des maladies mentales* (Paris, 1881). D. in Paris in Aug., 1897. S. T. Armstrong.

Luzerne, lü'zărn', Chevalier Anne César, de la, LL. D.: b. in Paris, France, in 1741; educated for the military service, and was aide-de-camp to his relative, the Duke de Broglie, during the Seven Years' war, attaining the rank of major-general of cavalry (1762), with the colonelcy of the Grenadiers de France. He afterward abandoned the military career for diplomacy; was sent as minister to the court of Bavaria 1776, and to the U. S. as successor to Gerard after the recog-

nition by France of the independence of the united colonies in 1778. He arrived at Philadelphia Sept. 21, 1779, where he resided four years, giving proofs of prudence and friendship for the struggling colonists, which were highly appreciated, and gave him a considerable influence in the direction of affairs. In 1780 he contracted on his own responsibility a loan for the relief of the army then suffering the utmost destitution. In 1782 he obtained the postponement of the ratification by Congress of the treaty of peace with Great Britain until that between Great Britain and France should be signed. On his return to France in 1783 he bore with him the most honorable testimonies of esteem from Congress and from individuals. Harvard College conferred upon him the degree of LL. D., and Pennsylvania gave his name to one of her counties. On the organization of the Federal Government (1789) the Secretary of State, by direction of Washington, addressed a letter to Chevalier Luzerne conveying the thanks of the nation for his services. He died in London, Sept. 14, 1791, being then French minister to the British court.—His elder brother, CÉSAR GUILLAUME (b. July 7, 1738, d. June 21, 1821), became Bishop of Langres 1770, and Cardinal 1817; was a distinguished theological writer, and defender of the liberties of the Gallican Church.

Luz, La, Guanajuato, Mexico: See LA LUZ.

Luzon, loo-zōn′, or **Luçon**: the largest of the Philippine islands, in the Malayan Archipelago, belonging to the U. S.; situated between the Chinese Sea and the Pacific Ocean, between lat. 12° 30′ and 18° 40′ N., and between lon. 119° 45′ and 124° 10′ E. Area, 39,650 sq. miles. Like all the Philippine islands, it is of volcanic origin, having several active volcanoes, among which is Mayon; earthquakes are frequent and destructive; the city of Manilla was nearly destroyed by one in 1863. The ground is mountainous, several ranges of a height from 4,000 to 7,000 feet traversing the island from N. to S. The soil is of exceeding fertility, and the climate being hot and moist, the luxuriance of the vegetation is almost unequaled. Immense forests of ebony, cedar, gum-trees, and iron-wood, interspersed with orange, citron, cocoa, breadfruit, and tamarind trees, cover the mountains to their very tops. Myriads of climbing plants and parasites wind from tree to tree, cover every twig, and form a forest growing on the forest. Rice, wheat, maize, sugar, cotton, indigo, tobacco, coffee, ginger, pepper, and vanilla are raised in continuous crops without difficulty and in great abundance. Luzon is entirely free from beasts of prey; oxen and buffaloes are employed in agriculture; sheep, goats, and swine are reared. Pheasants, ducks, and brilliantly colored birds swarm all over the island, and fish are abundant both in the rivers and the surrounding sea. Of minerals, gold, iron, copper, coal, and marble are found. Mother-of-pearl, amber, coral, and tortoise-shell are exported, together with rice, sugar, hemp, and tobacco; the last article is a Government monopoly, and yields a clear annual profit of nearly $5,000,000. The population of Luzon, which numbers 3,400,000, consists partly of Negritos, who live as nomades in the mountains of the interior in a savage state. They are idolaters, and are believed to be the original inhabitants of the island. Around them are the "Indios" or Indonesians (the Polynesians of Malaysia). These people are Roman Catholics, and form the bulk of the population. Around them on the coasts are the Malays (Tagals, Bicols, Ilocanos, etc.). These are industrious, hospitable, and open to progress and civilization, and, besides being good agriculturists, possess some manufactures: they build ships with which they sail to Spain. Many Chinese have settled here, but comparatively few Spaniards. The trade, which is very considerable and increasing every year, is mostly in the hands of English and American merchants established at Manilla, the principal town of the island. Luzon was discovered by Magallanes in 1521; Manilla was built in 1581. See PHILIPPINES.

Revised by MARK W. HARRINGTON.

Lu′zula [Mod. Lat., from O. Ital. *luzziola*, glow-worm (whence Ital. *lucciola*, firefly)]: a genus of perennial pseudo-glumaceous plants, commonly called wood-rushes, belonging to the family *Juncaceæ*, and differing from the *Juncus*, or rush proper, in the form of the leaves, which are flat, soft, usually hairy and grass-like, and in the three-seeded capsule. Numerous species are found in the woods of Europe and nine in the U. S., among which are *L. pilosa* and *L. parviflora* or *melanocarpa*, which have the flowers loosely long-peduncled, umbelled, or corymbed; *L. campestris*, *L. arcuata*, and *L. spicata* having the flowers crowded in spikes or close clusters.

Luzzatto, loot-saa′tō, SAMUEL DAVID: Old Testament scholar; b. at Trieste, Austria, in 1801, of Jewish descent; received a brilliant education, and became the most popular historian of his people, bringing to light the forgotten episodes of Jewish history. He was liberal in his views of Old Testament exegesis, of which science he was professor in the rabbinical school at Padua from 1829 to his death Sept. 29, 1865. He wrote Hebrew, German, French, and Italian with great elegance, and is justly regarded as one of the chief restorers of Hebrew literature. He wrote a *Hebrew Grammar*, *Grammar of Biblical Aramaic*, *French Notes on Isaiah* (1834), *Hebrew Notes on the Pentateuch* (1850), and Italian translations of Job (1844) and of Isaiah (1850), with a Hebrew commentary, besides *Dialogues on the Cabala, the Zohar, and the Antiquity of the Vowel-points and Accents of the Bible* (1852), and a work on the Aramaic version of Onkelos (1830). See Grätz, *History of the Jews*, vol. xi.

Ly′all, Sir CHARLES JAMES: See the Appendix.

Lyall, EDNA: pseudonym of Miss ADA ELLEN BAYLY; b. and educated at Brighton, England; author of *Won by Waiting* (1879); *Donovan* (1882); *We Two* (1884); *In the Golden Days* (1885); *Knight Errant* (1887); *Autobiography of a Slander* (1887); *Derrick Vaughan, Novelist* (1889); *A Hardy Norseman* (1889); *Doreen* (1894); etc.

Lycanthropy [from Gr. λυκανθρωπία, lycanthropy; λύκος, wolf + ἄνθρωπος, man]: a kind of madness in which the patient fancies that he is a wolf. The old and very widespread belief in the existence of man-wolves possessed of the devil has in many instances led deluded persons to fancy themselves thus possessed; and in not a few instances this fancy has become epidemic, and hundreds of persons have become cannibals, going upon all fours, living in the forests, and howling like wolves. In 1600 hundreds of people in the Jura were executed for lycanthropy. Likewise persons may imagine themselves dogs, and go about snarling at every passer. In some cases they bark and froth at the month, and simulate rabies in their actions. This spurious hydrophobia is in nowise related to true rabies, but is simply a form of mental perversion. Revised by WILLIAM PEPPER.

Lyca′on [= Gr. Λυκάων, cf. λύκος, wolf]: in Greek mythology, (1) a King of Arcadia, whose fifty sons were personifications of Arcadian cities, and surpassed the rest of mankind in insolence and impiety. In order to test them Zeus assumed the garb of a beggar and accepted from them an invitation to dinner, at which, on the suggestion of Mænalus, they served up to him, along with the sacred offerings, the entrails of a boy murdered for the purpose (the story points to the offerings of human sacrifice to Zeus Lycæus in ancient times). Zeus detected the crime and slew Lycaon and all of his sons except Nyctinus, the youngest, whom Gaia (Earth) saved by seizing the uplifted hand of Zeus. Nyctinus became King of Areadia, though the vengeance of heaven still pursued him, for it was in his reign that the flood of Deucalion was sent to devastate the world. (2) The father of Pandarus, who led the forces of Zelea to the support of the Trojans against the Greeks. (3) A son of Priam and Laothoë, half-brother of Hector. He was slain by Aehilles.

J. R. S. STERRETT.

Lycao′nia (in Gr. Λυκαονία): a province of Asia Minor, situated between Galatia, Cappadocia, Cilicia, Pisidia, and Phrygia. Its boundaries changed often, according to the fortune of war or the caprice of the Romans, and it was not until 321 A. D. that it became a fixed and separate province. In Byzantine times it was included in the Anatolic Theme. It afterward became the center of the Seldjuk empire. Its principal town was Iconium (now Koniah). Other important towns were Lystra (near Khatyn Serai), Derbe (at Güdelissin), Laranda (at Karaman), and Laodicea (Catscecaumene, now Ladik). The country is for the most part a plain whose soil is impregnated with salt, but supports vast herds of fat-tailed sheep. Salt is the chief product of the country. It is gained from Lake Tatta (now Tuz Giöl).

J. R. S. STERRETT.

Lyce′um [= Lat. = Gr. τὸ Λύκειον, named from the neighboring temple of Apollo Lyceus (Gr. Ἀπόλλων Λύκειος, liter., the wolf-slayer), deriv. of λύκος, wolf. See WOLF]: the largest of the three great gymnasia of ancient Athens. None but well-born youth, whose parentage on both sides was Athenian, were allowed to be trained here. In 335 B. C. Aristotle was permitted to make use of the Lyceum as a place for teaching philosophy. His instruction was given while he walked in the groves which surrounded the Lyce-

um; hence his philosophy was called *Peripatetic* (walking about). The Lyceum stood on the east side of the city, outside the gates, just S. of the Cynosarges, and near the fountain of Panops. It was surrounded by a grove of lofty plane trees.—In France the public schools for secondary instruction have the name of lyceum (*tycée*).

Lychnis, lik'nis [Mod. Lat., from Lat. *lych'nis*, a kind of red flower = Gr. λυχνίς; cf. λύχνος, lamp]: name of a genus of annual or perennial plants found in Europe and the U. S., the commonest species of which is the corncockle (*L. githago*). It belongs to the pink family, and received its name from a scarlet or flame-colored Grecian species. Several species are cultivated as garden-flowers in the U. S., the best known being the scarlet lychnis (*L. chalcedonica*), sometimes called the Maltese cross, a native of Northern Asia, the tints of which vary from scarlet to rose-color and white. The common mullein pink or rose-campion (*L. coronaria*) is of this genus. The genus differs from *Sitene*, or catchfly, only in having five (rarely four) styles, and a pod opening by as many or twice as many teeth. The corncockle is too common in wheat-fields, the black seeds being injurious to the quality of the flour.

Lycia, lis'i-a (in Gr. Λυκία): an ancient region of Asia Minor of small extent, lying on the Mediterranean, between Mts. Taurus on the N., Climax on the E., and Dædala on the W., the adjoining regions across the mountains being Phrygia, Pamphylia, Pisidia, and Caria; the chief rivers, Xanthus, Limyrus, and Glaucus; and the most noted cities, Xanthus, Patara, Pinara, Olympus, Myra, Tlos, and Telmissus. The most ancient name of the country, according to Herodotus, was Milyas, the inhabitants being of two races, Solymi and Termilæ or Tremilæ. Extended accounts of Lycia have been given by the Greek poets, historians, and geographers. It was a favorite region with Homer, who assigns to the Lycian heroes, Glaucus and Sarpedon, the place of honor among the Trojan allies. Apollo was often called Lycian Apollo, from his temple at Patara, second in renown only to that at Delphi, and regarded by some as the place of his birth. The Solymi, doubtless the earliest inhabitants, and of Semitic stock, were conquered by the Tremilæ, who are said to have come from Crete and took the name of Lycians. They appear as *Leka*, a seafaring people, in the Egyptian inscriptions of the fourteenth century B. C. It is to be noted that the only mention of writing found in the Homeric poems is in connection with the Lycian legend of Bellerophon. The Lycians were conquered by Harpagus, the general of Cyrus, notwithstanding the heroic and memorable resistance of the inhabitants of Xanthus, who burned themselves with their wives, slaves, and treasures in their citadel. They took part in the revolt of the Asiatic Greeks, were subdued and made a satrapy of Persia, and furnished fifty ships to Xerxes for his invasion of Greece. Alexander the Great subdued the country almost at the outset of his Asiatic career; it was afterward attached to the Syrian empire, and was given to the Rhodians by the conquering Romans. Soon afterward it became independent as a republican confederation of cities, but ultimately became a Roman province, with Myra as the capital. In the great civil war on the death of Cæsar, Lycia espoused the cause of Octavius and Antony, and was conquered by Brutus after a desperate resistance, in which the city of Xanthus repeated its act of self-immolation by fire. In modern times Lycia had fallen into complete oblivion, no traveler had explored it, and the sites of its celebrated cities were unknown, when in 1838 and 1840 it was visited by Mr. (afterward Sir Charles) Fellows, who found there vast ruins of temples, fortresses, and tombs, and inscriptions in an unknown character. An expedition under his leadership was sent in a British vessel of war 1846, which conveyed to London the remarkable sculptures now occupying the "Lycian room" of the British Museum. The Lycian alphabet consists of twenty-five single and several double letters. A few of the characters are peculiar; thirteen are identical with the Cypriote in form, and consequently related to the Phœnician, while three were borrowed from the Greek. The inscriptions in this collection are chiefly from tombs cut in the rock, the Lycians having been remarkable for the honors shown to the dead, as well as for the cyclopean character of their architecture, which in its later period showed traces of Grecian influence. See Sir Charles Fellows, *Account of Discoveries in Lycia* (1841) and *Coins of Ancient Lycia* (1855); Benndorf and Niemann, *Reisen in Lykien und Karien* (Vienna, 1884); Petersen and von Luschan, *Reisen in Lykien, Milyas und Kibyratis* (Vienna, 1888); Kiepert, *Lykia* (Vienna, 1887); Benndorf and Niemann, *Das Heroon von Gjölbaschi Trysa* (Vienna, 1888); Treuber, *Geschichte der Lykier* (Stuttgart, 1887), and his *Beiträge zur Geschichte der Lykier* (Tübingen, 1888); Hirschfeld, *Ueber die Griechischen Grabschriften welche Geldstrafen anordnen* (Königsberg, 1887), and his *Gebiet von Aperlai*, in the *Archæol. Epigraph. Mittheil. aus Oesterreich*, ix., pp. 192–201; von Warsberg, *Das Reich des Sarpedon*, in his *Homerische Landschaften* (Vienna, 1884); Perrot and Chipiez, *History of Art in Phrygia, Lydia, Caria, and Lycia* (London and New York, 1892).

Revised by J. R. S. STERRETT.

Lycian Language: the ancient language of Lycia; preserved in a few inscriptions, which have been as yet but partially deciphered. Though some scholars, notably Savelsberg and Deecke, have sought to establish for the language a place among the Indo-European tongues, no such relation has been satisfactorily demonstrated. Savelsberg attempted to prove a close connection with Avestan, and Deecke, connecting the language closely with the Carian, asserts for the Carian-Lycian an intermediate position between the Iranian and Hellenic groups. Schmidt, *Corpus of Lycian Inscriptions* (1868); Savelsberg, *Beiträge zur Erklärung der lykischen Sprache* (1875–78); Deecke, *Lykische Studien*; Bezzenberger's *Beiträge* (xii., xiii., xiv., 1887–89).

BENJ. IDE WHEELER.

Lycon (in Gr. Λύκων): one of the successors of Aristotle and Theophrastus as the head of the Peripatetic school of philosophy, over which he presided from 270 to 226 B. C. He was born in the Troad, was distinguished for health of body and mind, while the charm of his language was so great that he was called Γλύκων. He was courted by the kings Antigonus, Antiochus, Attalus, and Eumenes. Though he was the immediate successor of Strato, he imitated Theophrastus in character sketches. J. R. S. S.

Lycoper'don [Mod. Lat., from Gr. λύκος, wolf + πέρδεσθαι, to break wind]: name of the principal genus of the PUFFBALLS (*q. v.*).

Lyc'ophron (in Gr. Λυκόφρων): grammarian and poet; b. at Chalcis in Eubœa; lived at the court of Ptolemy Philadelphus, who intrusted him with the arrangement of the works of the comic poets contained in the Alexandrian library. His extensive work on comedy and his many tragedies have been lost. Only his *Cassandra* or *Alexandra*, a monologue of 1,474 iambic verses, is still extant. It has the form of a prophecy uttered by Cassandra relating to the later fortunes of Troy, the Trojan and the Greek heroes, and winding up with a reference to Alexander the Great, who should unite Asia and Europe in one universal empire. The style is overwrought and the expressions enigmatical, and even in antiquity the poem was considered very obscure. It swarms with obsolete words and long-winded compounds, and seems to have been written for the purpose of displaying the author's mythological learning. By reason of its learning and obscurity it was much studied in the Byzantine period, nor is one surprised to find that in modern times it has been carefully conned by scholars, notably by Milton. There is a considerable body of scholia, and sundry paraphrases have been preserved. Anachronous references to the domination of Rome are clearly later interpolations, and do not affect the genuineness of the work as a whole. Editions: Bachmann (1820), Scheer (1881), and Kinkel in the Teubner Library (1880); an English translation by Lord Royston. Revised by B. L. GILDERSLEEVE.

Lycopo'dium [Mod. Lat., liter., wolf's foot; Gr. λύκος, wolf + *ποδίον, dimin. of πούς, ποδός, foot]: a genus of FERNWORTS (*q. v.*). In botany, the name of the typical genus of the family *Lycopodiaceæ*, several species of which are popularly called club-moss. The powder called lycopodium is composed of the spores of *Lycopodium clavatum* (which is common in both the Old and the New World) and of other species. It is extremely inflammable, is used in fireworks for making a white flame, and in theaters for artificial lightning. In pharmacy it is used as a pill-powder, and in the nursery as a dressing-powder for infants. The spores of many species form a powder which is beneficial in ulcerations, etc. The species are evergreen, and two or three are extensively sold at Christmas-time for decorative purposes, especially in the U. S. the "ground-pine" (*L. dendroideum*).

Lycopods: the common name of the highest class (*Lycopodiaceæ*) of the FERNWORTS (*q. v.*).

Lycop'olis (Egypt. *Saut*; sacred name *Pa-Anub*, place of Anubis; modern, Siut or Assiut): a city of Middle Egypt (27° 15′ N. lat.) of great antiquity, the seat of powerful princes of the Middle Kingdom, and to-day one of the most important places in the Nile valley. Of ancient structures little is left except some fragments of columns. The interesting remains are the tombs cut in the Libyan hills, which, with those at Bersheh and Beni-Hasan, are our main sources of information concerning the history and conditions of the Middle Kingdom (say 2100–1900 B. C.). One of them contains a peculiar contract made by a nomarch of Siut for the making of funeral offerings for himself in perpetuity. Opposite Siut are other tombs constructed during the sixth dynasty. The local god was Anubis, to whose emblem, the jackal, the Greeks applied the name of "wolf," whence the name Lycopolis. A peculiarity of the temple service at Siut was the employment of lay priests as late as the Middle Kingdom. Siut was the birthplace of Plotinus, the Neo-Platonic philosopher, and here Christian hermits and ascetics were found as early as the beginning of the fourth century. CHARLES R. GILLETT.

Lycur'gus: Spartan legislator; lived, according to the most common tradition, in the ninth century B. C., and was a son of King Eunomos; ruled the country for some time during the minority of his nephew, Charilaos, but was afterward compelled to emigrate; visited Asia Minor, where he became acquainted with the Homeric songs; Crete, where he studied the laws of Minos; Egypt and other countries; and became on his return the founder of those institutions by which one of the most striking types of national character which history contains was developed in Sparta. All details of his life are very uncertain, however, and some modern scholars even consider him a mythical person; but the Spartans themselves built a temple to his honor, and said that he brought his laws from Crete, and introduced them with the sanction of the Delphic oracle. The most prominent feature of Spartan society was the division into two classes or castes—the slaves, helots, who performed all the labor and had absolutely no rights; and the citizens, Spartans, who were completely exempted from labor, and owned and ruled the land. The most prominent feature of this privileged class was its military discipline. The individual was absolutely subordinate to the state, and lived only for the state. The Spartan had no talent, no passion, no plan of his own; he was merely a tool. Only strong and well-formed children were allowed to live; the weak or deformed were exposed to die on Mt. Taygetus. At the age of seven years the boy was taken from his mother and educated by the state, which subjected him to the severest discipline. When he was thirty years old he was allowed to marry, but the state chose his wife, and, although married, he continued to live in garrison till his sixtieth year. By the establishment of this social order Lycurgus succeeded in transforming the Spartans from one of the rudest and wildest to the most quiet and dignified of all the Greek peoples, and was worshiped by them as a god.

Lycurgus (in Gr. Λυκοῦργος): one of the ten Attic orators; flourished in the second half of the fourth century B. C.; was an eminent statesman and patriot of the Anti-Macedonian party, and closely associated with Demosthenes. He was especially distinguished for his administration of the finances of Athens (338–326 B. C.) and for his exertions in beautifying the city. As an orator he was active in prosecuting defaulters and traitors, and the only extant speech of his—that against Leocrates (331)—is a prosecution of a man who forsook Athens in her time of need (338). Lycurgus was highly honored by the Athenians, who refused to surrender him at the demand of Alexander. D. some time before Demosthenes. The ancient critics had much fault to find with the bad arrangement, the harsh style, the excessive digressions of the speeches of Lycurgus, and modern critics see a confirmation of those strictures in the only oration we have; and yet all agree that this speech against Leocrates is instinct with exalted patriotism, and that the interest of the matter far outweighs the defects, real and imaginary, of the manner. Editions: Mätzner (1836), Kiessling and Meier (1847), Rehdantz (1876), Thalheim, critical (1880). See, further, Blass, *Attische Beredsamkeit*, vol. iii. B, pp. 1–72, and Dürrbach, *L'orateur Lycurgue* (1890). B. L. GILDERSLEEVE.

Lyd'da (in Gr. τὰ Λύδδα): an ancient town of Palestine; within the tribe of Ephraim; on the road from Jerusalem to Joppa, 9 miles E. of the latter. In the Old Testament it bears the name of Lod, as also in the Apocrypha. It was the scene of Peter's miracle of healing Æneas (Acts ix. 32, 35); was destroyed by Cestius Gallus in his march against Jerusalem, rebuilt as capital of one of the nine toparchies of Judæa, and became the seat of a celebrated Jewish school of the law. Later it received the name of Diospolis; was one of the principal places of Palestine for several centuries; was the seat of a bishopric, and the birthplace of the celebrated martyr St. George, the patron of England. It figured largely during the crusades, and is still an extensive town under the name of *Lud*.

Lyd'gate, JOHN: poet; b. at Lydgate, Suffolk, England, about 1370; studied at Oxford; traveled in France and Italy, and became the head of a school at Bury St. Edmunds. He wrote several poetical works—*The Fall of Princes*, *The Storie of Thebes*, and *The Historie, Siege, and Destruction of Troye*—which are chiefly valuable as monuments of the English language in that obscure period. D. at Bury St. Edmund's about 1450.

Lyd'ia (in Gr. Λυδία): a country of Asia Minor, whose boundaries varied much in different periods, though it may be bounded by Mysia, Phrygia, Caria, and Ionia (or the Ægean Sea). Of the three dynasties of Herodotus, the Atyadæ, the Heraclidæ, and the Mermnadæ, the first two are purely fabulous. With the Mermnadæ (founded by Gyges 687–653 B. C., according to Gelzer), the last of whom was Crœsus (overthrown by the Persians in 546 B. C.), we begin to touch historical times. Lydia was famous for its wealth, which was gained not so much from the gold sands of the celebrated Pactolus (now Sarabat) as by trade, for which they had a natural aptitude which clung to them for centuries after the collapse of the empire of Crœsus. The name of Crœsus is proverbial to this day, because he was benevolent as well as wealthy. "The loving kindness of Crœsus fadeth not away," says Pindar. The *gifts* presented by Crœsus to the shrine of Apollo at Delphi are estimated at $6,000,000, and even the private citizen Pythius, of Celænæ, was worth $16,000,000. The Lydians invented coined money by imprinting upon the rude ingot of gold or silver the official stamp of the state along with the mark of the king. The capital of Lydia was Sardes (now Sart), other cities of importance being Magnesia ad Sipylum (now Manissa), Thyateira (now Ak Hissar), Philadelphia (now Ala Shehir), and Hypaipa (now Birghe). The country is still very fertile, and produces a fine quality of tobacco.

LITERATURE.—Perrot and Chipiez, *History of Art in Phrygia, Lydia, Caria, and Lycia* (London and New York, 1892, pp. 232–301); Curtius, *Beiträge zur Geschichte und Topographie Kleinasiens* (Berlin, 1872); Stark, *Nach dem Griechischen Orient* (1874); Sayce, *Notes from Journeys in the Troad and Lydia*, in the *Journ. Hell. Studies* (1880); Schmidt, *Aus Constantinople und Kleinasien* in the *Athenische Mittheilungen* (1881); Gregorovius, *Kleine Schriften zur Geschichte und Cultur* (Leipzig, 1887, vol. i., p. 1–47); Tehlatcheff, *Le Bosphore et Constantinople* (1864, pp. 232–242); Lenormant, *La Monnaie dans l'Antiquité* (i., pp. 93–124); Head, *The Coinage of Lydia and Persia* (London, 1874–77). J. R. S. STERRETT.

Lydian [from *Lydia*]: in music, the designation of one of the ancient ecclesiastical modes. Its scale is that of F, and it differs from the modern scale on that letter by having B *natural* instead of B♭.

Lydian Stone: a siliceous slate or flinty jasper of a velvet-black color, used as a touchstone for testing the quality of gold and silver. See JASPER.

Ly'ell, Sir CHARLES: geologist; b. at Kinnordy, Scotland, Nov. 14, 1797; studied at Exeter College, Oxford, and graduated in 1819; prepared himself for the practice of law, which he soon abandoned for scientific research, especially in geology. His first studies were in Great Britain, but he afterward traveled much in Europe, besides visiting Canada and the U. S. in 1841–42 and 1845–46. He became Professor of Geology in King's College, London, in 1832; was president of the Geological Society of London in 1836 and 1850; was knighted in 1848 and created baronet in 1864. D. in London, Feb. 22, 1875. His great work *Principles of Geology* (1830–33) passed through eleven editions, receiving its final revision in 1870. Other important publications were the *Student's Manual of Geology* (1838 to 1870); *Travels in North America* (1845); *A Second Visit to the United States* (1849); and *Geological Evidences of the Antiquity of Man* (1863 to 1873). Though his direct contributions to knowl-

edge were of great value, he is most widely known as the apostle of "uniformitarianism," the doctrine that the stupendous changes demonstrated by the structure of the earth's crust were accomplished slowly by the cumulative action of agencies still at work with undiminished energy. This theory did not, indeed, originate with him, but before his time it was little known, and most geologists explained the revolutions of the earth's surface, whereby mountains were uplifted, valleys were opened, ocean beds were desiccated, provinces were submerged, and faunas were destroyed, as the results of sudden and violent catastrophes. The substitution of a more rational view was so largely due to the ability with which he discussed the subject and the great body of observations by which he illuminated it, that the geologic philosophy of modern times is often characterized as Lyellian.

G. K. Gilbert.

Lyenceph'ala [Mod. Lat., from Gr. λύειν, loose + ἐγκέφαλος, brain]: in Owen's classification, a class of mammals so named from the loose connection of the two hemispheres of the brain, which are united by the round and hippocampal commissures, the corpus callosum being rudimentary or absent. The cerebral hemispheres are usually without folds and leave the cerebellum, olfactory lobes, and part of the optic lobes exposed. This class includes the Monotremes and Marsupials. The term is contrasted with Lissencephala, Gyrencephala, and Archencephala. F. A. Lucas.

Lygo'dium [Mod. Lat., from Gr. λυγώδης, flexible, liter. willow-like; λύγος, willow twig + suffix -ωδης, having the form of]: name of a genus of climbing ferns found in New Zealand, Japan, and America. One species only, *L. palmatum*, is found in the U. S., from Massachusetts to the Gulf States. It is much prized for purposes of decoration. One or two species are cultivated in greenhouses.

Lykens: borough (incorporated 1871); Dauphin co., Pa. (for location of county, see map of Pennsylvania, ref. 5–G); on the N. Cent. Railway; 43 miles N. E. of Harrisburg. It is in a coal-mining region, and has 7 churches, 10 schools, public library, several manufactories, and a weekly newspaper. Pop. (1880) 2,154; (1890) 2,450; (1900) 2,762.

Editor of "Register."

Lyl'y, or **Lilly**, John: author; b. in the Weald of Kent, England, in 1553 or 1554; was educated at Magdalen College, Oxford, and graduated in 1573. His *Euphues, or the Anatomy of Wit* (1579) and *Euphues and his England* (1580) attained great popularity in his own times. They are novels of that half-sentimental, half-didactic description which the time adored. It was, however, not so much their contents as their style which made them popular. This "new style" became extremely fashionable. Its characteristics depend more upon syntax and construction than upon phraseology, and consist in "a peculiar combination of antithesis with alliteration, assonance, rhyme, and play upon words, a love for the conformity and correspondence of parallel sentences, and a tendency to accumulate rhetorical figures—such as climax, the rhetorical question, objections and refutations, the repetition of the same thought in other forms," etc. (see Landmann, *Der Euphuismus, sein Wesen, seine Quelle, seine Geschichte*, Giessen, 1881). The books ran through thirteen editions before 1636, and then fell into utter oblivion. In 1868, however, they were again edited among the Arber reprints. Prof. Rushton, of Cork, discovered that *Euphues and his Euphœbus*, the most valued portion of the *Euphues*, is a rather close paraphrase of Plutarch *On Education*. Lyly also wrote nine court-plays, which contain fine passages and songs. He was perhaps the author of *Pap with an Hatchette*, a once famous pamphlet. His life was mostly spent at Elizabeth's court. Burghley seems to have been his special patron; he obtained, however, no substantial patronage either from him or from the queen. D. in Nov., 1606.

Lyman, Chester Smith: astronomer and physicist; b. at Manchester, Conn., Jan. 13, 1814; studied astronomy and the kindred sciences in boyhood without a teacher, constructing astronomical and optical apparatus with his own hands, and computed complete almanacs for 1830 and 1831, and tables of eclipses for fifteen years ahead. He graduated at Yale College 1837, taught school at Ellington two years, studied theology at Union Seminary, N. Y., and at New Haven 1840–42; was pastor of a Congregational church at New Britain, Conn., 1843–45; went to the Sandwich islands on account of failing health in 1845; taught the Royal School, having as pupils four of the subsequent occupants of the Hawaiian throne; became a surveyor in California 1847; was one of the earliest to send to the Eastern States authentic accounts of the discovery of gold; settled in New Haven 1850, where he engaged in scientific pursuits, and was one of the revisers of *Webster's Dictionary* (edition of 1864), taking charge of the scientific terms; became in 1859 Professor of Industrial Mechanics and Physics in Yale College, and took an active part in organizing the Sheffield Scientific School, in which he also taught astronomy, both theoretical and practical. From 1871 to 1884 his professorship was that of astronomy and physics. In 1884 he was relieved of the charge of physics, and in 1889 was made emeritus professor of astronomy. He published articles in *The American Journal of Science*, *The New Englander*, and elsewhere, and made various useful inventions; e. g. his wave apparatus, his pendulum apparatus for acoustic curves, etc. He was an honorary member of the British Association for the Advancement of Science, and filled positions in several scientific bodies in his own country. D. in New Haven, Jan. 29, 1890.

Lyman, Henry Munson, A. M., M. D.: physician; b. in the Sandwich islands, Nov. 26, 1835, of New England parents; was educated at Williams College, where he graduated in 1858; studied medicine at Harvard Medical School and at the College of Physicians and Surgeons, New York, graduating M. D. in 1861; was interne in Bellevue Hospital 1861–62; acting assistant surgeon U. S. army 1862–63; went to Chicago to practice in 1863; was Professor of Chemistry 1870–76, Professor of Nervous Diseases 1876–84, Professor of the Theory and Practice of Medicine 1885 to date, in the Rush College, Chicago. He is an able teacher and clinician, and has been a frequent contributor to current medical literature. Among his more important works are *Insomnia and other Diseases of Sleep* (Chicago, 1885); *Practice of Medicine* (Philadelphia, 1892). S. T. Armstrong.

Lyman, Phineas: soldier; b. at Durham, Conn., about 1716; graduated at Yale College in 1738; was tutor there till 1741; became a lawyer at Suffield, and was influential in securing that town to Connecticut; was appointed major-general and commander-in-chief of the Connecticut forces in the French war; built Fort Lyman (since called Fort Edward), N. Y.; succeeded Sir William Johnson in command at the battle of Lake George; was engaged in the attack upon Ticonderoga, the capture of Crown Point, the surrender of Montreal, and the expedition against Havana (1762); spent several years in England as agent to solicit lands for a colony in Florida, and died in West Florida (now Mississippi), near Natchez, Sept. 10, 1774.

Lyman, Theodore: philanthropist; b. in Boston, Mass., Feb. 20, 1792; graduated at Harvard College 1810; inherited an ample fortune; visited Europe 1812–14; wrote a small volume, *Three Weeks in Paris* (1814); made a second European tour 1817–19, on returning from which he published *The Political State of Italy* (1820); studied law; delivered the Fourth of July oration at Boston 1820; wrote an *Account of the Hartford Convention* (1823), in defense of that celebrated political demonstration; and published a useful work, *The Diplomacy of the United States with Foreign Nations* (1826). He took an active part in politics, served in both branches of the Legislature, became brigadier-general of militia, and was mayor of Boston 1834–35. In the latter year he was prominent in disapproval of the early popular meetings of the abolitionists, and incurred obloquy on that account. D. in Boston, July 18, 1849. He was a liberal benefactor to the State Horticultural Society and the Farm School, and was the founder of the State Reform School at Westborough, to which he gave $72,500.

Lyman, Theodore: naturalist; b. at Waltham, Mass., Aug. 23, 1833; son of Theodore Lyman, philanthropist; graduated at Harvard College 1855; studied zoölogy and geology under Louis Agassiz at the Lawrence Scientific School, where he graduated B. S. 1858; afterward continued the pursuit of science in the U. S. and in Europe, and since 1860 had been assistant in geology at the Museum of Comparative Zoölogy. His principal attention was given to the Radiata, on which he published many papers. His chief work is *Ophiuroidea of the Challenger Expedition* (4to, 400 pp., and 48 plates, 1882). From 1865–82 he was commissioner of inland fisheries of Massachusetts, and made the first scientific experiments in fish-culture undertaken by any State. From Sept. 2, 1863, to Apr. 20, 1865, he served as lieutenant-colonel and volunteer aide-de-camp on the staff of Maj.-Gen. Meade, commanding the Army of the Potomac. He was a member of the American Academy of

Arts and Sciences and of the National Academy of Sciences. He was interested in the administration of charities, was president of the Boston farm-school, a trustee of the Peabody education fund, and of the Peabody Museum of Archæology. He was one of the overseers of Harvard University in 1868–80 and 1881–87, and was a member of the Forty-eighth Congress. D. in Nahant, Mass., Sept. 10, 1897.

Lyman, Theodore Benedict, D. D., LL. D.: bishop; b. at Brighton, near Boston, Mass., Nov. 27, 1815; graduated at Hamilton College, Clinton, N. Y., in 1837, and from the General Theological Seminary in the city of New York in 1840; was ordained deacon in Christ church, Baltimore, Sept. 20 of the same year, and early the next month became rector of St. John's church, Hagerstown, Md., where he remained until he entered upon the rectorship of Trinity church, Pittsburg, Pa., in Apr., 1850; continued in charge of that parish until May, 1860, when he went to Europe, and remained there nearly ten years. During that time he had charge for a short period of an American church in Florence, and later was for several years rector of the American Episcopal church in Rome. Upon his return to America, in 1869, he became rector of Trinity church, San Francisco, and was in charge of that church when elected assistant Bishop of North Carolina in May, 1873. He was consecrated to that office in Christ church, Raleigh, Dec. 11, in the same year. On the death of Bishop Atkinson, in 1881, he became Bishop of North Carolina. He received the degree of D. D. from St. James's College, Md., and that of LL. D. from his *alma mater*, Hamilton. He published a few occasional sermons and addresses. D. at Raleigh, N. C., Dec. 13, 1893. Revised by W. S. Perry.

Lymington, lim'ing-tŭn (in Doomsday Book called *Lentune*, which was afterward changed to *Limentum*): a seaport-town of Hampshire, England; on the Lym, near its confluence with the Solent, just opposite the Isle of Wight, and 94 miles S. W. of London (see map of England, ref. 14–H). Its manufactures of salt and Epsom salt were once important. It is much frequented, however, as a summer resort and for its sea-bathing, and from its yards some of the best racing-yachts have been launched. The parish church dates from the time of Henry VI. Pop. (1891) 4,551.

Lymph [from Lat. *lympha*, clear water]: the clear, faintly straw-colored fluid contained within the system of lymphatic channels which, in addition to the blood-vessels, permeate all parts of the body, either as clefts or as definite vessels. Since the relation between the lymphatic radicles and the tissues and the organs is most intimate, the terms "tissue juices" and "white blood" are often applied to designate the lymphatic fluid. The lymph resembles the blood in being composed of two parts—the clear limpid *plasma*, or *liquor lymphæ*, and the small granular cells, the *lymph corpuscles*, which float about in the fluid. The lymph-plasma closely corresponds in its constituents with blood-plasma, from which it really is largely derived, since as the blood circulates in the capillaries a certain amount of the *liquor sanguinis* diffuses through the thin walls of the vessels, and thus directly supplies nutrition to the elements of the tissues. This escaped fluid collects within the tissue spaces as lymph, and thence it passes to the larger and more definite lymphatic channels. Certain extensive cavities within the body, as the peritoneal, the pleural, the pericardial, the cerebro-spinal, and the intra-articular, very closely related to the lymphatic system, are occupied by various accumulations of lymph. When the amount of this fluid becomes excessive, as in certain forms of disease, the condition is known as dropsy.

Lymph possesses a specific gravity of between 1,012 and 1,022, being essentially the watery exuded blood plasm; its chemical composition closely resembles that of the *liquor sanguinis*; it is, however, less rich in organic constituents (except urea, which is increased) and in fibrin. The composition of lymph-plasma is as follows:

Water	93·99
Fibrin	0·05
Other proteids	4·27
Fats, etc	0·38
Extractions	0·57
Salt	0·73

The morphological elements of lymph, the *lymph-corpuscles*, present the same appearances as the colorless cells of the blood (see Histology and Blood), with which they are identical; the lymph collected from the entire body is poured by the great lymphatic trunks—the thoracic duct and the right lymphatic duct—directly into the venous blood-current, the lymph-cells thereafter being known as the colorless blood-corpuscles. The lymph-cells are irregularly round, nucleated masses of protoplasm about $\frac{1}{2500}$ of an inch in diameter, whose principal source of origin is the lymphatic tissue through which the lymphatic current passes on its course to larger channels. The lymph contained within the absorbent vessels of the digestive tract during certain stages of digestion becomes mingled with the particles of oil taken up from the intestinal contents; the emulsion thus formed produces the temporary milky appearance of the fluid within the intestinal lymphatics, which, in recognition of this condition, is designated as chyle and the vessels often as lacteals. After the digestive processes are completed, the milky appearance disappears and the lymph within the absorbents of the intestines returns to its usual limpid condition. See Histology.

G. A. Piersol.

Lymphat'ics: See Histology.

Lynch, Patricio: naval officer; b. at Santiago, Chili, in 1824. His father was an Irish merchant. He studied at the Chilian Military Academy, served with the Chilian navy in Peru 1838, and from 1839 to 1847 was in the British navy, taking part in the Chinese war 1841–42. Re-entering the Chilian service 1847, he rose to be commander of frigate, but retired 1854–65. In the latter year he served against the Spaniards. In 1880, during the war with Peru, he commanded a flotilla and military force which ravaged the coast regions from Callao to Payto in the most ruthless manner, doing a great amount of wanton damage. In the attack on Lima he commanded one of the Chilian divisions, and on May 4, 1881, was appointed military commandant of the captured city, and practically of all the conquered district in Northern Peru. By his orders the provisional Calderon government was deposed Sept., 1881, and Calderon himself was sent a prisoner to Chili, an act which provoked a vigorous protest from the U. S. minister. Subsequently he directed operations against Caceres, and finally, having invested Iglesias with supreme power, evacuated the city Oct. 22, 1883, taking a vast amount of plunder. In 1884 he was made minister to Spain, and while returning died at sea May, 1886. Herbert H. Smith.

Lynch, Patrick Wilson, D. D.: bishop; b. at Cheraw, S. C., Mar. 10, 1817; studied theology in the Roman Catholic Seminary at Charleston and in the College of the Propaganda at Rome; was ordained priest in 1840; became principal of the collegiate institute at Charleston, vicar-general of the diocese in 1850, and Bishop of Charleston in 1858. He built several churches, including the fine cathedral of St. Michael; founded an Ursuline convent, an orphan asylum, and many schools. Some of these establishments having been destroyed during the civil war, he chiefly devoted himself to their restoration, for which purpose he made extensive tours through the Northern States, preaching and collecting funds. He wrote some theological and scientific essays, and participated in the Vatican Council of 1869–70, supporting the dogma of infallibility. D. in Charleston, S. C., Feb. 26, 1882.

Lynch, Thomas, Jr.: one of the signers of the Declaration of Independence; b. in Prince George parish, S. C., Aug. 5, 1749; was educated at Eton and Cambridge, England, and studied law in the Temple, London. In 1772 he returned to South Carolina; became in 1775 a captain in the provincial troops; was sent in 1776 to Congress to succeed his father, who died in that year, but, his own health failing, he soon left Congress. In 1779 he sailed for the West Indies, intending to proceed to France, but the ship never reached its destination, being probably lost in a storm.

Lynchburg: city (laid out 1786): Campbell co., Va. (for location of county, see map of Virginia, ref. 7–F); on the James river, and the Ches. and O., the Rich. and Dan., and the Norfolk and West. railways; 147 miles E. by N. of Richmond. It is situated on the sides of a hill rising abruptly from the river, and presents a picturesque appearance with its numerous terraces and ornamental villa-residences, which command a splendid view of the Blue Ridge and the Peaks of Otter, 20 miles distant. It is a central point for an extensive shipping and distributing business, has numerous manufactories of tobacco, several iron-foundries, railway machine-shops, cotton and flouring mills, and possesses a magnificent water-power, while in the immediate vicinity vast deposits of coal and iron are found. The reservoir

constructed in 1828 is situated 253 feet above the river. There are 4 national banks with combined capital of $705,300, 3 State banks with capital of $350,000, a trust and savings-bank with capital of $150,000, a private bank, and 2 daily, 3 weekly, and 3 other periodicals. The city was an important base of supplies for the Confederates during the civil war, but early in 1865 Gen. Sheridan destroyed the canal and the railways leading into it, Pop. (1880) 15,959; (1890) 19,709; (1900) 18,891. EDITOR OF "NEWS."

Lynch Law: the practice of trying and punishing men, by unauthorized persons, without due process of law, and in violation of the right of the proper legal authorities to bring alleged offenders to trial for alleged crimes and offenses with which they are charged. In times of especial turbulence and disorder, when the duly constituted legal authorities are powerless to enforce the laws, there may be some justification for a resort to lynch law, but, while in some such instances lynch law has been productive of advantage, it is ordinarily an unmixed evil. The legal safeguards which serve to protect an innocent man from unjust conviction are almost invariably disregarded, and the excitement and passion under which the self-constituted judges usually labor render conviction almost a certainty in all cases, and often results in the infliction of inhuman cruelties by way of punishment. The origin of this phrase has been variously accounted for, but it is usually derived from a Virginian farmer named Lynch, who is said to have exercised unauthorized judicial functions in the early history of the State. This origin is very doubtful, however. Revised by F. STURGES ALLEN.

Lyndhurst, lind'hŭrst, JOHN SINGLETON COPLEY, Baron: statesman; b. in Boston, Mass., May 21, 1772, son of the artist John Singleton Copley; went to England in 1775; graduated with high honors at Cambridge University in 1794, and became a fellow of Trinity College; visited the U. S. in company with Volney; was called to the bar at Lincoln's Inn in 1804: became a sergeant-at-law in 1813; chief justice of Chester 1817; entered Parliament as a Tory in 1818; was knighted and made solicitor-general 1819; was counsel of George IV. in 1820 in the trial of Queen Caroline; became attorney-general in 1824; sat in Parliament for Cambridge University 1826, and was made master of the rolls; opposed Catholic emancipation; was raised to the peerage as Baron Lyndhurst and appointed lord chancellor in 1827, holding that office until 1830, a second time from 1834–35, and again from 1841–46; was chief baron of the exchequer 1830; and lord high steward of Cambridge University 1840. He originally entertained very advanced views. Before he became prominent in politics he was a republican and a Jacobin, but when, in 1817, he was taken up by the leaders of the Tories, on account of his brilliant defense of Dr. Watson, who was on trial for his participation in the Spa Fields riot, and when he shortly after entered Parliament by their support, he became a steady, and often a violent, opponent of all liberal measures. He was possessed of great eloquence, and continued to astonish the House by his speeches up to his ninetieth year. His denunciation of the aggressive policy of the Emperor Nicholas in 1853 created a European sensation, and in 1859 he attacked the policy of Napoleon III. with equal effect. D. in London, Oct. 12, 1863. See *Lives of the Lord Chancellors* (1869).

Lyndsay, lin'zi, Sir DAVID: statesman and poet; b. about 1490, probably in the old mansion-house of the Lyndsays, at Garleton, near Haddington, in East Lothian, Scotland; entered the University of St. Andrews in 1505; traveled in France and Italy 1509–11, and received in the latter year some position at the court of James IV. When James V. was born, in 1512, he was appointed his personal attendant, and he remained with the young king until the Douglasses came into power, in 1524, when he was banished from the court. He was recalled, however, in 1529, and afterward often served in important diplomatic missions to the Netherlands, to France, to Denmark, etc. He died early in 1555. It is, however, not as a courtier and a statesman, but as a poet, that he acquired his great fame. Indeed, he was for two centuries and a half the most popular poet Scotland produced. His principal works are *The Dreme*, a half-didactic poem, and *The Satire of the Three Estates*. The poetical merits of these productions are not so very great, but a vigorous spirit of reform, especially in the domain of the Church, is alive in them and gives them a considerable interest. The best editions of his works are those by George Chalmers (3 vols., London, 1806) and David Laing (3 vols., Edinburgh, 1879).

Lynn: city (settled by the English in 1629; incorporated as a city in 1850); Essex co., Mass. (for location of county, see map of Massachusetts, ref. 1–I); on Massachusetts Bay and the Boston and Me., and the Boston, Revere Beach and Lynn railways; 9 miles N. E. of Boston. It has an area of 11⅛ sq. miles, a coast-line of about 3 miles, and a shallow but well-sheltered harbor: is built mainly on a plain; and is noted for its manufactures of boots and shoes. The census returns of 1895 showed that 915 manufacturing establishments (representing 26 industries) reported. These had a combined capital of $11,046,779, employed 14,778 persons; paid $7,587,445 for wages and $20,401,311 for materials; and had products valued at $34,444,091. The boot and shoe industry had 284 establishments and $5,362,547 capital; employed 9,391 persons; paid $4,801,892 for wages and $14,270,721 for materials, and had products valued at $22,698,877. The next industry in importance was the manufacture of morocco leather, which had 20 establishments and $891,082 capital: employed 637 persons; paid $290,152 for wages and $1,925,585 for materials; and had products valued at $2,566,011. The city has 5 national banks and 2 safe-deposit companies with combined capital of $1,340,000, 3 savings-banks with assets of over $8,000,000, 2 libraries (free public, founded 1862, and a subscription circulating, founded 1881), and 2 daily, 4 weekly, and 5 monthly periodicals. It owns property valued at over $1,500,000, and its water-works in 1900 had cost over $2,427,561. The assessed valuation in 1900 was $51,091,948, and the net funded debt $3,107,397.59. Pop. (1890) 55,727; (1900) 68,513.

Lynn Re'gis, or **King's Lynn**: town; in the county of Norfolk, England; 100 miles N. of London, on the estuary of the Great Ouse, 9 miles from its mouth (see map of England, ref. 9–K). It is well built, has a good harbor, a fine church of the twelfth century, and beautiful public walks, and carries on a very extensive trade with Spain, the Baltic, and North America. Coal, timber, and manufactured goods are imported; corn, wool, and oil-cake exported. It has also large breweries, iron-foundries, ship-yards, and manufactures of tobacco, cork, and rope. Pop. (1891) 18,265.

Lynx [Mod. Lat. = Lat. = Gr. λύγξ, lynx]: the common as well as generic name for several good-sized members of the cat family (*Felidæ*), distinguished by the absence of the first upper premolar, by their tufted ears, and, with one exception, by their short, truncated tails. The fur is soft, gray, or reddish gray, more or less spotted and marbled, very thick and soft in northern specimens. With the exception of the CARACAL (*q. v.*), the lynxes are all inhabitants of the northern hemisphere. They climb well and prey

The lynx.

upon birds and small mammals. The exact number of species is still in dispute, but two well-marked species, *Lynx borealis* and *L. pardina*, occur in Europe and two in North America, the bay lynx (*L. rufus*) and the Canada lynx (*L. canadensis*). Except that it is smaller, measuring about 3 feet in length, this last is very similar to the animal found in Northern Europe. F. A. LUCAS.

Lyon, DAVID GORDON, A. B., Ph. D.: Orientalist and Assyriologist; b. at Benton, Ala., May 24, 1852; was educated at William Jewell College (Missouri), Howard College (Alabama), Southern Baptist Theological Seminary, and the University of Leipzig; has been Hollis Professor of Divinity in Harvard University since 1882, and recording secretary of the American Oriental Society since 1886. He has

published *Keilschrifttexte Sargons Koenigs von Assyrien* (Leipzig, 1883); *An Assyrian Manual for the Use of Beginners in the Study of the Assyrian Language* (Morgan Park, 1886; new ed. New York, 1892).

Lyon, Mary: educator; the founder of Mt. Holyoke College; b. at Buckland, Mass., Feb. 28, 1797; became a school-teacher at Shelburne Falls, Mass., in 1814; taught 1821–24 in the academy at Byfield, Mass.; 1824–28 in the Female Academy at Londonderry, N. H.; and then until 1834 in the ladies' seminary at Ipswich, Mass. Her great work was the founding of the Mt. Holyoke Female Seminary at South Hadley, Mass., of which she was principal from 1837 to 1849. Her practical sagacity was as remarkable as her unconquerable energy and sublime faith. D. at South Hadley, Mar. 5, 1849. See her *Life*, by President Hitchcock (Northampton, Mass., 1851), and *Recollections of Mary Lyon*, by Fidelia Fiske (Boston, 1866).

Lyon, Matthew: politician; b. in Wicklow co., Ireland, in 1746; emigrated to New York in boyhood; worked on a farm in Connecticut for some years; removed to Vermont; became in 1776 lieutenant in a company of "Green Mountain Boys"; became paymaster-colonel of militia, member of the Legislature, and assistant judge; founded the town of Fairhaven in 1783; built saw and grist mills; established a forge; made paper from basswood; manufactured types, and issued a paper called *The Scourge of Aristocracy and Repository of Important Political Truth*; took an active part in politics; was elected to Congress in 1797 as a Jeffersonian; was in Oct., 1798, convicted of libel against President Adams, fined $1,000, and imprisoned four months in Vergennes jail, during which time he was re-elected twice; narrowly escaped expulsion, first as a convicted felon, and afterward on account of an altercation on the floor of the House with Roger Griswold, of Connecticut, resulting in blows; removed to Kentucky in 1801; was immediately elected to the Legislature, and to Congress from 1803 to 1811; built gunboats on speculation for the war of 1812, and became bankrupt; was appointed by President Monroe in 1820 U. S. factor among the Cherokee Indians in Arkansas, and was elected delegate to Congress from that territory, but soon after died at Spadra Bluff, Ark., Aug. 1, 1822.

Lyon, Nathaniel: U. S. soldier; b. at Ashford, Windham co., Conn., July 14, 1819; graduated at West Point in 1841; served honorably in the Mexican war; was stationed in Kansas during the period of the slavery agitation, and remained actively engaged on frontier duty until Feb., 1861, when he was placed in command of the U. S. arsenal at St. Louis. Here he distinguished himself by surrounding and capturing the "State guard," and was appointed a brigadier-general of volunteers May 17. Soon after this he led his army to Springfield where he was compelled to remain by the superior force of the Confederates who were now overrunning Southern Missouri. After vainly waiting for re-enforcements he learned of the advance of the Confederates in two columns. Hoping to defeat the column from the S. before it united with that coming from the W., he moved out from Springfield, Aug. 1, and in the following morning defeated McCulloch at Dug Spring, who retreating now united with the other wing, and the whole body advanced toward Springfield, to which place Lyon had fallen back. Arriving at Wilson's Creek on the 7th, Lyon proposed to surprise them here; but this plan failed, and on the 9th he again moved out from Springfield and fought the battle of Wilson's Creek on Aug. 10. This battle is said to have been fought against his own judgment; but the evil to be apprehended from abandoning Southwestern Missouri without a battle being strongly represented, determined him to risk the engagement, throughout which he displayed the most daring courage, and it was after being twice wounded that, placing himself at the head of a regiment whose colonel had fallen, he was struck by a minie ball and almost instantly killed. The Union forces were repulsed, but retired in good order. By will Gen. Lyon left almost his entire property to the U. S. Government to aid in preserving the Union. A series of able letters written by him during and subsequent to the Kansas troubles was published in 1862, entitled *The Last Political Writings of Gen. Nathaniel Lyon.*

Lyon King-of-arms: the chief herald of Scotland. When the office is held by a nobleman certain of its duties must be performed by Lyon depute, one of his subordinates. Lyon also appoints messengers-at-arms for the courts and counties of Scotland. He is the chief officer of Lyon court, the heraldic college of Scotland. His subordinates are Lyon depute, Lyon clerk, Lyon clerk-depute, the procurator-fiscal, a herald painter, and a macer. The proper heralds and pursuivants of Scotland perform duties which are chiefly ceremonial, and do not relate to the blazoning of arms. These last duties are performed by the Lyon court, and are even more elaborate and formal than those of English heraldry.

Lyonnais, lē̆ē′ō′nā′: an ancient province of France, which is now divided into the departments of Loire, Haute-Loire, Puy-de-Dôme, and Rhône.

Ly'ons, Fr. pron. lē̆ē′ōn′ [from Fr. *Lyon*, Lyons < Lat. *Lugdu'num*, the ancient name]: next to Paris the largest city of France, and the most important manufacturing place of the country; situated in lat. 45° 45′ 44″ N., lon. 4° 49′ 43″ E., at the confluence of the Saône and the Rhône, 315 miles by rail S. S. E. of Paris (see map of France, ref. 6–H). It consists of a central part, covering a peninsula formed by the two rivers, and a number of suburbs scattered over the hills on the right bank of the Saône and on the left bank of the Rhône. It is the capital of the department of Rhône, the headquarters of the seventh military division of France, and is very strongly fortified. Eighteen detached forts which defend and command it form a circle around it 16 miles in circuit. The quays along the Rhône and the Saône are surprisingly beautiful; they are planted with magnificent trees and lined with elegant houses. Twelve bridges span the Saône, seven the Rhône. Some other quarters of the city and several of the many public squares are also handsome. Place Bellecour is one of the largest squares in Europe; on Place des Terreaux stood the guillotine in 1794; from the summit of the hill of Fourvières, on the right bank of the Saône, where stands the Church of Notre Dame de Fourvières, a most magnificent view is presented of the city, the Alps to the one side and the Cévennes to the other. Other parts of the city contain nothing but narrow, crooked streets, lined with tall gloomy houses, and have a squalid and dismal appearance. Among the public buildings the most remarkable are the Hôtel de Ville, one of the most interesting and beautiful buildings of its kind in Europe; the Palais des Beaux-Arts, on the Place des Terreaux; the cathedral, on the declivity of the hill of Fourvières, in Gothic style of the time of Louis XI.; the Church of St. Nizier, of the fourteenth century, etc. The educational and benevolent institutions of the city are numerous and good. The Royal College was founded in 1519, and enjoys a great reputation. The School of Drawing and the Veterinary School are model establishments. In the Martinière 220 sons of artisans receive gratuitous education. There is a public library with over 66,000 volumes, a botanical garden, several scientific associations, etc. The dye-works, foundries, glass-houses, potteries, tanneries, and breweries of Lyons are very extensive, especially the latter. Its manufactures of jewelry, hats, fine liqueurs, and chemicals also are important, and its trade in its own manufactures and in the produce of the surrounding country, especially in wine, is very brisk; it communicates by canals with Bordeaux, Paris, Marseilles, Geneva, and the Rhine. Its principal business is its silk manufacture, in which branch of industry it is hardly surpassed by any other place in the world. The average annual value of raw silk imported is estimated at $60,000,000; of manufactured silk exported, at $76,000,000. Silk-weaving was first started here in the reign of Louis XI. by artisans from Florence, Lucca, and Genoa; in the latter part of the seventeenth century between 9,000 and 12,000 looms were in operation, but the Revocation of the Edict of Nantes bereft the city of many of its most skilled workmen, and the number of looms decreased to about 4,000. In the latter part of the eighteenth century it had risen again to about 18,000, but the Revolution interfered sadly with the industry. At present more than 100,000 looms are worked in and around Lyons. An international exposition was held here in 1894.

The city is very old. The ancient *Lugdunum*, on the hill of Fourvières (*Forum vetus*), was colonized in 43 B. C. by Munatius Plancus. Under Augustus it became the capital of the province of Gaul, and the center of the different roads which the Romans built in the country. Germanicus, Claudius, Marcus Aurelius, Caracalla, and Geta were born here. During the early Middle Ages it belonged to the Archbishop of Lyons, and was very much disturbed by feuds between its municipal council and its ecclesiastical ruler, but in 1312 it was incorporated with the kingdom of

France by Philip the Fair, and its prosperity increased very much after that period. During the Revolution it suffered terribly; its insurrection against the Convention was punished by Collot d'Herbois and Fouché with an unheard-of cruelty. A great many of its buildings were demolished, and its very name was changed from Lyons to *Vitte-Affranchie*. Of its inhabitants many fled, while their property was confiscated, and many more perished on the scaffold or were mown down by grapeshot. After the fall of Robespierre the horrors were repeated. The terrorists and their adherents were drowned in the Rhône. Again in 1814, 1815, 1830, 1831, and finally in 1870–71, it was much disturbed by riots. Here President Carnot, while leaving a banquet given in his honor at the Exhibition of Arts, Sciences, and Industries, was assassinated on June 24, 1894, by an Italian anarchist.

Lyons has suffered severely by inundations, especially in 1840 and 1856, the result of the injudicious felling of the forests of the Vosges Mountains. Since 1856, however, extraordinary precautions have been taken, and the city is now free from danger of this character. Pop. (1881) 376,613; (1896) 466,028. Revised by C. H. Thurber.

Lyons: city; Clinton co., Ia. (for location of county, see map of Iowa, ref. 5–L); on the Mississippi river, and the Chi. and N. W. and the Chi., Mil. and St. P. railways; opposite Fulton, Ill., with which it is connected by a steel highway bridge. It is in an agricultural and nursery region; has an electric railway connecting it with Clinton, the county-seat; and contains saw, flour, and wrapping-paper mills, steamboat-ways, machine-shops, and sash-factories, several public parks, 2 libraries (German Association, founded 1859, and Young Men's Association, founded 1863), and 2-weekly newspapers. Pop. (1880) 4,095; (1890) 5,799. Annexed to Clinton since 1890.

Lyons: city; capital of Rice co., Kan. (for location of county, see map of Kansas, ref. 6–F); on the Atch., Top. and S. Fé, the Mo. Pac., and the St. L. and San Fran. railways; 21 miles E. of Ellinwood, 250 miles W. of Kansas City, Mo. It is in a highly productive salt region, is an important supply-point for the miners in Colorado and New Mexico, and has a monthly, a semi-weekly, and three weekly newspapers. Pop. (1880) 509; (1890) 1,754; (1900) 1,736.

Lyons: village; capital of Wayne co., N. Y. (for location of county, see map of New York, ref. 4–E); on the Erie Canal, and the Fall Brook, the N. Y. Cent. and H. R., and the W. Shore railways; midway between Syracuse and Rochester. It has excellent water-power, manufactures silverware, peppermint oil, and agricultural implements, fans, tool-handles, and various iron goods; and contains a large union school, the library of school district No. 6, and three weekly newspapers. Pop. (1880) 3,820; (1880) 4,475; (1900) 4,300.
Editor of "Republican."

Lyons, Gulf of: a large bay formed by the Mediterranean on the southern coast of France. It receives the Rhône. Marseilles and Toulon stand on its shores.

Lyons, Edmund: first Baron Lyons of Christchurch; naval officer and diplomat; b. at Burton, Hampshire, England, Nov. 21, 1790; was descended from Gov. John Winthrop of Massachusetts; entered the British navy in childhood; became a midshipman in 1803; served in the East Indies; became commander in 1812, and post captain in 1814. In 1828 he was engaged in the blockade of Navarino, Greece, then held by the Turks, and conveyed King Otho to Athens on the formation of the new kingdom; was knighted, and resided there as minister for fourteen years. In 1849 Sir Edmund became minister at Berne, and in 1851 at Stockholm. At the outbreak of the Crimean war he was appointed second in command of the Black Sea squadron, became commander-in-chief in Jan., 1855, and distinguished himself by brilliant services, which procured him a peerage in 1856 under the title of Baron Lyons of Christchurch. In 1857 he became successively vice-admiral and admiral. D. Nov. 24, 1858.

Lyons, Richard Bickerton Pemell, G. C. B., D. C. L.: second Baron Lyons; diplomat; b. at Lymington, England, Apr. 26, 1817; educated at Winchester School and Christ Church, Oxford; appointed *attaché* at Athens 1839, at Dresden 1852, at Florence (residing in Rome) 1853; secretary of legation there 1856, and envoy to Tuscany 1858; was envoy at Washington Dec., 1858–65; became ambassador at Constantinople Aug., 1865, and at Paris July, 1867; resigned in 1887. He was sworn a member of the privy council 1865. D. in London, Dec. 5, 1887.

Lyra, lē̆'raa', Nicholas, de: Hebrew scholar; b. at Lyre, Normandy, France, about 1270; studied in the Franciscan college at Verneuil and at the University of Paris; became a doctor of theology and an eminent lecturer upon biblical interpretation. He held the most important posts in the Franciscan order, and his commentaries upon the Scriptures were approved and used by the Reformers, whence the punning couplet—

Si Lyra non lyrasset,
Lutherus non saltasset—

"If Lyra had not piped, Luther would not have danced." His great work was the *Postitlæ perpetuæ in universa Biblia*, printed very early at Rome (5 vols. folio, 1471–72), which earned him the title of *Doctor planus et utilis*. In it he follows Rashi, and adopts the four Jewish modes of interpretation, the literal, the allegorical, the moral, and the anagogical or mystical. It is the only exegetical work of any merit produced by the Middle Ages before the revival of letters. His knowledge of Hebrew gave him a great advantage over the expositors of his time, although he made a modest plea for indulgence in the prologue to his commentary, "because," he said, "I am not so well skilled in the Hebrew or Latin language as to prevent me from failing in many particulars." He also wrote a work in defense of Christianity and against Judaism, entitled *Tractatus fratris Nicolai de Lyra de Messia ejusque adventu, una cum responsione ad Judæorum argumenta quatuordecim contra veritatem Evangetiorum* (1309). Whether he was a Jew by birth is disputed. D. in Paris, Oct. 23, 1340. See Davidson, *Sacred Hermeneutics*; Graetz, *Geschichte der Juden*. Revised by C. H. Toy.

Lyre [viâ O. Fr. from Lat. *ly'ra* = Gr. λύρα, lyre]: a musical instrument of unknown origin and antiquity, famous in mythology and poetry. Diodorus ascribes its invention to the Egyptian Hermes (Mercury). According to the tradition, the Nile in its subsidence left on its bank a tortoise-shell, the contents whereof were so dried by the sun that the hard-strained cartilage was like stretched catgut. This gave the hint of an instrument. The Greek tradition does not materially differ from the Egyptian. The improvements in the lyre were made by the Greeks, who increased the capacities of the instrument by adding to the number of the strings. The most ancient lyre had three; the lyre of Terpander (B. C. 680) had seven; the lyre of Pythagoras (B. C. 600) had eight. The number was afterward increased to eleven, and even to thirteen. In its perfected form the lyre consisted of two side-pieces set upright, like horns, connected together near the top by a wooden cross-piece; the strings were attached to this, and stretched perpendicularly, the lower end being fastened to the bottom of the resonant shell. They were struck either with the fingers or a plectrum, a stick of polished wood or ivory. When played, the lyre was held between the knees. The form of the instrument varied slightly, as can be imagined, in different epochs and among different peoples. It was used chiefly as an accompaniment to the voice in passionate, pathetic, and heroic song. For this reason it has given the name *lyric* to a class of poetry that expresses the mood of private and personal emotion. Literature celebrates the lyre of Sappho, the Lesbian lyre, and the lyre of Apollo. The Abyssinians and neighboring peoples of the present day use an instrument of seven strings that closely resembles the lyre of ancient Greece.

Lyre-bird: a name given to three Australian birds (*Menura superba*, *M. victoriæ*, and *M. alberti*) on account of the peculiarly shaped tail of the male. The outermost feather on either side curves outward like the sides of an ancient lyre, while the effect is heightened by the fact that the two inner tail-feathers are little more than mere shafts, and the twelve others have very sparse, slender barbs, thus suggesting the strings of the instrument. The lyre-bird is about the size of a small fowl, has long, strong legs, and short weak wings. The general color is olive brown. It has a striking song, is very shy, and inhabits the dense thickets of New South Wales. The *Menuridæ*, the family of passerine birds to which the lyre-birds belong, are distinguished by the peculiar form of the vomer, which, according to Huxley, is "broad and rounded off in front and deeply cleft behind. The maxillo-palatines are long and slender. The sternum has a well-developed and forked manubrium, but its posterior edge is strongly convex, and only exhibits a slight notch on each side. The furcula has no median process, and its scapular ends are comparatively little expanded." The bill is moderately slender and pointed; the gape quite well cleft; the nostrils linear, and advanced beyond the

middle of the bill. Owing to numerous anatomical peculiarities, the lyre-birds have been by some authors considered

Lyre-bird.

as a super-family, or even as forming a separate order, *Menuræ*. F. A. Lucas.

Lyre-turtle: a name applied to the largest of the sea-turtles, *Dermochelys coriacea*, on account of its somewhat lyre-shaped outline, the strings of the instrument being suggested by the dorsal keels. The peculiar leathery appearance of this species and its high, arched carapace have earned for it the names of leatherback and trunk turtle. The carapace of the lyre-turtle is broad and high in front, and tapers to a point behind; there is a well-marked ridge or keel down the center of the back, on either side of which are two others. The neck is short, head large and rounded, front flippers long and narrow, hind flippers short and wide. The skin is tough and leathery; the color is black above, white, mottled with black, below. There are no nails. This turtle differs from all other living species in the fact that the carapace, instead of being composed of large, regular plates of bone, related and united to the vertebræ and ribs, is formed of large numbers of thin, irregularly shaped pieces of bone, having no relation to the skeleton. This turtle attains a weight of 1,000 lb. It is very oily, and the flesh is said to be poisonous. It is an inhabitant of tropical seas, and is occasionally brought to the shores of the Eastern and Northern U. S. by the Gulf Stream. F. A. Lucas.

Lyric Poetry [*lyric* is from Lat. *ly'ricus* = Gr. λυρικός, liter., pertaining to the lyre, hence to songs or poems intended to be accompanied by the lyre; deriv. of λύρα, lyre, whence Eng. *lyre*]: a kind of poetry which in modern usage can hardly be more exactly defined than as that which is most closely related to music. In classic Greek the word *lyric* seems always to have been used literally. Finding favor in Latin and in modern languages, the term has persisted with great extension of meaning and corresponding loss of precision. It is now used to cover a range of literature wide enough to include not only all verses written to be sung under any conditions, but also poetry so diversified as the Psalms, Pindar, Horace, Petrarch, Villon, Burns, and the libretti of the operatic stage. Little as at first sight they seem to have in common, it will appear on reflection that their relation to actual music is far closer than that of distinctly epic or dramatic poetry. It seems probable indeed that all poetry which may properly be termed lyric, may be classified under one of four heads, whose relation to music is traceable. The first includes all verse which is written for musical accompaniment of any kind, such as the Psalms, the odes of Pindar, or one of Gilbert's libretti. The object of this primary lyric poetry is clearly to phrase in words certain aspects of that great variety of human emotion which is properly the subject also of purely musical expression. The second includes all verse, such as an ode of Gray or of Wordsworth, or any modern sonnet, whose conventional form is traceable to the musical conditions of former times. Here, too, in this secondary lyric poetry the inherent nature of the form involves some attempt on the part of the poet to formulate in words phases of emotion that at least once were held to be primarily within the province of music. The third, which involves a less precise use of the term, includes all passages in poetry generally of another character—epic, for example, or dramatic—which impress the ear as subtly musical in sound. One hears much, and properly, of the lyric beauty with which many speeches in Shakspeare's plays are permeated. In this tertiary lyric poetry it is clear on reflection that the poet, perhaps with no conscious effort to conform to actually or historically musical conditions, has been to some degree influenced by emotions which under other circumstances might have found primarily musical expression. The fourth, which involves a distinctly modern use of the term lyric, much in favor among the Germans, includes all verse, whatever its form or sound, whose object is to express the personal emotion of the poet, as distinguished from the impersonalities of epic poetry or dramatic. Lyric poetry indeed is sometimes defined as subjective poetry, in distinction from objective. A little consideration will show that this quaternary lyric poetry, like the other kinds, has distinctly musical traits. Without detailing any theory of pure æsthetics, we may safely say that music is generally the vehicle of that great, unformulated body of human emotion which, in spite of its general existence, presents itself to the individual as primarily personal. In this sense such poetry as that of Heine is conspicuously lyric. Under these four heads all lyric poetry may probably be included. In each case, as we have seen, there remains a perceptible trace of that aspect of the original meaning of the term lyric which connects it, not with a specific musical instrument, but with music in general. So far, then, as any effort to phrase thought and emotion in written words endeavors, either in substance or in form, to phrase that indefinitely subtle range of emotion whose normal expression is purely musical, the result of that effort may be said to possess lyric quality.

If this view of the essential nature of lyric poetry be accepted, we may see at once why so many efforts to classify lyric poetry—as sacred, patriotic, erotic, convivial, etc.—are confusingly unsatisfactory. Whatever is properly the subject for musical expression is properly also the subject of lyric verse; and this clearly includes the whole range of emotional experience. Anything approaching a complete topical classification of lyric poetry, then, would amount to a complete tabulation of emotional psychology. In a very general way, however, we may say that at certain periods of human history certain phases and forms of lyric poetry have so developed as to be historically characteristic. Among the earliest phases of emotion to seek lyric expression was certainly the religious. In the Vedic hymns, in the Psalms, and by far the greater part of other biblical poetry, this fact clearly appears. It is perhaps typical of the essentially lyric nature of religious emotion that to the present day religious poetry is still actually associated with music. The Psalms are chanted still; so are the Latin hymns of the mediæval Church; and Luther's hymns, and those of Dr. Watts, and Cardinal Newman, and Mr. Moody are known as familiarly by their tunes as by their names. Perhaps quite as early came that sort of national lyric, in English generally called Ballad Poetry (*q. v.*), which has everywhere existed as the predecessor of formally epic verse. So, too, the folk-song, the immemorial nursery rhyme, the war-song, and the love-song emerge from the highest antiquity. In no literature that survives has any general lyric subject been quite neglected. In the great literatures that still consciously influence us, however, certain kinds of lyric poetry have from time to time developed so highly as permanently to survive in their

original form. In this sense certain kinds may be called peculiarly typical of certain of these literatures. In this sense the typical Hebrew lyric—in spite even of so superb an erotic work as the Canticles—must be pronounced the spiritually religious. The typical Greek lyric—in spite even of the philosophic choruses of classic tragedy and what else—must be pronounced either the passionately local, occasional odes of Pindar, or the frankly erotic songs of Sappho and of Anacreon. The typical Latin lyric—in spite of all the rest—must be pronounced the urbanely convivial odes of Horace. The typical lyric of the early Middle Ages—for all their ballads and folk-songs—probably remains the rhyming hymn of Latin Christianity, no longer spiritually but now dogmatically religious. The typical lyrics of the later Middle Ages or of the early Renaissance may perhaps be pronounced the *canzone* and Petrarchan sonnet, no longer frankly erotic but now idealized and romantic love-songs. The typical modern lyric, in all European languages is—for all the vagaries of the operatic stage—the consciously subjective.

From the middle of the sixteenth century English literature has been exceptionally rich in lyric poetry. In Palgrave's *Golden Treasury* there exists a remarkably compact and typical collection of English lyrics. This anthology is useful both as a general example of the range and nature of lyric poetry in modern times and as a guide to the development of this kind of literature in English. It is divided into four books, roughly corresponding to the sixteenth, seventeenth, eighteenth, and nineteenth centuries, and roughly grouping themselves about the work of Shakspeare, Milton, Gray, and Wordsworth. Very generally we may say that the lyric poetry of the sixteenth century in England, which groups itself about the sonnets and the songs of Shakspeare, deals either with idealized love, or with simple and elementary emotions, joyous or sorrowful, such as are apt to coincide with alert intensity of personal affection. In equally general terms, we may broadly describe the three successive periods. The English lyrics of the seventeenth century, which group themselves about the lesser poems of Milton, are distinctly more various. With decidedly less spontaneity, they are more definite. The moods expressed by such poems as *L'Allegro* and *Il Pensoroso* are more mature than those expressed by earlier poetry, or at least far more modern; the songs of the cavaliers, the sternly Puritan sonnets of Milton, express specific, not general, phases of intense emotion; while such an elaborate ode as Dryden's *Alexander's Feast* exhibits a deliberate mastery of technical composition very different from that shown in such earlier occasional verse as the nuptial poems of Spencer. The general term for this period, then, is perhaps *articulate*. The English lyrics of the eighteenth century—which group themselves about the odes and the *Elegy* of Gray—may perhaps be most comprehensively described as *conscious*. Amid considerable variety, they are apt at first to be sentimental, always to be deliberate, and, finally to show marked traces of the spirit which in our own time is called romantic. The English lyrics of the early nineteenth century—which group themselves about the verses of Wordsworth—exhibit romantic feeling to the full in the verses of Scott, of Byron, of Shelley, of Keats, of Coleridge. These very names, however, will have suggested other motives, too, far less evident in any of the earlier periods. The most notable of these are perhaps the profound sense of Nature so characteristic of Wordsworth, and a growing sense of philosophic insight which gives this period a far more valid claim to the term metaphysical than is possessed by the period so termed by Dr. Johnson. The best single name for the poetry in question, then, is perhaps the broadly general name, *philosophic*. To sum up, we have said that in four successive stages, English lyric poetry has been first spontaneous, then articulate, then conscious, finally philosophic.

In comparing the work of these four periods, one can hardly fail to remark a palpable, though hardly definable, difference between the earlier work, which we have called spontaneous, and the work which follows. The earlier work has a subtle quality of its own, more inevitably, essentially musical than any of the rest. A comparison of Elizabethan music with that of our own time, then, becomes very suggestive. In the sixteenth century musical art was not so developed as to drown in emotional sound the words which the singer uttered. In our time the art of music has reached such a stage that whoever would thoroughly appreciate verses that are sung must consider them again apart from their musical setting. The lyric poets of the sixteenth century, in short, were forced to make in their verses a great part of their own music. The lyric poets of the later periods have been forced, by the very growth of pure music about them, either consciously to adapt their work to the changed conditions of musical art, or consciously to write independently of musical considerations. In the earlier work, then, the quality we have called spontaneity is probably due to the fact that the older poets were called upon to express phases of emotion that in our own day have long been recognized as more properly subjects for musical composers. If this is true, it goes far to confirm the definition we have given of lyric poetry.

In modern English there are various conventional lyric forms—ballades, rondeaus, triolets, etc. There are only two, however, which have so fully developed, and which have lasted so long as to be surely permanent in our literature. These are the so-called Pindaric ode and the sonnet. Like the ballad and the hymn, however, the ode and the sonnet demand more specific discussion than is here possible.

BARRETT WENDELL.

Lys, lees: a river which rises in France, in the department of Pas-de-Calais, flows in a northeastern direction into Belgium, and joins the Scheldt at Ghent after a course of 125 miles, of which 45 have been changed into a canal.

Lysan'der (in Gr. *Λύσανδρος*): a Spartan general; received in 407 B. C. the command of the Spartan fleet, and defeated the Athenians off the promontory of Notium. His term of command having expired, he was replaced by Callicratidas, but Callicratidas was defeated in 406 B. C. in the battle of the Arginusæ; and as it was against the Spartan laws that the same person could hold an office twice, Aracus was nominally placed at the head of the fleet, while in reality Lysander held the command. His campaigns were very brilliant. He routed and captured the Athenian fleet at Ægospotami, and early in the next year (404 B. C.) took Athens, thus ending the Peloponnesian war. At this moment he was the most prominent man in Greece, but his arrogance and enormous ambition made it impossible for him to hold any office. When in 395 B. C. he was sent at the head of an army against the Bœotians, during which campaign he was killed while besieging Haliartus, it is said that he was deeply involved in a conspiracy for the subversion of the dynasty of the Heraclidæ in Sparta. It seems very probable that at the time of his death he was deeply implicated in various revolutionary schemes, but he had, nevertheless, committed no overt act. He was buried on the road from Delphi to Chæronea, and a monument was erected on his tomb. Revised by J. R. S. STERRETT.

Lys'ias: a Syrian nobleman of the blood-royal, whom King Antiochus Epiphanes, on setting out for Persia, appointed guardian of his son and regent of the kingdom, and as such he waged a formidable war with the Jews. His vast forces were defeated by Judas Maccabæus near Emmaus (B. C. 166); he was himself repulsed near Bethsura in the following year, but took that fortress B. C. 163, and laid siege to Jerusalem, but by an insurrection at Antioch was forced to treat with the Jews. Shortly afterward Lysias was put to death by the populace of Antioch, who had rebelled in favor of Demetrius Soter. Revised by J. R. S. STERRETT.

Lysias: one of the ten canonical Attic orators, model of the "plain style"; son of Cephalus, a wealthy Syracusan, who had settled in Athens. The year of his birth is a matter of dispute. The earliest date given is 459 B. C.; the latest advocated makes him only a little older than Isocrates (b. 436). He went in his youth to Thurii, where he studied rhetoric under Teisias. In consequence of the issue of the Athenian expedition to Sicily he returned to Athens in 412; but during the Reign of Terror (404–403) the thirty (see THIRTY TYRANTS), whose cupidity was stirred by the wealth of the heirs of Cephalus, put Polemarchus, the brother of Lysias, to death, and Lysias himself had a narrow escape to Megara. Lysias returned with the victorious democracy, and though not a full citizen had a privileged position, which qualified him to prosecute Eratosthenes, one of the thirty, as the murderer of his brother. D. not long after 380 B. C. With the exception of this speech against Eratosthenes and the show-pieces, all the extant speeches of Lysias were composed to be spoken by others, and the adaptation of each speech to the character and circumstances of the speaker is an important element in the study of his oratory. The excellence of Lysias lies in the simplicity, clearness, vividness, point of his narrative, in the keenness of his argument, and in the consummate art with which he wins the interest and sympathy of the jury by the subtle, self-delineation of the speakers, who however else they differ, are all

frank and candid souls. The authorship of the funeral oration attributed to Lysias is much disputed. If not his, it is a good sample of the other side of Lysias's profession, the making of show speeches for public occasions. There are editions by Reiske (1772), Bekker (1828), Baiter and Sauppe (1850), Cobet (1863) with an interesting critical preface, and Scheibe (in the Teubner Series); selections with German notes by Rauchenstein-Fuhr in the Haupt and Sauppe Series (Weidmann), and by Frohberger, and with English notes by Shuckburgh, American school editions by Whiton, Stevens, and Bristol. The English translation by Gillies is loose. See Blass, *Attische Beredsamkeit*, vol. i., 338–644 (2d ed.); Jebb, *Attic Orators*, vol. i., 142–312; Girard, *Études sur l'éloquence attique*, pp. 1–91.

B. L. GILDERSLEEVE.

Lysim'achus (in Gr. Λυσίμαχος): b. at Pella, Macedonia, about 360 B. C.; served as a general in the army of Alexander the Great, and received Thrace on the division of the empire at the death of Alexander in 323. In 306 he assumed the title of king, and having defeated Antiochus in the battle of Ipsus in 301, he united a large part of Asia Minor to his dominions. An expedition he undertook in 292 against the Getæ, N. of the Danube, was very unfortunate; he was taken prisoner with his whole army, and received his freedom only by giving his daughter in marriage to the king of the Getæ. After the murder of his son Agathocles, who was much loved, the population of Asia Minor rose in insurrection, and was supported by Seleucus, and in the battle of Corupedion (281) Lysimachus was defeated and killed. Revised by J. R. S. STERRETT.

Lysip'pus (in Gr. Λύσιππος): statuary; originally a coppersmith of Sicyon, who by his careful study of the human form and of the canon of Polyclitus became one of the most celebrated artists. His aim was to make his statues as beautiful as possible without detracting from their charm as portraits, and so he elaborated a new canon, according to which the figure became taller and more slender, while the head became smaller than was natural, and thereby added to the impression of height and slender proportions. He claimed to represent the human figure as it seemed to be to the eye, and not as it actually was. He attained great distinction by his statues of Zeus, Heracles, and Helios. In fact he created a new type of Heracles. He became especially celebrated for his statues of Alexander the Great, whom he represented in every conceivable way, beginning with his youth. Alexander would sit for but three artists: Lysippus (artist in bronze), Pyrgotiles (sculptor), and Apelles (painter). Lysippus worked only in bronze, in which he fashioned no less than 1,500 statues, all of which have perished, though we have an antique copy in marble of at least one of his works, the *Apoxyomenos* in the Vatican. The colossal Heracles of Lysippus was taken to Rome after the conquest of Tarentum, and stood for centuries on the Capitol, whence it was removed to adorn the Hippodrome of Constantinople. It was melted down in 1022 A. D. Other celebrated colossal statues of Lysippus were the statue of Helios in Rhodes, Zeus in Tarentum, Poseidon in Corinth, and Kairos (an allegory representing the Favorable Moment).

J. R. S. STERRETT.

Lyskander, KLAUS: historian; b. in Skaane, Denmark, 1557 or 1558. His *Danske Kongers Slægtebog* (Chronology of the Danish Kings, 1622), which attempts to trace the royal line back to Adam, is absolutely unreliable, but *De Scriptoribus Danicis*, the first attempt at a history of Danish literature, is still of great value. D. 1623. See H. F. Rördam, *Lyskanders Levned, etc.* (Copenhagen, 1868). D. K. D.

Ly'sons, DANIEL, F. R. S.: antiquary; b. at Rodmarton, Gloucestershire, England, Apr. 28, 1762; graduated M. A. at Oxford in 1785; took holy orders, and became curate of Putney about 1790, rector of Rodmarton 1804; published, under the patronage of Horace Walpole, *The Environs of London, being an Historical Account of the Towns, Villages, and Hamlets within Twelve Miles of that Capital* (5 vols., 1792–1800), and in conjunction with his brother Samuel, *Magna Britannia, being a Concise Topographical Account of the Several Counties of Great Britain* (6 vols., 4to, 1806–22), a colossal work, left unfinished, containing the counties in alphabetical order up to Derby inclusive. The materials collected for this vast enterprise are now deposited in the British Museum, forming sixty-four MS. volumes. D. at Rodmarton, Jan. 3, 1834.—His son, Maj.-Gen. Sir DANIEL LYSONS, C. B., b. 1816, a distinguished officer, became commander of the northern military district of Great Britain.

Lysons, SAMUEL, F. S. A.: antiquary; b. at Rodmarton, England, May 17, 1763; aided his brother Daniel in the preparation of the *Magna Britannia*, and published several splendid works on British antiquities, among which were *An Account of Roman Antiquities discovered at Woodchester* (1797, colombier folio), *Reliquiæ Britannico-Romanæ, containing Figures of Roman Antiquities discovered in Various parts of England* (1813–17, folio, with 156 colored plates), and *The History and Antiquities of Devonshire* (2 vols., 4to, 1822), in which he was aided by Dean Buckland, the Bishop of Cloyne, and other distinguished archæologists. He was called to the bar in 1798; became keeper of the records in the Tower 1803, and vice-president of the Society of Antiquaries 1812. D. in London, June 29, 1819.

Lyssa: See HYDROPHOBIA.

Lys'tra (in Gr. τὰ Λύστρα): an ancient city of Asia Minor; placed by Pliny in Galatia and by Ptolemy in Isauria, while in the Acts of the Apostles it is placed in Lycaonia. It belongs naturally either to Isauria or Lycaonia, whose confines varied greatly at different epochs. It was the native place of Timothy, the scene of Paul's miracle of healing a lame man, of the attempted worship of Paul and Barnabas as Jupiter and Mercury, and of the stoning of St. Paul (Acts xiv). The site of Lystra, which was placed by modern travelers at different localities, has been fixed definitely by the writer of this article at Zoldera, a short distance above the village of Khatün Serai. The site was identified by means of the following Latin inscription: *Divum Aug(ustum) Col(onia) Jul(ia) Felix Gemina Lustra consecravit d(ecreto) d(ecurionum)* on a pedestal upon which once stood a statue of the Emperor Augustus. The pedestal is still *in situ*, but the city has entirely disappeared. Lystra was turned into a colony by the Romans, who gave it the composite name seen in the Latin inscription quoted above, and on coins of Lystra, four of which are in existence. See Sterrett, *Wolfe Expedition to Asia Minor* (Boston, 1888), p. 142 ff.

J. R. S. STERRETT.

Lyte, ELIPHALET ORAM: See the Appendix.

Lyte, HENRY FRANCIS: hymn-writer; b. at Ednam, near Kelso, Scotland, June 1, 1793; was educated at Trinity College, Dublin; ordained in 1815, and appointed to the curacy of Lower Brixham, Devon, in 1823. D. at Nice, Nov. 20, 1847. He published *Tales Illustrative of the Lord's Prayer* (1826); *Poems, chiefly Religious* (1833); *Miscellaneous Poems* (1868), etc., and wrote many popular hymns, among them, "Abide with me; fast falls the eventide," etc.

Lyt'telton, EDWARD, D. C. L., Baron: jurist; b. at Mounslow, Shropshire, England, in 1589; graduated at Oxford 1609; became chief justice of North Wales 1621; entered Parliament 1626; recorder of London 1631; solicitor-general and knight 1634; chief justice of common pleas 1640; lord keeper of the great seal 1641; raised to the peerage Feb. 18, 1641; escaped with the great seal to Charles I. at York May, 1642; required by Parliament to return it or lose his place 1643; first commissioner of the treasury Mar., 1644; commissioned to raise a regiment of foot-soldiers May, 1644. D. at Oxford, Aug. 27, 1645.

Lyttelton, GEORGE, First Baron: statesman and man of letters; son of Sir Thomas Lyttelton, Bart.; b. at Hagley, Worcestershire, England, Jan. 17, 1709; was educated at Eton and at Christ Church, Oxford; traveled in France and Italy; entered Parliament in 1735; joined the young "Patriots," who eventually drove Walpole from power, and soon figured by the side of Pitt and Pulteney among the most formidable opponents of the ministry; took part in most of the debates, exhibiting great fluency of speech and elegance of expression; wrote *Letters from a Persian in England to his friend at Ispahan* (1735–36), an imitation of Montesquieu, which had an immediate success; became secretary to Frederick, Prince of Wales, when that prince formed his little court as head of the opposition; was intimate with Pope and his literary school, and proved himself the official patron and private benefactor of Thomson, Fielding, and Mallet; married, in 1741, Lucy, sister of Lord Fortescue, and on the fall of Sir Robert Walpole in 1744 became one of the lords of the treasury. He is said to have been a skeptic in early manhood, and in 1747 produced his celebrated *Observations on the Conversion and Apostleship of St. Paul*, which was considered a masterly treatise upon the evidences of Christianity, and as such has been frequently reprinted. The death of his wife, to whom he was tenderly attached, in the preceding year, gave occasion

to his pathetic *Monody to the Memory of a Lady lately Deceased* (folio, 1747), considered the best of his poetic efforts. On the death of his father in 1751 he succeeded to the baronetcy and to the vast family estates, when he gave free scope to his artistic tastes, and made Hagley one of the most beautiful seats in England. He became successively cofferer of the king's household, privy councilor, and Chancellor of the Exchequer (1755); in 1756 gave up the office of Chancellor and was raised to the peerage with the title of Baron Lyttelton of Frankley. In 1760 he published his *Dialogues of the Dead*, and in 1764–67 his *History of Henry II.* (4 vols.), a work upon which he had been engaged more than twenty years, and which was highly commended for accuracy and research, but is now forgotten. D. Aug. 22, 1773. His *Miscellaneous Works* (2 vols.) appeared in 1774, and his *Poetical Works* in 1785. See also *Memoirs and Correspondence of Lord Lyttelton* (1845).

Lyttelton, Thomas, Lord: son of George, the first Baron Lyttelton; b. in 1744; exhibited extraordinary precocity in youth; at the age of sixteen was regarded almost as a prodigy by several of the ablest writers and most erudite scholars in England; became dissipated and dissolute in his habits; lost the favor of his father; an alienation between them ensued; his marriage proved to be unhappy, and a separation followed. He was returned to the House of Commons in 1768; lost his seat on a contest early in Jan., 1769, and on the death of his father in 1773 took his seat in the House of Lords. While in the House of Commons, as well as in the House of Lords, he was greatly distinguished for vigor of thought, elegance of language, and for the force and power of his speeches. His style, tone of political sentiments, and other points of coincidence have led to the hypothesis, entertained by many, that he was the author of the *Letters of Junius*. A strong article sustaining this view was published in the London *Quarterly* for Dec., 1851. A very important fact, however, in support of the hypothesis was not presented with its due force in that article. It was that during the life of Lord Lyttelton he was voted out of his seat in the Commons by the Tory administration early in Jan., 1769, and just before the appearance of Junius's first letter to *The Public Advertiser*. D. in 1779.

Revised by C. K. Adams.

Lyttleton, Thomas: See Littelton, Thomas.

Lytton, Edward George Earle Lytton Bulwer, First Baron: See Bulwer.

Lytton, Edward Robert Bulwer-Lytton, Earl: poet and statesman; eldest son of the eminent novelist; b. in England, Nov. 8, 1831; was educated first at Harrow, then under private tutors, and afterward at Bonn, Germany, where he devoted himself especially to modern languages; entered the diplomatic service in 1849 as *attaché* and private secretary to his uncle, Sir Henry Bulwer, minister at Washington; was transferred in the same capacity to Florence in 1852, and to Paris in 1854. As paid *attaché* he was sent to The Hague in 1856, to St. Petersburg in 1858, to Constantinople in the same year, and to Vienna in 1859. He was acting consul-general at Belgrade in 1860, and was employed on a special confidential mission for preventing the renewal of hostilities between the Turks and the Servians (1862). He was in the same year made second secretary of legation, and in Jan., 1863, was sent to Constantinople as first secretary; was *chargé d'affaires* for brief intervals in 1863 and 1864; secretary of legation at Athens in 1864, and at Lisbon in 1865, where he was *chargé d'affaires* several times, and at Madrid in 1868; became secretary of embassy at Vienna in the same year; at Paris in 1872, where he acted twice in 1873 as *chargé d'affaires*; received the appointment of ambassador at Lisbon in Dec., 1874; in May, 1875, declined the governorship of Madras, and was Viceroy of India 1876–80. He married in 1864 a niece of the Earl of Clarendon, succeeded to his title as Baron Lytton on the death of his father Jan. 18, 1873, and was promoted to an earldom on his return from India. His first appearance as an author was under the pseudonym of *Owen Meredith* with *Clytemnestra and other Poems* (1855). *The Wanderer, a Collection of Poems in Many Lands* (1859), and *Lucile* (1860), a novel in elegant verse, established his reputation as a popular poet. In 1861 he published anonymously *Tannhäuser, or the Battle of the Bards*, in collaboration with an intimate friend, whose biography he wrote in 1871 under the title *Julian Fane, a Memoir*. In 1861 he issued *Serbski Pesme*, a translation of the national songs of Servia; in 1863 a prose romance, *The Ring of Amasis* (rewritten 1886); in 1868 *Chronicles and Characters*; in 1869 *Orval, or the Fool of Time*, a dramatic poem paraphrased from the Polish, with imitations of authors in several other languages; in 1874 *Fables in Song* (2 vols.) and *Speeches of Edward, Lord Lytton, with some of his Political Writings hitherto Unpublished, and a Prefatory Memoir*; in 1883 *Life, Letters, and Literary Remains of Edward Bulwer, Lord Lytton*; in 1885 *Glenaveril* (2 vols.); in 1887 *After Paradise, or Legends of Exile*. In 1867 a collected edition of the *Poetical Works of Owen Meredith* appeared. Without attaining the mark of creative genius, all the poems of Lord Lytton are fluently and elegantly written. He became British ambassador at Paris in 1887. D. in Paris, Nov. 24, 1891.

Revised by H. A. Beers.

M

: the thirteenth letter of the English alphabet.

Form.—The form is derived through the Latin alphabet from the Greek, where it was M or ⋀⋀, retrograde ⋁⋁, the last being essentially the Phœnician form. With the discontinuance of the use of the sibilant *sam* M and the general adoption of *sigma* Σ in its place, the fifth stroke of ⋀⋀ was omitted as no longer necessary for discrimination.

Name.—The Greek name *mū* (also *mō*), following the analogy of the next name, *nū*, replaced the inherited Phœnician name *mēm*, water, which expressed probably the supposed resemblance of the letter to the ripples of water. The English name *em* comes through Old French from the Latin name *em*; cf. *el*, *en*, *er*, *es*.

Sound.—It denotes a labial nasal, the voiced breath being diverted through the nasal cavity by closing the lips. It is, however, often pronounced as labio-dental before *f*, as in *symphony*, *nymph*. It is written double in the middle of a word after a short vowel, *summer*, *hammer*.

Source.—The sound has been a peculiarly permanent one, and in general represents in genuine English words a Teutonic and Indo-European *m*; thus *mother*: Lat. *māter*: Skr. *mātar-*; *smile*: Skr. √ *smi-*; *mm* may represent *fm* as in *women*, earlier spelling like present pronunciation *wimmen* < O Eng. *wīfmenn*, *Lammas* < *hlāfmæsse*; *mp* may represent an *-np*, as in *hemp* < O. Eng. *hœnep*. The *m* often develops an excrescent *b* before liquids, as in *gamble*, *timber*, *embers*.

Value as Symbol.—M represents in Roman notation 1,000. In Latin M. = Marcus, M'. = Manius. In French M. = Monsieur. Also M. A. or A. M., Master of Arts; A. M. *ante meridiem*, forenoon; M. C., member of Congress; M. P., member of Parliament; M. E., Methodist Episcopal. See Abbreviations.

Benj. Ide Wheeler.

Maa: Egyptian deity. See Mat.

Maartens, Maarten: pseudonym of J. van der Poorten-Schwartz (*q. v.*).

Maas: See Meuse.

Maas, Hermann, M. D.: surgeon; b. in Stargard, Pomerania, Jan. 3, 1842; entered the University of Greifswald in 1861 and of Breslau in 1863, graduating from the latter in 1865; from 1866 to 1868 was assistant in Middledorpf's surgical clinic in Breslau; in 1869 was appointed docent in surgery: in 1876 was appointed Professor Extraordinary of Surgery in Breslau University; in 1877 became Professor of Surgery in the University of Freiburg; in 1883 succeeded von Bergmann as Professor of Surgery in the University of Würzburg. Among his publications are *Kriegschirurgische Beiträge aus dem Jahre 1866* (Breslau, 1870); *Mittheilungen aus der chirurgischen Klinik in Freiburg*; and he was the author of the section entitled *Die Krankheiten der Harn- und Geschlechtsorgane* in Koenig's *Chirurgie*. D. July 23, 1886.

Maas, Joseph: See the Appendix.

Maas, Louis: See the Appendix.

Mabie, Hamilton Wright: See the Appendix.

Mabillon', Jean: b. at St.-Pierremont, in Champagne, France, Nov. 23, 1632; educated at the theological seminary of Rheims, and entered in 1653 the order of the Benedictines. D. in Paris, Dec. 27, 1707. His collections and editions of historical documents, *Vetera Analecta* (4 vols., 1675–85) and *Musæum Italicum* (2 vols., 1787–89), gathered in Germany and Italy, and based on critical researches, are very valuable; and his *De Re Diplomatica* (1681), in which he set forth and defended his method, and which was violently attacked by the Jesuits, exercised a wholesome influence on the study of history. He also wrote *Acta Sanctorum Ordinis S. Benedicti* (9 vols., 1668–1702) and *Annales Ordinis S. Benedicti* (6 vols., 1703–39).

Mabinogion: the name commonly but inaccurately given to all mediæval Welsh tales or fairy-stories. This use of the word has been general ever since Lady Charlotte Guest published under this title her translation of the tales in the famous manuscript of Jesus College, Oxford, known as the *Red Book of Hergest* (*The Mabinogion from the Llyfr Coch o Hergest, etc.*, 7 parts, 1838–49, containing both text and translation; reprint with translation only, London, 1877). The word has even been adopted into modern Welsh in this sense. More accurately, however, *mabinogion* signifies not tales for children, but the body of knowledge imparted by a professional bard to his *mabinog*, or apprentice. Etymologically, it is either the plural of *mabinog*, meaning "pupils of bards" and "things concerning such pupils," or it serves as a plural for the abstract noun *mabinogi*, signifying "condition of pupilage" or "matters reserved for pupils." According to Welsh usage, each professional bard must take three of these apprentices and train them in all the essentials of the bardic art. When the *mabinog* had so mastered these essentials as to be able to conquer in three public competitions, he became a bard and could take pupils in his turn. Apparently there were certain special themes reserved for the use of such pupils, who probably had the privilege of reciting them at a price fixed by law or custom. In the *Red Book of Hergest*, which is a kind of *corpus* of later bardic material, only four of the tales are really *mabinogion*, as the manuscript itself clearly points out, calling each of them a "branch of the *mabinogi*." These tales are *Pwyll, Prince of Dyved*; *Branwen, Daughter of Llyr*; *Manawydan, Son of Llyr*; and *Math, Son of Mathonwy*. The remaining tales have no title to the name *mabinogion*, nor are they indeed even all Welsh in their origin. The manuscript was written in the latter part of the fourteenth century, when the Welsh poets had come to borrow extensively from the French, and accordingly many of the themes are of French and even indirectly of Oriental origin. This is an extremely important fact for those who have to use the so-called *Mabinogion* for the elucidation of the intricate and difficult Arthurian cycle. Besides Lady Guest's edition, we have the fine diplomatic edition of the text of the *Mabinogion*, by John Rhŷs and J. G. Evans (2 vols., Oxford, 1887–90). A more complete and reliable translation than hers is the French one of J. Loth (2 vols., Paris, 1889, being vols. iii. and iv. of the *Cours de littérature celtique* of d'Arbois de Jubainville and Loth). See also John Rhŷs, *Studies in the Arthurian Legend* (Oxford, 1891); A. Nutt, *Studies on the Legend of the Holy Grail* (London, 1888), with the review by H. Zimmer in *Göttingische gelehrte Anzeigen* (1890, p. 488); G. Paris, *Histoire littéraire de la France* (vol. xxx., 1888, with the review by H. Zimmer in *Gött. gel. Anz.*, 1890, p. 785, *seq.*). A good but not entirely complete bibliography of other works on the subject is given by H. O. Sommer in his edition of Sir Thomas Malory's *Morte d'Arthur* (vol. iii., pp. 4–5, London, 1891).

A. R. Marsh.

Mably, mȧȧ'blee', Gabriel Bonnot, de: author; a brother of Condillac; b. at Grenoble, France, Mar. 14, 1709; was educated in the college of the Jesuits at Lyons; served for some time as secretary to his relative, the minister-cardinal Teucin, but gave up this position, and lived afterward in retirement, solely occupied with literary pursuits. D. in Paris, Apr. 23, 1785. He was an enthusiastic admirer of the ancient republics of Greece and Rome, as is shown by his works, *Observations sur l'Histoire de la Grèce* (1766) and *Observations sur les Romains* (1751), but his understanding of their social and moral order was incomplete, and the conclusions he arrived at with respect to modern societies in his *Parallèle des Romains et des Français* (1740) were very erroneous and superficial. He enjoyed a great reputation, however, with his contemporaries, and he was invited by the Polish Diet to prepare a code of laws for Poland. *Du Gouvernement de Pologne* (1781) embodied the results of his study of the subject, and *Observations sur le Gouvernement et les Lois des États-Unis d'Amérique* (1784) summarized his views relative to self-government in the U. S. The singular, often ludicrous, enthusiasm for antique ideas and forms which prevailed during the Revolution was largely due to him, and later philosophers have generally agreed in tracing

the rudimentary ideas of modern communism in his *Entretiens de Phocion* (1763), *De la Législation* (1776), and *Principes de Morale* (1784).

Macabre: See DANCE OF DEATH.

Macad'am, JOHN LOUDON: inventor of the system of road-making called macadamizing; b. at Ayr, Scotland, Sept. 21, 1756; went to New York in 1770 to reside with an uncle; during the Revolution was a loyalist: made a considerable fortune as agent for the sale of vessels brought into port as prizes, but lost most of it by his forced withdrawal at the peace of 1783; returned to Ayrshire, Scotland; became a magistrate and deputy lord-lieutenant of the county, and a trustee of roads. He was engaged for much of the time during many years in traveling at his own expense through Great Britain to examine the condition of the roads, addressing in 1811 a memorial on the subject to the House of Commons, which led to the adoption of his system and to his own appointment as surveyor of roads in the Bristol district, where in 1816 he began to improve the highways. Within a few years he had personally supervised the road-making in twenty-eight counties of England. No patent was solicited for his system, which consists in the application of a layer of broken stones to the center of the road, and no remuneration asked beyond the payment of the expenses of his personal supervision; he refused knighthood, on account of his age, but accepted £2,000 voted him by Parliament. D. Nov. 26, 1836. He wrote *A Practical Essay on the Scientific Repair and Preservation of Public Roads* (1819); *Remarks on the Present State of Road-making* (1820); and *Observations on Roads* (1822).

McAdoo, WILLIAM GIBBS: See the Appendix.

McAll, ROBERT WHITAKER: founder of the McAll Mission; b. in Macclesfield, England, Dec. 17, 1821; son of a Congregational minister; took his B. A. degree at London University in 1847, and was for twenty-three years pastor of Congregational churches in England (at Manchester, Birmingham, and elsewhere). While visiting Paris after the downfall of the Commune, in Aug., 1871, he was assured by a workingman that the common people of France were ready to hear a gospel of true belief, and, with his wife, decided to undertake a mission to this people. With the approval of prominent Protestant pastors, they began their labors on Jan. 21, 1872, in a small shop in an obscure street in Belleville, the communistic quarter of Paris, and devoted their energies to the work, without compensation, until Mr. McAll's death, May 11, 1893. Mr. McAll was an accomplished musical critic, and in collaboration with his wife he gave to the French Protestant Church a hymn-book of great value. A few years after the founding of the mission the French Society for the Promotion of Education and the Society for the Encouragement of Well-doing bestowed gold medals upon Dr. McAll, and in 1892 the French Government conferred upon him the cross of the Legion of Honor. Mr. McAll was a skilled botanist, and was for years a member of the Linnean Society.

The mission now (1894) has 119 halls—39 in Paris and its suburbs and 80 in the departments, Corsica, and Algiers—and a mission-boat which plies on the inland waterways of France. The work is carried on in small halls, where fundamental religious instruction is given, highly evangelical in character and strictly undenominational, with the addition of dispensaries, soldiers' reading-rooms, and industrial schools. Volunteer workers are largely employed, the thorough yet flexible organization making this practicable to a high degree. Five-sixths of these workers are French; the rest are from Great Britain, the U. S., and other countries. Twenty-two of the mission stations are carried on in connection with some one of the five great missionary societies of France. The mission founds no churches and administers no sacraments, but sends its converts to strengthen the neighboring churches of their own choice. Except for a brief period in Corsica, the Roman Catholics have never been hostile to the movement; indeed, in several instances Roman Catholics have provided halls or contributed money toward the support of stations. The prefect of the Seine and mayors of provincial towns welcome the opening of new halls, as experience has proved that where there is a McAll station fewer police are required. The mission is managed by a board of directors—French, English, and American—sitting in Paris. The office of honorary president is now held by Louis Sautter, a banker, and the executive head is the Rev. Charles E. Greig. The expenses of the mission are met exclusively by voluntary contributions. In 1883 the American McAll Association was founded for the collection of funds. It now has about sixty auxiliaries, and sends to France about $50,000 annually.

LITERATURE.—A quarterly journal, *The McAll Mission*, is published in Paris, and *The American McAll Quarterly* in Philadelphia. Also see *The White Fields of France*, by Rev. Horatius Bonar; *Among the French Folk*, by Miss E. H. Moggridge: *The McAll Mission and its Workers*; and *The Cruise of the Mystery in McAll Mission Work*, by Mrs. L. S. Houghton. LOUISE SEYMOUR HOUGHTON.

McAlpine, WILLIAM JARVIS: engineer; b. in New York city in 1812; received his education in New York, and began engineering in 1827 under John B. Jervis, with whom he remained until 1839, having been employed upon the Delaware and Hudson Canal and Railroad, and upon the State canals and other hydraulic works planned and constructed by that engineer, and incidentally on the St. Lawrence canals, under Benjamin Wright. He succeeded Mr. Jervis as engineer of the Erie Canal enlargement, continuing until 1846, when he was called upon to construct the dry-dock at the Brooklyn Navy-yard; in 1851 was elected State engineer of New York; in 1855–57 was railroad commissioner of the State, and made a valuable report on the principles and practice of railway construction and management; for two years was acting president and engineer of the Erie Railway, and later engineer of the Galena and Chicago and of the Ohio and Mississippi railways; constructed the Albany and Chicago water-works, and planned those for Brooklyn, New Bedford, and other cities; in 1870 presented plans for the improvement of the cataracts of the Danube ("the Iron Gates"), which were adopted by the Austrian Government. In 1873–74 he was superintendent of the new State Capitol of New York at Albany. During 1869 he was the president of the American Society of Civil Engineers. In 1879–80, as engineer of the department of parks, he constructed the Riverside drive in New York and made plans for the Washington bridge at 181st Street. D. at New Brighton, Staten Island, Feb. 16, 1890.

Macao, maa'kow' (known to the Chinese as Ngao-mŭn): a Portuguese settlement and port on the south coast of China; 40 miles W. of Hongkong, and situated like it in the estuary of the Chukiang or Pearl river; area, 4½ sq. miles; lat. 22° 11′ N., lon. 113° 33′ E. (see map of China, ref. 8–I). It occupies a tongue of land which was formerly an island, but is now connected on the north with the island of Hiangshan by a narrow sand-spit, across which a barrier has been built by the Chinese. The town, which is defended by several forts, occupies an irregular table-land which connects several low hills (200 to 300 feet in height) on the extreme south with other low hills of similar height on the north and northeast. Pop. about 68,000. The settlement dates from 1557, when certain Portuguese merchants who had established themselves at Lampaco received permission from the Chinese Government to remove to *A-ma-ngao*, the port of the goddess Ama, as the place was then called. It is conveniently situated for trade, and down to the cession of Hongkong to the British in 1842, and the opening of the treaty-ports, it enjoyed a monopoly of the European trade with China. Its trade, which is now insignificant, is mostly with Hongkong and is chiefly in the hands of the Chinese and Parsees.

Macao has never been a possession of Portugal, though many attempts have been made to have it recognized as such. Until 1886 an annual ground-rent of 500 taels was paid to the Chinese Government. In 1846 the custom-house which the Portuguese had established was abolished, and three years later the Chinese custom-house was forcibly closed and the Chinese mandarin expelled. Since that date the settlement has been governed exclusively by Portuguese officials. Its chief source of revenue is a tax on the gambling-tables for which it is noted. Until 1873 it was the central dépôt for the coolie traffic.

Camoëns resided in Macao for eighteen months, and a grotto is pointed out where he is said to have composed part of the *Lusiad*. Here also is the tomb of Robert Morrison, the first Protestant missionary to China. R. LILLEY.

Macaque, ma-kăk': a common name for various Old World monkeys of the genus *Macacus*, characterized by a projecting muzzle, cheek-pouches, and large ischial callosities. In some macaques the tail is longer than the body, but in many it is very short, while in the Barbary ape, *Inuus ecaudatus*, it is entirely wanting. This species is a native of Africa, but a few are found on the Rock of Gibraltar, being

the only monkeys found wild in Europe. These apes, which probably were introduced by the Moors, were, about 1860, reduced to three, when others were brought over from Africa. In 1893 the colony numbered sixty. All other macaques are found in Asia or the adjacent islands. The most northern monkeys belong to this group, and the Tibet and Japanese macaques (*M. tibetianus* and *M. speciosus*) gambol about in the snow, the odd effect being heightened by the animals' bright red faces. About thirty species have been recognized, but some authorities place certain species under other genera, such as *Inuus*, *Cynopithecus*, and *Theropithecus*. F. A. L.

Macareo River: See the Appendix.

Macaro'ni [Ital. *maccare*, to bruise or crush], **Vermicel'li**, Ital. pron. vãr-mēe-chel'lēe [Ital., liter., little worms], **Fedelini**, and **Italian Paste**: articles of food made from very white and glutinous varieties of wheat, such as are grown in Russia, Italy, and California. The wheat is ground by a peculiar process, being first wet and then heated. The flour resulting is very coarse. It is mixed with warm water and carefully worked into a uniform paste. This paste is forced by a press through holes in an iron plate. If the holes are very small, *vermicelli* is thus formed. A still finer and smaller sort is *fedelini*. Large pipe-shaped cylinders of this paste constitute *macaroni*. When the paste is rolled thin and cut into various shapes, *Italian paste* is the result. After molding the macaroni is partially baked. Italy is the principal seat of this manufacture. France and England produce a considerable quantity, and a few firms in the U. S. produce an article equal to any of the imported kinds.

Macaron'ic Verse [for etymology of *macaronic*, cf. Fr. *macaronique* and Ital. *maccheronico*, liter., pertaining to macaroni (orig. a mixed dish), hence mixed, confused, medley. Cf. *macaroni* in sense of a medley]: a kind of humorous verse in which Latin and Latinized words are mixed with the vernacular. This kind of literature is very old, but apparently the name was first used in its present sense by Teofilo Folengo (1491–1544), called Merlino Coccajo, a Benedictine, who published in 1521 a satiric poem entitled *Maccaronea*, republished as *Opus Macaronicum* in 1651. See Delepierre, *Macaroneana* (1852); *De la Littérature Macaronique* (1856); and Morgan's *Macaronic Poetry* (New York, 1872).

McArthur, Duncan: frontiersman and soldier; b. in Dutchess co., N. Y., June 14, 1772; removed in childhood to Western Pennsylvania; was a volunteer in Harmar's and the succeeding Indian campaigns in Kentucky and Ohio from 1790 until Wayne's victory (1794), after which he settled near Chillicothe, O., as a surveyor; acquired large property in land; was chosen to the Legislature 1805, became major-general of militia 1808, colonel of Ohio volunteers May 7, 1812; was second in command at Hull's surrender; made brigadier-general in the U. S. army Mar. 12, 1813; was second in command of the Army of the West under Gen. Harrison, whom he succeeded in 1814, when he projected and partially executed a plan for the conquest of Upper Canada; was joint commissioner with Gen. Cass to treat with the Ohio Indians for the sale of their lands within the State 1816–17; served in the Legislature 1815–21, was Speaker 1818; member of Congress 1823–27, and Governor of Ohio 1830–32. D. near Chillicothe, Apr. 28, 1839.

MacArthur, Robert Stuart, D. D.: clergyman, editor, and author; b. at Dalesville, P. Q., Canada, July 31, 1841; was educated at the Canadian Literary Institute, Woodstock, Ontario, at the University of Rochester, and at Rochester Theological Seminary. In 1870 he was chosen pastor of Calvary Baptist church, New York city. Dr. MacArthur also is connected editorially with *The Christian Inquirer* and *The Baptist Quarterly Review*. In 1890 he published a volume of sermons entitled *The Calvary Pulpit*. In connection with Rev. Charles S. Robinson, D. D., he edited the *Calvary Selection of Spiritual Songs* (1878) and *Laudes Domini* (1891). With Miss Kate S. Chittenden he edited *The Calvary Hymnal* (1891). W. H. Whitsitt.

Macartney, George Macartney, First Earl of: statesman; b. at Lissanoure, near Belfast, Ireland, May 14, 1737; educated at Trinity College, Dublin, and graduated 1757; studied law at the Middle Temple, London; was appointed envoy to Russia in 1764; sat in the English Parliament, and in 1769 became chief secretary to the Viceroy of Ireland, where he took a prominent part in the debates of the Irish Parliament for the ensuing period. He wrote *A Sketch of the Political History of Ireland* (1773). He was governor of Grenada from 1775 to 1779, but in the latter year was forced to surrender the island to d'Estaing and was himself carried as prisoner of war to France. Securing his release, he was appointed political resident at Madras 1780; governor of that province June 21, 1781, and afterward, on account of his distinguished services, promoted to the office of governor-general, an honor which ill-health forced him to decline. He returned to England in 1786. A few years later he was selected as first British ambassador to China; sailed from Portsmouth with a brilliant suite Dec. 26, 1792; was received by the Emperor of China, Sept. 14, 1793, and opened negotiations at Peking for a commercial treaty, demanding the right to establish factories at Peking and three other cities, free trade between Macao and Canton, and a fortified post in the latter port. Offended at the pressure put upon him, or perhaps (according to French authorities) acceding to the advice of the Jesuit missionaries, the emperor suddenly broke off the conferences and ordered the British embassy to leave the capital within forty-eight hours. After experiencing some dangers the embassy reached Portsmouth Sept. 26, 1794. Lord Macartney was made an earl in the Irish peerage Mar., 1794; was sent as minister to Italy 1795; became a baron of the United Kingdom 1796; went as first British governor to the Cape of Good Hope 1797; returned in feeble health 1798, and lived thenceforth in retirement until his death at Chiswick, Surrey, May 31, 1806. An official account of Earl Macartney's embassy to China was published by Sir George L. Staunton, his secretary (2 vols., 1797), and was of great value in diffusing more exact information upon the history, political and natural, and the social condition of the Chinese empire. Macartney's *Journal of the Embassy* and a selection of his other writings was edited by Sir John Barrow, with a memoir (2 vols., 1807). C. K. Adams.

Macartney Pheasant: See Pheasant.

Macas'sar: town of Celebes; on the southern shore of the island; on the Strait of Macassar; in lat. 5° 7′ S. and lon. 119° 24′ E. (see map of East Indies, ref. 8–G). It is the capital not only of the government of Macassar, but of all the Dutch possessions in Celebes and of many neighboring islands. Next to Batavia it is the most important Dutch center in the East Indies. The residence of the governor is surrounded by walls and ditches, and defended by Fort Rotterdam. Its harbor is spacious and safe, and its trade, especially in tortoise-shell, edible nests, ebony, sandal-wood, rice, and spices, is large. The native inhabitants of the town and government of Macassar are Mohammedans, and are considered the most gifted and civilized tribe of the Malayan race. They carry on agriculture, commerce, and ship-building with success. Pop. of town, 15,000 to 20,000.

Macassar, Strait of: a passage of water separating Borneo from Celebes, varying in breadth from 50 to 150 miles. Its navigation is difficult on account of shoals and rocks.

Macaulay, Sir James Buchanan: jurist; b. in Niagara, Ontario, Dec. 3, 1793; was educated at Cornwall, Ontario, and joining the Ninety-eighth Regiment as an ensign fought during the war of 1812. He was admitted to the bar in 1822; was an executive councilor during the administration of Sir Peregrine Maitland; became judge of the court of queen's bench in 1829; was chief justice of the court of common pleas 1849–56, and shortly before his death, which occurred in Toronto, Nov. 26, 1859, was appointed judge of the court of error and appeal. The statutes of Upper Canada were consolidated in 1858 under his supervision and largely by his aid. He was knighted in 1859.

Neil Macdonald.

Macaulay, Thomas Babington, Baron Macaulay of Rothley: historian; b. at Rothley Temple, Leicestershire, England, Oct. 25, 1800; son of Zachary Macaulay, eminent as a philanthropist, and grandson of the Rev. John Macaulay, a Presbyterian minister at Inverary in the Scotch Highlands. The family was originally from the island of Lewis, Outer Hebrides. The mother of Lord Macaulay was Selina Mills, daughter of a bookseller at Bristol, of Quaker descent. His early education was of an austere religious type, but this influence was modified by frequent visits to the celebrated authoress, Hannah More, who took great interest in the precocious boy, of whose early traits of character and literary tastes she gave valuable notices in her *Letters to Zachary Macaulay* (published in 1860). At the age of twelve years he was placed under the tutorship of a Mr. Preston at Shelford, made surprisingly rapid progress in the classics,

and in 1818 entered Trinity College, Cambridge, where he gained the chancellor's medal in 1819 for a poem on *Pompeii*, and again in 1820 for a poem on *Evening*; took the second Craven scholarship in 1821, and bore off the palm at the Union Debating Society from many brilliant competitors, among whom were his intimate friends, W. M. Praed and Nelson Coleridge. Having a distaste for mathematics, he did not compete for honors in scholarship, but the extent and variety of his classical and literary reading while at college was probably never surpassed by any undergraduate. He took his bachelor's degree in 1822, was chosen to a fellowship the same year, and passed his time until 1826 alternately at London and Cambridge, engaged in adding to his stores of miscellaneous information. His *début* as a writer was made in the columns of *The Quarterly Magazine*, published by Charles Knight, and edited by his college friends Praed and Coleridge, to which he contributed his fine poems *Ivry* and *The Spanish Armada* and several prose articles (1824); but his brilliant essay on *Milton*, published in *The Edinburgh Review* for Aug., 1825, first revealed him to the world as an aspirant for the highest honors in the modern science of criticism. For twenty years thereafter he was a constant writer for the *Review*, chiefly upon subjects involving a wide range of historical knowledge, as well as an almost unexampled mastery of ancient and modern literature, and his essays were soon regarded as the leading feature of a periodical which counted many celebrated names among its contributors. Macaulay took his master's degree in 1825; was called to the bar at Lincoln's Inn Feb., 1826, but seems never to have practiced law, and soon devoted all his splendid energy to the service of the Whig party, to whose doctrines he adhered with a fervent conviction which quickly advanced him to a place in its councils. In 1828 he was appointed by the Whig government a commissioner of bankruptcy, and in 1830 Lord Lansdowne procured his election to Parliament from the pocket borough of Calne. His first public appearance as an orator had been made in 1826, at the annual meeting of the Anti-Slavery Society; his first speech in Parliament was in favor of the repeal of the civil disabilities of Jews (Apr. 5, 1830), and his second against slavery in the West Indies (Dec. 13). In the great debates on the Reform Bill Macaulay took a prominent part, making eight speeches on the subject, and in the election to the reformed Parliament was returned for the town of Leeds. As a parliamentary orator he took high rank for real eloquence and for the exhaustive manner in which he treated his subjects, though his delivery was too rapid and monotonous to produce upon the audience the full argumentative effect of his speeches, which was better understood when they appeared in print. In 1833 he was appointed secretary to the board of control, but in 1834 resigned that office and his seat in Parliament to accept the post of legal member of the supreme council of India. One of his letters gives an interesting account of the motives which led to the acceptance of this position. He states that it is impossible to be independent as a member of Parliament so long as one is indebted to personal favor for position. He had not an independent fortune. The position offered was accompanied with a salary of £10,000. As a bachelor he believed he could live in India on £5,000 a year, and by remaining five years accumulate a competence of £25,000. His object was attained sooner than he had anticipated, and consequently he remained at Calcutta only three years. While there he was chiefly engaged in the preparation of a new penal code, which embodied the most liberal principles. It established in many respects an equality of rights between natives and Europeans, and was therefore unpopular with the latter. This code was published in 1838, but never put in operation, though later many of its features were adopted with good results. During his residence at Calcutta he continued the main line of his historical studies, writing several of his most brilliant essays upon European topics, his only Oriental essays, those on Lord Clive and Warren Hastings, not having been written until some years afterward. Returning from India in 1838, he was elected to Parliament from Edinburgh, and was Secretary of War in the Melbourne ministry, with a seat in the cabinet (1839–41), taking, as before, a prominent part in the parliamentary debates, but finding leisure to write his *Lays of Ancient Rome* (1842). An imperfect collection of his essays having been printed in the U. S., where they attained an enormous circulation, he issued an authorized edition in 1843, and thenceforth directed his studies to the higher task of a history of his native country. He was an active member of the opposition during the five years of Tory supremacy (1841–46), and on the return of the Whigs to power (1846) received the lucrative post of paymaster of the forces, but having incurred the disfavor of his Edinburgh constituency by his course in support of the Maynooth grant, he was defeated at the election of 1847, and thus found himself at leisure to give definite form to his long-projected *History of England*. Two volumes appeared in 1848, and were immediately sold by scores of thousands, both in England and the U. S., and hailed as the great work of the age. The third and fourth volumes did not appear until 1855, when they had an equal success. In 1849 Macaulay was chosen lord rector of the University of Glasgow, and announced his retirement from political life, but was returned to Parliament in 1852 by his former constituency of Edinburgh. Owing to feeble health he took no part in debate. In 1857 he was made a peer of the realm under the title of Baron Macaulay of Rothley, and in the same year was chosen a foreign associate member of the French Academy of Moral and Politica Sciences. He died at his residence, Holly Lodge, Kensington, Dec. 28, 1859, and was buried in Westminster Abbey. As he was never married, the title expired with him. A posthumous volume of his *History* brought it down to the death of William III., but the great work was destined to remain a mere fragment of that originally projected, which was to have included the reign of George III. A collection of Lord Macaulay's *Speeches* first appeared in the U. S. in 1853, and an authorized edition followed in 1854. Biographies of Dr. Johnson, Atterbury, Bunyan, and Goldsmith, contributed to the eighth edition of the *Encyclopædia Britannica* (1857–58), were among the latest productions of Macaulay's pen. His characteristics as a historian are well known, and his interesting volumes will remain one of the English classics; but the view of English history which they present will require constant correction by the perusal of annalists of humbler name, less governed by partisan interests. The mind of this brilliant essayist was so peculiarly constituted, and so devoted to antithesis and paradox, that it is a rare occurrence to find any speculative opinion in his pages which can maintain itself intact against a searching criticism. His *Letters*, edited by his nephew, Sir George Otto Trevelyan (2 vols., 1876), are among the most delightful in the English language. In selecting an edition of Macaulay's works care should be taken not to procure a reprint of an early issue. In revising his work, the author made many changes of importance.

Revised by C. K. Adams.

Macaw': a name applied to the large parrots of the genus *Ara* or *Sittace*, forming the sub-family *Arinæ*, a group peculiar to South America. With one or two exceptions they are readily distinguished by their size, their enormous beaks, long tails and gaudy colors, in which brilliant red, blue, and yellow are conspicuous. Their voice is loud and harsh, and they do not learn to talk well. The great blue macaw (*Ara ararauna*), which is about 3 feet long, bright blue above and equally vivid yellow below, is a well-known example of the group. F. A. Lucas.

Maçayo: See Maceio.

Macbeth', or **Macbeathad MacFinlegh**: a King of Scotland in the eleventh century; immortalized as the hero of one of Shakspeare's tragedies. Little is positively known concerning him. He was the son of Finlegh, a chieftain from whom he inherited the rule of the province of Moray, and married Gruoch MacBoedhe, a granddaughter of King Kenneth MacDuff. In a war with King Duncan MacCrinan, Macbeth defeated and killed that prince at Bothgouanan, near Elgin, in 1040, after which he was proclaimed King of Scotland, probably as a vassal of Thorfinn of Norway. His reign is chronicled as a time of plenty and prosperity. He made grants to the Culdees of Loch Leven, and made a pilgrimage to Rome in 1050. In 1054 Malcolm MacDuncan (or Ceanmore), eldest son of King Duncan, invaded Scotland with a force collected by the aid of Siward, Earl of Northumberland, and near Dunsinane defeated Macbeth, who fled north of the Grampians, and resisted, until he was killed at Lumphanan, Aberdeenshire, Aug. 15, 1057, by Malcolm and MacDuff. Malcolm was crowned king at Scone in the following April. Many fabulous circumstances attributed to Macbeth were compiled from early chronicles by the Scottish historian Hector Boece or Boethius (1526), from whose pages they were taken by Holinshed, and thus became known to Shakspeare.

McBurney, Robert R.: See the Appendix.

McCabe, CHARLES CALDWELL, D. D.: clergyman; b. at Athens, O., Oct. 11, 1836; was educated at Ohio Wesleyan University; joined the Ohio conference in 1860; entered the Union army as chaplain of the 122d Ohio Volunteer Infantry in 1862; was captured in 1863, and spent four months in Libby prison; returned to the army, but was soon sent by the Christian commission to speak in its behalf in the large cities of the Northern States. In 1865 he was selected as agent of the centenary cause (1866) for the Ohio conference and afterward for the State of Ohio. From 1868 to 1884 he was assistant secretary of the board of church extension, and since 1884 he has been the corresponding secretary of the missionary society of the Methodist Episcopal Church. A. OSBORN.

McCabe, JAMES DABNEY: See the Appendix.

Mac'cabees: a family consisting of the father, Mattathias, and his five sons, Jochanan, Simon, Juda, Eleazer, and Jonathan, who were the first to make a determined stand against the attempt of Antiochus Epiphanes, the Syrian king, to destroy the Jewish nation. The name Maccabee was originally given to Juda, and is probably derived from *Makkābhā*, a hammer. (Cf. Carl Martel; but see Curtis, *The Name Machabee*, Leipzig, 1876.) Great dissatisfaction had arisen in Judæa because of the manner in which the office of high priest had been bought and sold. Antiochus fell upon Jerusalem in 169 A. D., and in order to break all opposition ordered the Jews to refrain from the observance of their religious ceremonies. The temple was given over to the service of the Olympian Jupiter; Mattathias, of priestly family, revolted in Modiim. With his five sons and a few followers he fled to the mountains. He encouraged others to join him and to obey the laws of their religion. When he died Juda (166–160) assumed command of the small army. He defeated Apollonius, then Seron at Beth Choron (165). He was successful against Ptolemäus, Nicanor, and Gorgias at Emmäus, with 6,000 men against 47,000. In 164 he again defeated the Syrians under Lysias at Beth Zur. Juda now pressed forward to Jerusalem, purified the temple, and on the 25th of Kislev, 164, celebrated for eight days the re-dedication of the temple (Feast of Chanukkah). The cause of the Jews was largely assisted by disturbances in Syria which took the leaders away from the seat of war. Juda was able to subdue some of the neighboring tribes. He sent Simon to Galilee, while he and Jonathan went to Gilead. Antiochus Eupator and Lysias made a last attempt (162), with a force of 120,000 men, to quell the rebellion. The outcome of the battle of Beth Zur would forever have silenced the Maccabean cause had not Antiochus been compelled to return to Syria to defend himself against Philip. In 161 Juda had to defend himself against Nicanor, the general of Demetrius. He even made a treaty with the Roman senate. He met his death at Adasa, fighting against great odds, under the leadership of Bacchides. Jonathan succeeded as commander, and kept up the guerrilla warfare. In 159 Baechides returned to Syria, and shortly afterward was willing to make peace. In 152 Jonathan entered Jerusalem and assumed the office of high priest. He lost his life in 142, being involved in the quarrels concerning the Syrian throne. Simon (142–135) completed the work of his brothers. He finally drove out the Syrian garrison from the citadel of Jerusalem, and renewed the treaty with the Roman senate. He turned his attention to internal affairs, and succeeded in securing the right to coin money in his own name. He was declared hereditary high priest and prince, thus founding the Harmonean dynasty. Simon was murdered by his son-in-law in Dok near Jericho.

RICHARD GOTTHEIL.

Maccabees, Books of [from Lat. *Maccabæ'i* = Gr. **Μακκαβαῖοι**, plur. of **Μακκαβαῖος**; from Heb. name, prob. deriv. of *maqqābhā(h)*, a hammer, or perhaps deriv. of *makbī*, the extinguisher]: are four in number. The first two are received as canonical by the Roman Catholic Church, and are found also in Luther's translation, as well as, at times, in Protestant Bibles. The first three are regarded as canonical by the Greek Church. None of the books are received as canonical by the Jews.

The First Book of the Maccabees is generally regarded as trustworthy, and is our authority for the history of the Jews from 175 to 135 B. C. It relates in well-chosen language the history of the perseeutions set on foot by Antiochus IV. (Epiphanes), the uprising of the Jews under Mattathias and his five sons, and their sueeessful struggle for independence. It ends with the death of Simon Maeeabee. The chronology is fixed according to the Seleucid era. It was probably written in Hebrew, by a Jew of Palestine, between the death of John Hyrcanus (B. C. 106) and the capture of Jerusalem (B. C. 63). It has come down to us in a Greek translation, which was probably known to Josephus. According to Origen, the title was **Σαρβὴθ Σαβαναιέλ**, the meaning of which is not clear. Of this we have two translations in Latin, and two in Syriac, one contained in the Polyglots and the other in the Ambrosian MS. of the Peshitta. (See Grimm, *Das Erste Buch der Maccabäer erklärt* (Leipzig, 1853); Bissell, *The Apocrypha of the Old Testament* (New York, 1880); Reuss, *Gesch. des Alten Testaments* (1881, § 501); Schürer, *Gesch. der Juden zur Zeitalter Christi* (ii., pp. 579, *sq.*); *Apocrypha* (ed. Wace, ii., pp. 373, *sq.*).) *The Second Book of the Maccabees* is of a little later date, and is evidently an epitome (2 Macc. ii., 26, 28) of an historical work in five books written by Jason of Cyrene. Beginning with the year 175 B. C., it gives the history of the Maccabean uprising, and carries the story down to Juda's victory over the Syrian general Nicanor (160 B. C.). Though it runs parallel to the account contained in the first book, it supplies us with numerous details which bear evidence of being founded on facts. It was, however, written with a more religious or didactic design. At the beginning are added (i.–ii. 18) two letters, in which the Jews in Egypt are invited to join their brethren in Palestine in the celebration of the Feast of Dedication. (See Grätz, *Das Sendschreiben der Palästinenser an die ägypt.-jud. gemeinden, Monatsschrift für Geschichte*). This epitome was known to Philo, but the exact date of its author can not be determined. It was originally written in Greek. There are two ancient Latin translations and two in Syriac (see above). (See Grimm (1857); Bissell (1880); Reuss (1881, § 583); Schürer (ii., pp. 739, *sq.*); *Apocrypha* (ed. Wace, ii., pp. 539, *sq.*).) *The Third Book of the Maccabees* (so called) was probably written in Greek by a Jew of Alexandria. It has nothing to do with the Maccabees, but gives a marvelous and distorted account of the sufferings and deliverance of the faithful Jews of Alexandria during the reign of Ptolemy IV. (Philopator), 217 B. C. The historical basis may be found in a similar event which took place in the reign of Ptolemy VII. (Physkon), and which is mentioned by Josephus (*Contra Apion*, ii., 5). Schürer places the date of its compilation between 100 B. C. and 100 A. D. It seems to have been received into the Syrian Church, as it is found in their MSS. of the Old Testament. (See Grimm; Bissell; Reuss, § 574; Schürer, ii., pp. 743, *sq.*) *The Fourth Book of the Maccabees* is an ethical treatise written probably during the first century A. D. by an Alexandrian Jew. It is cited under the title **περὶ αὐτοκράτος λογισμοῦ**, and has for its theme the Stoical idea **αὐτοδέσποινός ἐστι τῶν παθῶν ὁ εὐσεβὴς λογισμός** (i., 1). The author dwells upon this theme, taking his illustrations from the feats performed by the Maccabean brothers. He is a strict Jew, with a leaning toward Phariseeism. Eusebius and others say that Josephus was the author, and the work is found in most of the MSS. and printed editions of that historian; but there are weighty internal reasons for doubting this. Scholars agree in placing its composition during the first century A. D. See especially Freudenthal, *Die Flavius Josephus beigelegte Schrift ueber die Herrschaft der Vernunft* (Breslau, 1869); also Grimm (as above); Reuss, § 570; Selürer, ii., pp. 766, *sq.*

Reference is made occasionally to a *Fifth Book of the Maccabees*, a title invented by Cotton. It is sometimes called *Second Book of the Maccabees*. It is a compilation treating of the history of the Jews from the time of Heliodorus to that of Herod (184 B. C.–6 B. C.). It thus runs parallel with the First and Second Books of the Maccabees and Josephus, *Antiq.* (xiii.–xvi.). It is evidently based upon earlier works, and its historical value is not great. It exists only in an Arabic translation, which is incorporated in the Paris and London Polyglots, together with a Latin rendering. Grätz identifies it with an Arabic chronicle written about the year 900 A. D., and which he thinks formed the basis of the Hebrew *Josippon* by Joseph ben Gorion. A French translation has been made by de Saey and others. (See Cotton, *The Five Books of the Maccabees* (London, 1832); Grätz, *Geschichte der Juden* (v., p. 281); Davidson, *Introduction to the Old Testament* (iii., p. 466); McClintock and Strong's *Biblical Cyclopædia*, v., p. 614.) In the Ambrosian Peshitta there is also a *Fifth Book of the Maccabees*, but that is a Syriac translation of the sixth book of Josephus's *Wars*. See *Hebraica* (1887, p. 137); *Studia Biblica* (iii., p. 229). RICHARD GOTTHEIL.

Maccalub'ba [Arabic]: a mud-volcano 6 miles N. of Girgenti, Sicily; rises 138 feet above the plain and 804 feet above the sea; has numerous small craters, and occasionally casts up stones and mud. Gas is continually pouring out, and there are signs of petroleum.

McCall, George Archibald: See the Appendix.

McCallum, Daniel Craig: See the Appendix.

McCarthy, Justin: political leader and author; b. in Cork, Ireland, Nov. 22, 1830; received a liberal education; became connected with a Liverpool newspaper 1853; parliamentary reporter for the London *Star* 1860; was its chief editor 1864–68; spent three years (1868–70) traveling and lecturing in the U. S., where he became connected editorially with the New York *Independent*, and wrote much for the leading magazines, as he had previously done in England. Returning to London, he became a radical writer, novelist, and historian; was elected to Parliament in 1880, and became a leader of the Irish Home-rule party. He was re-elected to Parliament in 1886, and became vice-president of the Irish National League of Great Britain. Upon the breach in the Home-rule party he became the official leader of the anti-Parnell group, but resigned his leadership in Feb., 1896. He revisited the U. S. in 1886. Among his works are *Con Amore*, essays (1866); *Critical Notice of George Sand* (1870); *Prohibitory Legislation in the United States* (1872); *Modern Leaders* (1872); *History of Ireland from the Union to the Introduction of Mr. Gladstone's Bill*; *A History of our own Times* (4 vols., 1879–80); *The Epoch of Reform* (1882); *History of the Four Georges* (4 vols., 1889, *et seq.*); *Ireland's Cause in England's Parliament* (1888); *Reminiscences* (1899); besides several novels, including *Lady Judith* (1871); *Dear Lady Disdain* (1875); *Maid of Athens* (1883); and with Mrs. Campbell-Praed, he is the author of *The Right Honourable* (1886), and other novels.

McCheyne, mac-chān', Robert Murray: preacher and hymn-writer; b. in Edinburgh, Scotland, May 21, 1813; studied at the University of Edinburgh, and prepared for the Presbyterian ministry under Dr. Chalmers; was licensed in 1835; preached for some years at St. Peter's, Dundee, until his health failed, when he undertook, with three other ministers, a "mission of inquiry" to the Jews in Palestine, and on his return was engaged as an evangelist in the north of England until his death, Mar. 25, 1843. He had fine literary tastes, and was learned in the sacred languages. See his *Life and Remains*, by Rev. A. A. Bonar (New York, 1844 and 1857), and his complete works (2 vols., New York, 1847).

Macchiavelli: See Machiavelli.

McClellan, Ely: See the Appendix.

McClellan, George Brinton: soldier and scientist; b. in Philadelphia, Dec. 3, 1826; son of Dr. George McClellan; passed two years at the University of Pennsylvania; graduated from West Point 1846, and commissioned brevet second lieutenant of engineers; served in the Mexican war at the siege of Vera Cruz and in the battles of Cerro Gordo, Contreras, Churubusco, Molino del Rey, and Chapultepec, and capture of city of Mexico, winning the brevets of first lieutenant and captain for gallantry. At the close of the war he returned to West Point, where he remained until 1851, when he was assigned to duty in the construction of Fort Delaware; subsequently, in his engineering capacity, accompanied the expeditions to explore the sources of the Red river and the Northern Pacific Railway; promoted first lieutenant of engineers 1853, and captain of cavalry in 1855; in the latter year he went to Europe as a member of a military commission to visit the seat of war, and upon his return prepared an official report upon the *Organization of European Armies and Operations in the Crimea*, which was published by order of the Government. In 1857 he resigned from the army, and was chief engineer and vice-president of the Illinois Central Railway 1857–60, being chosen president of the St. Louis and Cincinnati Railway in the latter year. On the outbreak of the civil war in 1861 his services were enlisted by the Governor of Ohio in organizing the volunteers called for by the first proclamation, and he was placed in command of the department of the Ohio, and commissioned major-general of Ohio volunteers Apr. 23, 1861. On May 14 following the President appointed him a major-general in the U. S. army, and directed him to disperse the Confederate force occupying and threatening to overrun West Virginia. By a well-executed movement he met and defeated the enemy, and on July 14 reported his task accomplished and West Virginia clear. The thanks of Congress were tendered him for these services, and after the battle of Bull Run he was called to Washington and (July 25) placed in command of a division comprising the departments of Washington and of Northeastern Virginia; three weeks later he was assigned to command the department of the Potomac, and Aug. 20 the Army of the Potomac. Upon the retirement of Lieut.-Gen. Scott the command of the army of the U. S. fell upon him, which he retained until Mar. 11, 1862, when he was relieved of command of all military departments except that of the Potomac. On Mar. 6 he had made an advance upon Manassas, only to find the enemy gone, and returning, embarked his army for Fortress Monroe; the siege of Yorktown lasted until May 5, when followed the disastrous campaign known as the Peninsular campaign, resulting in the retreat of the army to the James, June 26 to July 2, 1862, and its final withdrawal the following month to the relief of Gen. Pope in Northeastern Virginia, leaving McClellan for a short time without any distinct command. After the defeat of Pope (Aug. 29–30), McClellan was (Sept. 2) placed in command of the capital and the troops for its defense, which were reorganized by him, and followed Lee into Maryland, the battles of South Mountain and Antietam ensuing Sept. 14–17. On Nov. 7 he was relieved of his command at Warrenton, and Gen. Burnside ordered to succeed him. Proceeding to New Jersey, he took no further part in the war. On Aug. 31, 1864, he was nominated by the Democrats for the presidency. The election occurred on Nov. 8, when Lincoln was almost unanimously re-elected by the States participating, McClellan receiving only the votes of New Jersey, Kentucky, and Delaware. On the day of election he resigned his commission as major-general, and in the spring of 1865 sailed for Europe, where he made an extended stay. Returning in 1868, he superintended the construction of the Stevens floating battery, and from 1870 to 1872 was chief engineer of the department of docks of New York city. Author of various military reports, text-books, and manuals; Governor of New Jersey 1878–81. D. Oct. 29, 1885. *McClellan's Own Story* (of the war for the Union) was published in 1887. Revised by James Mercur.

McClenachan, Charles T.: See the Appendix.

McClernand, John A.: See the Appendix.

Mac'clesfield: town; in Cheshire, England; on the Bollin; 15 miles S. S. E. of Manchester (see map of England, ref. 7–G). Its silk fabrics are of the finest quality, and more than 8,000 operatives are employed in this branch of industry; its cotton-manufactures are also considerable. It has a grammar school, a modern free school, a school of science and art, a technical school, a public library, an infirmary, and a public park. Its vicinity is rich in coal. Pop. (1891) 36,009. Macclesfield received its first charter in 1261. It did not attain its importance as a manufacturing town until the beginning of the nineteenth century.

McClintock, Sir Francis Leopold, D. C. L., LL. D., F. R. S.: explorer; b. at Dundalk, Ireland, in 1819; entered the navy at the age of twelve; accompanied Sir James Ross in his Arctic expedition of 1848; was engaged in Capt. Austin's expedition of 1850 in search of Sir John Franklin, with the rank of lieutenant, and made a sleigh-journey of 760 miles along the north shore of Perry Sound; was made commander the following year, and sent on the expedition of five vessels under Sir Edward Belcher; rescued Capt. McClure from a three years' imprisonment in the ice near Melville island, but subsequently had to abandon his own ship and three others; returned to England Sept., 1854, and in 1857 took command of the expedition dispatched by Lady Franklin to ascertain the fate of her husband, for which he received many deserved honors. He was knighted in 1860, was employed in 1861 in surveying a route for a North Atlantic telegraph, became a rear-admiral Oct., 1871, and a vice-admiral in 1877. He was commander-in-chief in West India waters 1879–82; became full admiral 1884; received an admiral's pension 1887. He published *The Voyage of the Fox in the Arctic Seas to Discover the Fate of Sir John Franklin and his Companions* (1860).

McClintock, John, D. D., LL. D.: educator; b. in Philadelphia, Oct. 27, 1814; graduated at the University of Pennsylvania 1835, and began preaching as an itinerant in the New Jersey conference of the Methodist Episcopal Church; was Professor of Mathematics in Dickinson College at Carlisle, Pa., 1836–39, Professor of Ancient Languages 1839–51; aided in translating Neander's *Life of Christ* (1847); prepared (in connection with Prof. G. R. Crooks) several ele-

mentary classical text-books upon the system of "imitation and repetition"; was editor of *The Methodist Quarterly Review* 1848–56; was sent to Europe with Bishop Simpson in 1856 as delegate to the Wesleyan Methodist conference of England, and to the Evangelical Alliance at its Berlin meeting; was pastor of St. Paul's M. E. church, New York, 1857–60; became pastor of the American chapel in Paris, France, in 1860; and while the civil war in the U. S. was in progress used both pen and voice to give the French an intelligent idea of the causes of the contest. Returning to the U. S. in 1864, he was again for a few months pastor of St. Paul's, New York, resigning the position on account of broken health; became in 1866 chairman of the Central Centenary committee of the Methodist Episcopal Church, which organized the celebration of the completion of the first century of American Methodism; was chosen first president of Drew Theological Seminary, and superintended its opening at Madison, N. J., in 1867. D. at Madison, N. J., Mar. 4, 1870. In the management of *The Quarterly Review*, in his *Analysis of Watson's Theological Institutes* (1850), his essay on *The Temporal Power of the Pope* (1851), his *Sketches of Eminent Methodist Ministers* (1863), and his translation of Bungener's *History of the Council of Trent* (1855), he gave proof of versatile scholarship. The great work of his life, projected as early as 1853, was the *Cyclopædia of Biblical, Theological, and Ecclesiastical Literature* (10 vols., 1867–82), which he edited with the co-operation of Dr. James Strong. A volume of his sermons, *Living Words*, was published in 1870, and a course of *Lectures on Theological Encyclopædia and Methodology* in 1873. See his *Life and Letters*, edited by Rev. George R. Crooks (New York, 1876). Revised by A. OSBORN.

McClos'key, JOHN, D. D.: cardinal; b. in Brooklyn, N. Y., Mar. 20, 1810; received his early classical training in New York; graduated at Mt. St. Mary's College, Emmittsburg, Md.; studied theology in the Roman Catholic seminary connected with the same institution; was ordained a priest in St. Patrick's Cathedral, New York, Jan. 9, 1834; spent two years attending lectures at Rome, and another year in France; became on his return assistant pastor, and soon afterward pastor, of St. Joseph's church, New York; was appointed by Bishop Hughes in 1841 first president of St. John's College, Fordham, N. Y.; returned the following year to his pastoral charge; was appointed coadjutor to Bishop Hughes Nov. 23, 1843; consecrated under the title of Bishop of Axiere *in partibus infidelium* Mar. 10, 1844, and on the division of the diocese of New York was installed in Sept., 1847, as first Bishop of Albany. He administered that diocese seventeen years with signal ability, erected a splendid cathedral, founded at Troy a well-equipped theological seminary, built a large number of churches, founded many charitable and religious institutions, and introduced numerous monastic orders and lay communities. On the death of Archbishop Hughes he was appointed his successor, May 6, 1864, and took possession Aug. 21, after which time he repeated upon a larger scale the activity shown at Albany. For the completion of the magnificent cathedral on Fifth Avenue he was very active, and visited Rome in 1874 to procure materials for it. Raised to the princely dignity of cardinal-priest Mar. 15, 1875, he received the biretta in May, after which he visited Rome to obtain the investiture. D. in New York city, Oct. 10, 1885. J. J. KEANE.

McClure, Sir ROBERT JOHN LE MESURIER, C. B.: Arctic discoverer; b. at Wexford, Ireland, Jan. 28, 1807; was educated at Winchester and Sandhurst; entered the navy as a midshipman; joined the Arctic expedition under Capt. Back (1836) as a volunteer; was appointed lieutenant on his return, and served on the Great Lakes during the Canadian rebellion 1838–39; took part in Sir John Ross's Arctic expedition (1848), and took command in 1850 of another exploring expedition, which discovered the Northwest passage. For this service he was knighted, received a captaincy and a reward of £5,000. From his journals Capt. Sherard Osborne published in 1856 *The Discovery of the Northwest Passage*. He afterward served in the China squadron, became rear-admiral 1867, and vice-admiral on the retired list 1873. D. in London, Oct. 17, 1873.

McClymont, JAMES ALEXANDER, M. A., B. D.: minister of the Church of Scotland; b. in Girvan, Ayrshire, May 26, 1848; educated in the Universities of Edinburgh and Tübingen; pastor of Holburn parish, Aberdeen, from 1874; translator, with Dr. Nicol, of Dr. J. T. Beck's *Pastoral Theology of the New Testament*; editor, with Prof. Charteris, of *The Guild and Bible Class Textbooks*; author of *The New Testament and its Writers* in that series (Edinburgh and New York, 1892); editor of *The Church of Scotland: What she has done for the People of Scotland, and what she expects in Return* (1893). C. K. HOYT.

MacColl, MALCOLM: clergyman and author; b. at Glenfinan, Inverness-shire, Scotland, Mar. 27, 1838; was educated in Edinburgh and appointed assistant curate of St. Paul's, Knightsbridge, 1861, chaplain to the British ambassador in St. Petersburg 1862, curate of St. Paul's 1864, and rector of St. George's, in the city of London, 1871. He published *Mr. Gladstone and Oxford* (2d ed. 1865); *Science and Prayer* (4th ed. 1866); *The Reformation in England* (2d ed. 1869); *The Ober-Ammergau Passion Play* (6th ed. 1870); *Who is Responsible for the War?* (Franco-Prussian) (1871); *Lawlessness, Sacerdotalism, and Ritualism* (1875); *The Eastern Question: its Facts and its Fallacies* (1877); *Three Years of the Eastern Question* (1878); *Christianity in Relation to Science and Morals* (3d ed. 1890), comprising lectures on the Nicene Creed delivered as canon residentiary of Ripon Cathedral, besides numerous contributions to periodical literature. Canon McColl was present at the Old Catholic conference at Bonn, 1875, representing Mr. Gladstone at this meeting of representative theologians of the Eastern and Western Churches. Revised by W. S. PERRY.

McComb: village; Hancock co., O. (for location of county, see map of Ohio, ref. 2–D); on the Cin., Ham. and Day., and the N. Y., Chi. and St. L. railways; 10 miles N. W. of Findlay, the county-seat. It is in a natural-gas belt; contains a private bank and a weekly newspaper; and has saw and grist mills, sash and blind factories, and grain elevators. Pop. (1880) 417; (1890) 1,030; (1900) 1,195.

McComb City: town; Pike co., Miss. (for location of county, see map of Mississippi, ref. 9–F); on the Illinois Cent. Railroad; 7 miles N. of Magnolia, the county-seat, 105 miles N. of New Orleans, La. It is in a cotton and corn growing region, and has a State bank with capital of $25,000, and a weekly newspaper. Pop. (1880) 1,982; (1890) 2,383; (1900) 4,477.

McConnelsville: village; capital of Morgan co., O. (for location of county, see map of Ohio, ref. 6–H); on the Muskingum river, and the Zanesville and Ohio River Railway; 27 miles S. of Zanesville. It is in an agricultural region; has natural gas; and contains 6 churches, an opera-house that cost $40,000, manufactories of flour, tobacco, and agricultural implements, many choice residences, and 2 weekly newspapers. Pop. (1880) 1,473; (1890) 1,771; (1900) 1,825. EDITOR OF "HERALD."

McCook: city; Red Willow co., Neb. (for location of county, see map of Nebraska, ref. 11–D); on the Republican river, and the Chi., Burl. and Quincy Railroad; 10 miles W. of Indianola. It is in a farming and stock-raising region, and contains the division headquarters and repair-shops of the railway company, and three weekly newspapers. Pop. (1880) not in census; (1890) 2,346; (1900) 2,445.

McCook, ALEXANDER MCDOWELL: soldier; b. in Columbiana co., O., Apr. 22, 1831; graduated at West Point, and entered the army as brevet second lieutenant of infantry in 1852; after a brief term of service in garrison, he was actively engaged against hostile Indians until 1857, when after a year's leave of absence he was assigned as instructor of infantry tactics at West Point. On the outbreak of the civil war he was appointed colonel of the First Ohio Volunteers, which regiment he commanded at the first battle of Bull Run. Reorganizing his regiment on the expiration of its term of service, he was recommissioned colonel in August; was appointed brigadier-general of volunteers in Sept., 1861, and assigned to the command of a brigade in the department of the Cumberland; commanded a division at the battle of Shiloh and siege of Corinth, and First Army-corps at the battle of Perryville; Twentieth Army-corps at Stone river and Chickamauga, and the troops for the defense of the capital at the time of Early's attack on it, July, 1864. Received the various brevets from major to major-general. Resigned his commission as major-general Oct., 1865, and in Mar., 1867, was promoted to be lieutenant-colonel of infantry; colonel in 1880; brigadier-general July 10, 1890, and major-general Nov. 9, 1894. Retired Apr. 22, 1895.

McCook, HENRY CHRISTOPHER, D. D.: Presbyterian minister and a naturalist; b. in New Lisbon, O., July 3, 1837; graduated at Jefferson College, Pennsylvania, 1859; Western Theological Seminary, Allegheny, Pa., 1859–61; lieu-

tenant, and afterward chaplain, in Forty-first Regiment Illinois Volunteers 1861–62; minister in Clinton, Ill., 1861, and 1862–63; home missionary in St. Louis, Mo., 1863–70; pastor of Tabernacle Presbyterian church, Philadelphia, from 1870. He has been active in the work of the American Entomological Society and in the Philadelphia Academy of Natural Sciences, publishing many papers in the *Proceedings* of the latter. He has also published *Object and Outline Teaching* (St. Louis, 1871); *The Last Year of Christ's Ministry* (Philadelphia, 1871); *The Last Days of Jesus* (1872); *The Tercentenary Book* (edited 1873); *The Mound-making Ants of the Alleghenies* (1877); *The Natural History of the Agricultural Ant of Texas* (1880); *Historical Decorations, Presbyterian Council, Philadelphia* (Philadelphia, 1880); *Garfield Memorial Sermons* (1881); *Honey Ants and Occident Ants* (1882); *Tenants of an Old Farm* (New York, 1884); *The Women Friends of Jesus* (1885); *American Spiders and their Spinning Work* (Philadelphia, vol. i., 1889; vol. ii., 1890). WILLIS J. BEECHER.

MacCormac, HENRY, M. D.: physician; b. in Belfast, Ireland, in 1800; studied medicine in the Universities of Dublin, Paris, and Edinburgh, graduating M. D. at the University of Edinburgh in 1824; licentiate of Royal College of Surgeons, Edinburgh, 1824; traveled in Africa and North America, returning to Belfast to practice his profession; was visiting physician to several local hospitals; in 1866 gave up the active duties of his profession for literature. Among his more important writings are *A Treatise on the Cause and Cure of Hesitation of Speech, or Stammering* (London, 1828); *Observations on Spasmodic Cholera* (London, 1832); *An Exposition of the Nature, Treatment, and Prevention of Continued Fever* (London, 1835); *Methodus medendi, or the Description and Treatment of the Principal Diseases Incident to the Human Frame* (London, 1842); *Metanoia: a Plea for the Insane* (London, 1861); *The Painless Extinction of Life in Animals Designed for Human Food* (London, 1864); *Translation of Antoninus Epictetus.* D. at Belfast, May 26, 1886. S. T. ARMSTRONG.

McCosh, JAMES, D. D., LL. D., Lit. D.: philosopher; b. at Carskeoch, Ayrshire, Scotland, Apr. 1, 1811; educated at the Universities of Glasgow 1824–29 and Edinburgh 1829–34; wrote, while a student in the latter, an essay on the Stoic philosophy, which obtained for him, on motion of Sir William Hamilton, the honorary degree of M. A.; was ordained a minister of the Church of Scotland at Arbroath in 1835; removed to Brechin in 1839; was actively concerned in the disruption of the Scottish Church and in the organization of the Free Church 1843: appointed Professor of Logic and Metaphysics in Queen's College, Belfast, 1851; elected president of the College of New Jersey at Princeton 1868, which post he filled with great ability and success. His resignation of the presidency was accepted in 1888, and he became president emeritus, retaining his professorship of Philosophy until 1890. D. at Princeton, N. J., Nov. 16, 1894. His principal works are *The Methods of the Divine Government, Physical and Moral* (1850), which laid the basis of a wide reputation both in Great Britain and America; (in connection with Prof. G. Dickie) *Typical Forms and Special Ends in Creation* (1856); *Intuitions of the Mind inductively Investigated, being a Defense of Fundamental Truth* (1860); *The Supernatural in Relation to the Natural* (1862); *An Examination of Mill's Philosophy* (1866); *Logic* (1869); *Christianity and Positivism* (1871); *The Scottish Philosophy, Biographical, Expository, and Critical, from Hutcheson to Hamilton* (1874); *The Development Hypothesis* (1876); *The Emotions* (1880); *Psychology* (2 vols., 1886); *Realistic Philosophy Defended in a Philosophic Series* (2 vols., 1887); *The Religious Aspect of Evolution* (1888); *The Prevailing Types of Philosophy: Can They Logically Reach Reality?* (1890); *The Tests of Various Kinds of Truth* (1891); *Our Moral Nature* (1893); *Philosophy of Reality* (1894). Dr. McCosh, both by his writings and by his personal work as president, teacher, and preacher, has had great influence on American philosophy, theology, and education. His philosophy is a development of the Scottish realism, but he goes further than Reid in asserting the direct cognition of realities of all kinds. He very early accepted the doctrine of biological evolution, and interested himself in the newer problems of psychology and education. The present important rank held by Princeton University was largely reached during his administration. Revised by J. MARK BALDWIN.

MacCracken, HENRY MITCHELL, D. D., LL. D.: educator and author; b. at Oxford, O., Sept. 28, 1840; was educated at Miami University, the United Presbyterian Theological Seminary, Xenia, O., Princeton Theological Seminary, and Tübingen and Berlin Universities. He was teacher of the classics and school superintendent 1857–61; pastor of Westminster church, Columbus, O., 1863–68; of the First Presbyterian church, Toledo, 1868–80; chancellor of the Western University, Pittsburg, Pa., 1880–84; vice-chancellor and Professor of Philosophy in the University of the City of New York 1884–91, and chancellor since 1891. In 1867 he was deputy to the General Assembly of the Free Church of Scotland and to the Irish Presbyterian General Assembly; on July 4, 1884, was the orator at the reunion of the Scotch-Irish at Belfast, Ireland. Besides many other pamphlets, he has published *Tercentenary of Presbyterianism, Kant and Lotze*, and *A Metropolitan University*, and is editor and author of *Leaders of the Church Universal* (3 vols., 1879). C. K. HOYT.

McCrary, GEORGE W.: See the Appendix.

McCrie, THOMAS, D. D.: historian and divine; b. at Dunse, Scotland, in Nov., 1772; became pastor of a church in Edinburgh 1795; took a prominent part in the agitations within the Scottish Church. In 1804, he, with three others, formed the Constitutional Associate Presbytery, commonly known as the Old Light Antiburgher body. (See PRESBYTERIAN CHURCH.) He was the author of an esteemed *Life of John Knox* (1811), and of *The Life of Andrew Melville* (1819), important for the history of the Reformation in Scotland. He also wrote a *History of the Progress and Suppression of the Reformation in Italy* (1827) and a *History of the Reformation in Spain* (1829); lives of several Reformers in *The Christian Magazine* (1802–06); vigorously criticised Sir Walter Scott for his treatment of the Covenanters in *Old Mortality*; published several controversial and political tracts and discourses, and left unfinished a *Life of Calvin.* D. in Edinburgh, Aug. 5, 1835. A posthumous volume of *Sermons* appeared in 1836, his *Miscellaneous Writings* in 1841, and his *Works* in 4 vols. in 1855–57. See *Life of Thomas McCrie* by his son, Thomas McCrie, Jr. (Edinburgh, 1841; 2d ed. 1843); Allibone's *Dictionary of Authors*; *Lord Cockburn's Journal* (vol. i., p. 100); Blackie's *Preachers of Scotland*, vol. ii., p. 269); Hugh Miller's *The Headship of Christ* (p. 77) and *My Schools and Schoolmasters* (ch. xvi.). C. K. HOYT.

McCrie, THOMAS, Jr., D. D., LL. D.: son of Thomas McCrie; Professor of Systematic Theology in the English Presbyterian College in London; b. in Edinburgh in 1798, d. in 1875; wrote *Life of Thomas McCrie* (1841); *Sketches of Scottish Church History* (1841); edited *The Provincial Letters of Blaise Pascal, a New Translation* (1846).

McCulloch, BEN: See the Appendix.

McCulloch, HUGH: financier; b. at Kennebunk, Me., Dec. 7, 1808; was educated at Bowdoin College; removed to Indiana in 1833; was president of the State Bank of Indiana from May, 1855, till May, 1863, when, at the instance of the Secretary of the U. S. Treasury, Mr. Chase, he was called to the newly created office of Comptroller of the Currency; he succeeded Mr. Fessenden as Secretary of the U. S. Treasury until Mar., 1869, when he returned to Indiana. His reports as Secretary of the Treasury are held in high esteem by financiers. He engaged in the banking business in London in 1870; was again Secretary of the Treasury 1884–85. He published *Men and Measures of Half a Century* (1888). D. May 24, 1895.

McCulloch, JOHN RAMSAY: economist; b. at Whithorn, Scotland, Mar. 1, 1789; became editor of *The Scotsman*, an organ of Liberal political opinions at Edinburgh, and one of the editors of *The Edinburgh Review*; wrote the article on political economy in the supplement to the *Encyclopædia Britannica* (1824), in which he anticipated the opinions of the Manchester school of advocates of free trade; republished this article in 1825, with additions and modifications, under the title *Principles of Political Economy: with a Sketch of the Rise and Progress of the Science*; and was professor of that science in the University of London 1828–32. During this time he expounded the wage-fund theory (1826), which, after constituting for years the accepted doctrine on the subject, was completely overthrown by the opponents of the *laissez-faire* system. He edited Adam Smith's *Wealth of Nations* (1828); published *A Dictionary, Practical, Theoretical, and Historical, of Commerce and Commercial Navigation* (1832); *A Statistical Account of the British Empire* (1837); *A Dictionary, Geographical, Statistical, and Historical, of the Various Countries, Places, and Principal Natural Objects in the World*

(1841; revised ed. 1866–67); *The Literature of Political Economy* (1845); and numerous other valuable treatises on economical topics. His great *Dictionaries* were long standard authorities upon their respective subjects. Prof. McCulloch received in 1843 the high honor of an election as one of the eight foreign associates of the French Institute of Moral and Political Sciences. He was appointed in 1838 comptroller of the royal stationery office, and received a pension of £200 for eminent services to literature. D. at Westminster, Nov. 11, 1864. Revised by F. M. Colby.

McCullough, John Edward: actor; b. in Coleraine, Ireland, Nov. 2, 1837; removed to the U. S. with his parents in 1853, and was apprenticed to a chairmaker. In 1855 he made his first appearance in a minor character in *The Belle's Stratagem* at the Arch Street theater in Philadelphia, and adopted the stage as a regular profession. From 1866 he traveled with Edwin Forrest, filling the second part in the plays. In 1869, in connection with Lawrence Barrett, he managed the Bush Street theater in San Francisco. Forrest, when he died in 1872, left his manuscript plays to McCullough, looking upon him as his legitimate successor. From 1873 until 1883 he played throughout the U. S. the parts of Brutus, in John Howard Payne's tragedy by that name, Jack Cade, the Gladiator, Virginius, Damon and Pythias, Othello, Coriolanus, and King Lear. While playing the Gladiator in Chicago he broke down. He appeared in England in 1881, but his acting was not admired. D. in Philadelphia, Nov. 8, 1885. Although a powerful actor, he was in every way inferior to his model, Forrest, especially in his lack of originality and literary culture.

MacCunn, Hamish: See the Appendix.

McCurdy, James Frederick, Ph. D.: philologist and professor of languages; b. in Chatham, New Brunswick, Feb. 18, 1847; was educated at the University of New Brunswick and Princeton Theological Seminary, where he was instructor in the Semitic languages 1873–82; studied in Göttingen and Leipzig 1882–84; was Stone lecturer at Princeton 1885–86; and since 1886 has been Professor of Oriental Languages in the University of Toronto. He has contributed many articles, linguistic, archæological, and exegetical, to journals and to the transactions of philological societies. For the American edition of Lange's commentaries he wrote the *Commentary on Haggai* (1876), and translated and supplemented from the German edition *Books III.–V. of the Psalms* (1872) and *Hosea* (1876). He has published *Aryo-Semitic Speech* (Andover and London, 1881), and *The Assyrian and Babylonian Inscriptions, with Special Reference to the Old Testament* (New York, 1886).
C. K. Hoyt.

Macdonald, Andrew Archibald: statesman; b. in Three Rivers, Prince Edward Island, Feb. 14, 1829; was educated at a grammar school and privately. He sat in the provincial House of Assembly 1854–60; in provincial legislative council 1863–73; was postmaster-general 1873–84, lieutenant-governor 1884–89, and was called to the Dominion Senate in 1891. He was a delegate to the Charlottetown and Quebec union conferences 1864; to the International convention at Portland, U. S., 1868; and is a public trustee under the Land Purchase Act of 1875. Neil Macdonald.

MacDonald, Arthur: See the Appendix.

Macdonald, Etienne Jacques Joseph Alexandre, Duc de Tarente: soldier; b. at Sancerre, in the department of Cher, France, Nov. 17, 1765; descended from a Scottish family which went to France with the Stuarts; entered the army in 1784; fought at Jemappes in 1792, after which he rose rapidly in rank and became general of division in 1795. Having been appointed governor of Rome and the Papal States in 1798, he commanded the principal corps in the successful battle at Otricoli, and was afterward made general-in-chief of the army of Naples. After considerable success against the Neapolitans he was beaten by Suwarow on the banks of the Trebbia June 17, 1799; was wounded; returned to Paris, and took the side of Napoleon in the revolution of 18 brumaire, but afterward lost the confidence of the emperor on account of his stanch defense of Gen. Moreau. In 1809, however, Napoleon again gave him a command, and he distinguished himself so much in the battle of Wagram that he was created Duke of Tarente and made a marshal of France. In the campaigns of 1812–14 he rendered distinguished services, but was defeated by Blücher at Katzbach Aug. 26, 1813, and adhered firmly and honestly to Napoleon till his abdication. Having taken service with the Bourbons, he refused to accept any office during the Hundred Days, and lived, much honored, though in retirement, during the second Restoration. D. at Courcelles, near Guise, Sept. 24, 1840. Revised by F. M. Colby.

Macdonald, Flora: heroine; b. at Milton, in the island of South Uist, one of the Hebrides, in 1720; became celebrated in 1746 as the heroine of some of the remarkable adventures of Prince Charles Edward, the Young Pretender, whom she assisted in escaping pursuit from South Uist to Skye. She was imprisoned on board vessels of war and in London for several months; released in 1747; married Allan Macdonald in 1750, and settled in Fayetteville, N. C., in 1775. During the Revolutionary war her husband served as an officer in the British army, and Flora returned to the island of Skye, where she died Mar. 4, 1790.

MacDonald, George: novelist and poet; b. in Huntley, Scotland, in 1824; was educated at the University of Aberdeen; studied for the ministry at the Independent College, Highbury, London; preached in the counties of Surrey and Sussex for some time, but ultimately became a lay member of the Church of England and devoted himself entirely to literature, settling in London. He published volumes of poems in 1855, 1857, 1864, 1868, and 1882. He has published several novels, including *David Elginbrod* (1862); *Alec Forbes of Howglen* (1865); *Annals of a Quiet Neighborhood* (1866); *Guild Court* (1867); *Robert Falconer* (1868); *Wilfred Cumbermede* (1871); *Malcolm* (1874); *The Marquis of Lossie* (1877); and *What's Mine's Mine* (1886); also several successful juvenile books, and two theological works. He has been principal of a ladies' seminary in London; lectured in the U. S. (1872–73). Revised by H. A. Beers.

MacDonald, James: jurist; b. at East River, Pictou, Nova Scotia, July 1, 1828; was educated at New Glasgow, and was admitted to the bar in 1861. He represented Pictou in the Nova Scotia Assembly 1859–67, 1871–72, and the same constituency in the Dominion Parliament 1874–81; was railway commissioner for Nova Scotia 1863–64; financial secretary 1864–67; Minister of Justice of Canada 1878–81; and was appointed Chief Justice of Nova Scotia May 28, 1881. He was one of the commissioners appointed to open up trade relations with the West Indies, Mexico, Brazil, and the British American provinces 1865–66. N. M.

Macdonald, Sir John Alexander, G. C. B., D. C. L., LL. D.: Canadian statesman; b. in Glasgow, Scotland, Jan. 11, 1815. His father, Hugh Macdonald, a native of Sutherlandshire, removed to Canada with his family in 1820, and settled in Kingston, where his son was educated at the Royal Grammar School. Admitted to the bar in 1836, John soon established a lucrative practice, and became noted for his knowledge of criminal and commercial law, and for his ability as a pleader. In 1844 he was elected to represent Kingston in the Canada Assembly, and sat for this constituency almost continuously until his death. Soon after entering Parliament he began to display those talents which secured for him so great an ascendency in Canadian politics, and in a few years became the virtual leader of the Upper Canada Conservatives, even before he had displaced Sir Allan MacNab as chief of the party. He assumed office for the first time May 21, 1847, entering the cabinet as Receiver-General; became commissioner of crown lands Dec. 7, 1847; and was Attorney-General for Upper Canada from Sept. 11, 1854, to July 29, 1858, when, as Prime Minister, he and his cabinet resigned. He returned to office Aug. 6, same year, as Postmaster-General; resigned this portfolio on the following day, on his reappointment as Attorney-General, a position he held until the defeat of the administration, May, 1862, when he and his colleagues again retired from office. He led the opposition in the Assembly, together with Sir George E. Cartier, until the defeat of the Sandfield Macdonald-Dorion government, when, with Sir Étienne Taché, he formed an administration Mar. 30, 1864. He resumed his former office of Attorney-General, and was Government leader in the Assembly from that date until the union of the provinces in 1867. To the consummation of this union he contributed more than any other person in Canada. He was a delegate to the union conferences held at Charlottetown and Quebec in 1864; and was chairman of the London colonial conference 1866–67, when the act of union known as the British North America Act was passed by the British Parliament. On July 1, 1867, he was called upon to form the first Government for the new Dominion, and was appointed Minister of Justice and Attorney-General of Canada, an office which he held until he and his ministry resigned on the Pacific Railway charges Nov. 6, 1873. During this administra-

tion negotiations with the Hudson's Bay Company respecting the transfer of the Northwest region to Canada were successful, and that vast domain was united to the Dominion largely through his efforts. Shortly after retiring from office he removed to Toronto and engaged in the practice of law, and many of his political opponents and others regarded his public career as ended. In the meantime, however, he introduced his scheme of protective duties, known since as the National Policy, to the notice of the public, and appealing to them upon that issue was successful at the polls. He was not, however, in favor of protection as a permanent fiscal policy, but was led to adopt it by the exigencies of trade with the U. S. He resumed office in Oct., 1878, as Minister of the Interior; resigned this portfolio and became president of the council and superintendent-general of Indian affairs Oct. 17, 1883. He resigned those offices Nov. 28, 1889, and became Minister of Railways and Canals, which post he retained until his death at Ottawa, June 6, 1891. In 1871 he was appointed one of the British joint high commissioners and plenipotentiaries, together with Earl de Grey (now Marquis of Ripon), Sir Stafford Northcote, Sir Edward Thornton, and the Right Hon. Montague Bernard, to act in connection with five commissioners for the U. S. for the settlement of the Alabama claims and of other matters in dispute between Great Britain and the U. S., the labors of the commissioners resulting in the Treaty of Washington, signed May 8, 1871. During the summer of 1880 Sir John visited London in company with Sir Charles Tupper and the Hon. J. H. Pope (members of his cabinet), when they arranged the terms for the construction of the Canadian Pacific Railway. He again visited London in 1884, and attended the conference held there Nov. 18, at which the Imperial Federation League was formed, and was regarded as the chief originator of the movement. The measures which Sir John carried through Parliament comprise the most important features of Canadian legislation from 1854 up till the period of his death. He received the degree of D. C. L. from Oxford University in 1865; LL. D. from Queen's University, Kingston, and McGill University, Montreal; was created a Knight Commander of the Bath in 1867, Knight Grand Cross of the Royal Order of Isabel la Catolica (of Spain) 1872; sworn in as a member of Her Majesty's Privy Council 1879; and received the decoration of the Grand Cross of the Bath in 1884.

Sir John possessed natural abilities of the highest order. He held no mean rank as an orator, and had no equal in Canada as a parliamentary debater. A master of repartee, witty, persuasive, and engaging, he had but few superiors anywhere as a conversationalist. He seemed to have an intuitive knowledge of human nature, and possessed in an eminent degree those special talents whereby he rendered this gift serviceable in promoting his public policy. He displayed the commanding character of his intellect and his statesmanship by welding opposing factions, creeds, and nationalities into a harmonious political unity of action.

He was twice married—first to his cousin, Isabella Clarke, who died in 1856, and second, in 1867, to Susan Agnes, daughter of the Hon. T. J. Bernard, a member of the Queen's Privy Council of the island of Jamaica. She, surviving Sir John, was soon after his death created Baroness Earnscliffe, in consideration of her husband's distinguished services.

His son Hugh John, Q. C. (b. in Kingston, Ontario, Mar. 13, 1850), was educated at Queen's College, Kingston, and the University of Toronto, and admitted to the bar in 1872. He served in the Red river expedition (1870) under Sir Garnet (now Lord) Wolseley, and again in 1885. He is president of the Manitoba Rifle Association, and in 1891 was elected to the Canadian Parliament for the city of Winnipeg.

Neil Macdonald.

Macdonald, John Sandfield: statesman; b. in St. Raphael's, Glengarry, Ontario, Dec. 12, 1812. He was self-educated, was admitted to the bar in 1840, and achieved an immediate success; elected for Glengarry County in Parliament of Canada in 1841; re-elected in 1848, 1852, and 1854 without opposition; was Solicitor-General 1849–51, Speaker 1852–54, and in 1858 was Attorney-General in the Brown-Dorion or "two-days" ministry. He was elected for Cornwall in 1857, was called upon to form a government after the defeat of the Cartier-Macdonald government, which he succeeded in doing, and was Premier till his resignation in 1864. He became Premier of the province of Ontario in 1867, which office he resigned in 1871; but he retained a seat in Parliament till his death in Cornwall, Ontario, June 1, 1872. —His brother Donald Alexander (b. in St. Raphael's, Feb. 17, 1817) represented Glengarry in the Canadian Parliament 1867–75. He became a member of the Privy Council Nov. 7, 1873, and was Postmaster-General from that date till appointed lieutenant-governor of Ontario May 18, 1875; this last office he held for five years. N. M.

McDou'gall, Alexander: soldier; b. in Scotland in 1731; went to North America with his father about 1755, and settled near New York; was in 1769 a printer, and imprisoned by the colonial government (1770) for an alleged libelous address. He took an active part in the popular movements preliminary to the Revolution; was appointed colonel of the first New York regiment; brigadier-general Aug., 1776, and major-general Oct. 20, 1777; was engaged in the battles of Long Island, White Plains, and Germantown, and in the New Jersey campaign; commanded the posts on the Hudson 1778–80; was Minister of Marine for a short time early in 1781; was elected a delegate to Congress from New York in that year, and again in 1784; was elected to New York Senate 1783. D. in New York, June 8, 1786.

MacDougall, William, C. B.: statesman; b. in Toronto, Canada, Jan. 25, 1822; was educated there and at Victoria College, Cobourg, and was admitted as an attorney in 1847. He founded (1848) *The Canada Farmer*; in 1850 *The North American*, of which he was editor until it was merged into the Toronto *Daily Globe* in 1857, and was a political writer on the latter 1857–60. He represented Canada at the New York exhibition 1853; was a member of the executive council and commissioner of crown lands 1862–64; provincial secretary 1864–67; acting Minister of Marine 1866–67; and Minister of Public Works from 1867 until appointed lieutenant-governor of Rupert's Land and Northwest Territory in 1869. He was chairman of the commission appointed to open up trade relations with the West Indies, Mexico, and Brazil 1865–66; delegate to the Charlottetown and Quebec union conferences 1864; to the colonial conference in London 1866–67; to confer with British Government on defenses of Canada and for the acquisition of the Northwest Territory 1868–69; and was sent to London (1873) as a special commissioner to confer with British Government respecting fisheries and to make arrangements in Scandinavia and Baltic provinces for emigration to Canada. He is author of *Six Letters on the Amendment of the Provincial Constitution* (Toronto, 1872). N. M.

MacDowell, Edward A.: composer; b. in New York city, Dec. 18, 1861; began the study of the piano very early; went to Paris in 1876, remaining three years in the conservatory there; then went to Wiesbaden and Frankfort, and in 1881 was appointed first piano-teacher in the conservatory at Darmstadt, but resigned in 1882. In 1884 he married an American lady, and took up his residence at Wiesbaden. He returned to his native country about 1889, and resides in Boston. His compositions are important, and include piano concertos and suites, symphonic poems for orchestra—viz., *Hamlet*, *Ophelia*, *Launcelot and Elaine*, *Lamia*—a symphony, a suite for orchestra, and similar large works. D. E. Hervey.

McDowell, Irvin: soldier; b. at Columbus, O., Oct. 15, 1818; educated at the Collège de Troyes, France, and at the U. S. Military Academy, at which he graduated July 1, 1838. Appointed second lieutenant of artillery in the army; adjutant at West Point 1841–45; aide-de-camp to Gen. Wool 1845, as adjutant-general of his division, in the war with Mexico, and subsequently of the army of occupation. At the battle of Buena Vista he gained the brevet of captain, and in May, 1847, was appointed brevet captain and assistant adjutant-general. Served as adjutant-general of various departments until 1861, having been promoted to brevet major in 1856. Ordered to Washington in Feb., 1861, he served until May as inspector of troops, in organizing and mustering volunteers. Appointed brigadier-general May 14, he was three days later assigned to the command of the department of Northeast Virginia and the defenses of Washington on the Virginia side of the Potomac, and on May 27 to the Army of the Potomac, which he commanded at the battle of Bull Run July 21. On the accession of Gen. McClellan to command, McDowell was placed at the head of a division of the Army of the Potomac, and on its reorganization (Mar., 1862) of the First Corps of that army. He was made major-general of volunteers Mar. 13, 1862; was in command of the department of the Rappahannock Apr., 1862; of the Third Army-corps (Army of Virginia) Aug., 1862, and during Gen. Pope's campaign in Northern Virginia was

engaged at Cedar Mountain, Rappahannock Station, and second Bull Run. In July, 1864, placed in command of the department of the Pacific; of department of California June, 1866, department of the East 1868; became major-general U. S. army in Nov., 1872; in command of the division of the South 1872–76, and then of the division of the Pacific till his retirement, Oct. 15, 1882. D. in San Francisco, May 4, 1885. Revised by JAMES MERCUR.

McDowell, WILLIAM FRASER: See the Appendix.

Mace [from Lat. *ma'cis*, *ma'cir*, from Gr. μάκερ, mace]: the dried arillus or inner coat investing the shell of the nutmeg, which is the kernel of the nut of *Myristica fragrans*, a tree of the Spice islands (family *Myristicaceæ*) now naturalized in other hot regions. Mace of inferior quality is also produced by *Myristica fatua* of the same regions. Mace is used as a spice, and as an aromatic stimulant in medicine. It has also the slight narcotic power of the nutmeg, in a milder degree. It yields a volatile oil upon distillation, and a buttery, fixed oil when subjected to pressure. The oil of mace of commerce is, however, generally the fixed oil of the nutmeg, which is harder than the true oil of mace. Mace, in the fresh state fleshy and of a beautiful crimson, appears in commerce as a mass of flat, dry branching plates of an orange-brown color, and a taste and smell resembling those of nutmeg, but rather milder and pleasanter.

Mace [from O. Fr. *mace* (> Fr. *masse*) : Ital. *mazza*: Span. *maza* < Lat. **matea*, club; cf. *mate'ola*, mallet]: (1) A weapon consisting of a wooden handle about 5 feet long with metal head, usually a spiked ball, sometimes of other forms. It was much used by knights in the days of plate armor, against which it was particularly effective, as a strong blow would frequently drive a spike through the plates. It was also used as a weapon by priests, who were forbidden to carry a sword. Ornamented maces, sometimes of copper or silver, are now used as badges of authority by magistrates and in legislative assemblies. (2) A substitute for the cue in billiards. (3) A currier's mallet used in dressing leather.

Macé, mȧȧ'sā', JEAN: author and educator; b. in Paris, France, Apr. 22, 1815; the son of a laborer, he was educated at the Collège Stanislas; served in the army 1842–45; was secretary to Théodore Burette 1845–47; editor of *La République* 1848; retired to Alsace after the *coup d'état*, and there for ten years taught in a school: founded in 1864 *Le Magasin d'Éducation*, and in 1866 a league of instruction after the Belgian model. D. Dec. 13, 1894. He wrote a number of extremely popular books for young people, of a semi-educational kind: *Histoire d'une bouchée de pain* (1861); *Contes du Petit-Château* (1862); *Les serviteurs de l'estomac* (1866); *L'anniversaire de Waterloo* (1868); *Les premiers livres des petits enfants* (1869); *Les idées de Jean-françois* (1872–73); *La grammaire de Mlle. Lili* (1878); *La France avant Les Francs* (1881). A. R. MARSH.

Macedo, mȧȧ-sā'dō, JOAQUIN MANOEL, de: poet and statesman; b. at São João de Itaborahy, province of Rio de Janeiro, Brazil, June 24, 1820. He studied medicine, and took his doctor's degree in Rio; but he early began to write, and was soon made Professor of Brazilian History in the college of Dom Pedro at Rio de Janeiro. He has been one of the chief forces in the literary and scientific life of Brazil in the nineteenth century. He has also interested himself in political affairs, being elected to the Brazilian chamber in 1854. His first literary work to attract attention was his novel *Moreninha* (1844; 5th ed. 1877). This was followed by *O Moço louro* (1845; 5th ed. 1877); *Os dous amores* (1848); *Vicentina* (1853); *Rosa* (1854); *A Carteira de meu tio: Viagem phantastica* (1855). In 1855 he made a hit in a new literary *genre* by his extremely successful national tragedy *Colé*, having in 1849 brought out with less success *O Cézo*. Hardly less pleasing were his vaudevilles: *O primo da California* (1855; published 1858); *O Fantasma branco* (1856); *Lujo e vaidade* (1859); besides *A torre em concurso* and *O novo Othelo*. Macedo's greatest literary success, however, has been his lyric-epic poem *A Nebulosa*, published in 1857. In spite of some exaggerations of style and sentiment, this remains on the whole the best Brazilian poem of the century. It consists of six cantos and an epilogue, in unrhymed hendecasyllables. The scene is laid in Brazil, and felicitous descriptions of the tropical nature of the country abound. The story is of an essentially romantic kind, somewhat alien from the taste of the present; but the reader has to acknowledge that in many of the situations both power and truth are to be found. Macedo later has devoted himself mainly to scientific studies. A. R. MARSH.

Macedo, JOSÉ AGOSTINHO, Padre de: poet and writer; b. at Beja, Portugal, Sept. 11, 1761. Destined for the Church, he took his vows Nov. 15, 1778, rather from motives of expediency than from a real call to the life. As a consequence his conduct poorly conformed to his professions, and on Feb. 18, 1792, he was formally expelled from the monastery da Graça at Lisbon, of which he was a member. This disgrace, contrary to all expectations, incited him to maintain himself in society, and even in the Church, despite the condemnation of his superiors. He became a kind of unconnected preacher, and at the same time began his extraordinary career as a writer. Having great abilities and entire disregard for the feelings of others, he succeeded in making himself almost a literary dictator for a time. His sermons drew great crowds, and in 1802 he even became court preacher. At the same time he tried his hand at almost every kind of literary production, poetry, philosophy, criticism, etc. Later he took part in political affairs, and in 1822 was elected to the chamber of deputies. Toward the close of his life, however, his friendlessness, due to his own unsparing bitterness, grew more and more marked, and he died in neglect and disesteem. The year before his death, which occurred at Pedrouços in 1831, he had been appointed chronicler to the usurper Dom Miguel, but he never undertook the duties of the office. His chief poetical works are *Contemplacão da natureza* (1801); *O Novo Argunauta* (1809); *Obras de Horacio* (translation, 1806); *Gama* (an epic, 1811; later enlarged under the title *O Oriente*, 1814); *Os Burros ou o reinado da Sandice* (a comic-heroic, 1812); *Meditacão: Poema philosophico* (1813); *Newton: Poema* (1813; 2d corrected and enlarged edition 1815); *A lyra anacreontica* (1819); *Viagem extatica ao templo de sabedoria* (1830); *A Natureza: Poema en 6 cantos* (1846). Among his philosophical works may be mentioned *O Homem ou os limites da razão* (1815); *Cartas filosoficas a Atico* (1815). His critical ability and his bitter, sarcastic, witty manner appear in his *Cartas a Manoel Mendes Fogaça*; *As Pateadas do theatro investigadas* (1812); *Censura dos Lusiadas* (1820); *Exorcismos contra periodicos e outros maleficos* (1821). It must be said that this vast productivity prevented Macedo from knowing any subject profoundly, and the personal bitterness that kept him involved in controversies all his life gives a singularly unpleasing quality to almost everything he wrote. A. R. MARSH.

Macedo'nia (in Gr. Μακεδονία): an ancient and at one time very famous kingdom of Southeastern Europe; originated from a small and obscure beginning, and comprised, when it first became known to history, the districts extending between Epirus and Illyria on the W., Pæonia on the N., Thracia, from which it was separated by the river Strymon, on the E., and Thessaly on the S. The country was fertile, rich in gold and silver, and produced excellent wheat, wine, and oil. The capital was Pella. The Macedonians were originally an Illyrian race, though the kingdom was a composite one—something like the Austria of to-day—including various tribes of barbarians, Pæonians, Brygians, Edonians, Pierians, and others, who met at Pella and mingled with Thracians from the north and Greeks from the south. Greece had very early planted many flourishing colonies in these regions, as, for instance, Potidæa, a colony of Corinth, Chalcidice of Eubœa, and Amphipolis of Athens. Greek became the prevailing language, and Greek civilization the ruling spirit, but the dominant race was not Hellenic, and the Macedonians were never acknowledged by the Greeks as countrymen. When Xerxes invaded Greece he compelled Alexander, King of Macedonia, to follow him as his vassal, but after the battle of Platæa the country once more became independent. A century and a half later Philip II. (359–336) conquered Greece, and his son, Alexander the Great (336–323), made Macedonia the most powerful empire of the time; but on the death of Alexander his empire dissolved into four kingdoms, and the splendor of Macedonia declined very rapidly. A quarrel between Philip V. and Athens gave the Romans an opportunity of interfering, and Philip was utterly defeated at Cynoscephalæ in 197 B. C., as was Perseus at Pydna in 168 B. C. After an unsuccessful uprising against the supremacy of the Romans, Macedonia was finally made a Roman province in 146, and included as such parts of Illyria, Pæonia, and Thracia. In the Middle Ages the name gradually went out of use, and in the present administrative division of Turkey it has no place.

Revised by J. R. S. STERRETT.

Macedonian Language: the native idiom of Macedonia, the country of Philip and Alexander. It was never em-

ployed for literary record, and is known only through scanty glosses in the lexicographers and a few loan-words and proper names. Plutarch tells us that it was displaced entirely by Attic Greek at the court of Philip, and it is apparent that the Macedonian generals and the nobility adopted Attic Greek as the general language of intercourse, though the common Macedonian soldiery spoke among themselves their native tongue. This language was, if not a Greek dialect as some hold, an independent branch of the Indo-European closely related to the Greek. Some of the words which are handed down to us as Macedonian may have been merely Greek words in Macedonian pronunciation—i. e. virtually Greek loan-words in Macedonian, and this may in some measure account for the apparently close resemblance between the languages in some points and great divergence in others. Greek φ is represented in Macedonian by β, and θ by δ; thus Maced. βίλιππος (φίλιππος), βερενίκη (φερενίκη), ἀβροῦτες (ὀφρῦς, pl.), κεβαλή (κεφαλή), καδαρὸν (καθαρόν), κάναδοι (γνάθοι), Δάρρων (Θάρσων?). Cf. Sturz, *De dialecto Macedonica et Alexandrina* (1808); Fick, *Zum makedonischen Dialekt*, *Kuhns Zeitschrift*, xxii., 193 ff. BENJ. IDE WHEELER.

Maceio, maa-sā-yō′ (sometimes, but incorrectly, written Maçayo): capital, principal city, and port of the state of Alagoas, Brazil; on the Atlantic Ocean, at the mouth of a little stream which forms the outlet of the Lagôa do Norte; lat. 9° 39′ 35″ S., lon. 35° 44′ 36″ W. (see map of South America, ref. 4–I). The city proper is situated a little inland, at the base of bluffs which form the edge of a low table-land; it is well built, and peculiarly picturesque, owing to the great number of cocoanut and *dendé* palms which grow about it. The heat of the climate is modified by regular sea-breezes, and the place is generally healthful, but the water-supply is poor. The port is a suburb called Jaragua, connected with the main city by a horse railway. The harbor is formed by a coral reef about half a mile off shore, is open to south winds, and of late years has tended to fill up with drifting sands. Maceio is the terminus of a branch of the Recife and São Francisco Railway. It has a thriving and growing trade, the most important exports being sugar and cotton. Pop. (1893) about 15,000. The Lagôa do Norte, a short distance inland from the town, is a salt lake of considerable size, and is navigated by small steamboats. It abounds in fish. HERBERT H. SMITH.

McEntee, JERVIS: painter; b. at Rondout, N. Y., July 14, 1828; studied under Frederic E. Church in 1850–51; a few years later opened a studio in New York; exhibited a picture at the Academy of Design in 1853; was elected an associate of the academy in 1860, and a full member in 1861. He visited Europe in 1869. Among his important works are *Indian Summer* (1861); *October Snow* (1870); *Cape Ann* (1874); *The Kaatskills in Winter* (1884). D. at Rondout, Jan. 27, 1891.

Macerata, maă-chă-raa′tăa: town; in the province of Macerata, Central Italy; about 30 miles N. W. of Fermo (see map of Italy, ref. 5–F). This town, one of the finest in the Marches, is surrounded by strong walls crowned by thirty-three towers, and at one of its six gates stands a triumphal arch. The aspect of the town itself is striking, and the panorama to be seen from it is beautiful. Among the public buildings are the cathedral, modern, but containing old mosaics and pictures of interest; the Churches of Santa Maria delle Vergini, of much architectural merit, and that of Santa Maria della Pace, of the fourteenth century, and a palace of the thirteenth century, which is one of the finest specimens existing of the architecture of that age. There is a university founded in 1824 by Pope Leo XII. Macerata was built about 408 A. D. on the ruins of Ricina, a celebrated town of the territory of Piceno. It was generally faithful to the pope during the Middle Ages; in 1799 it was sacked by the French. The bishopric of Macerata dates from the suppression of the see of Recanati in 1320. Murat retired here for a few days in 1815, and here his demoralized troops forsook him. Macerata was among the foremost to declare for popular freedom in 1848–49, and its citizens are distinguished for intelligence. Pop. (1891) about 10,000.

McEvoy, JOHN MILLAR: See the Appendix.

Macfarlane, CHARLES: historian; b. in Scotland early in the nineteenth century; traveled extensively in the East and resided many years in Italy; wrote, among other works, *Constantinople in 1828–29* (1829); *Civil and Military History of England*, contributed to Knight's *Pictorial History*, edited by G. L. Craik (8 vols., 1838–44); *Our Indian Empire* (1844); *The French Revolution* (1845); *The Pictorial History of Scotland*, with G. L. Craik (8 vols., 1849); *Turkey and its Destiny* (1850); *Memoir of the Duke of Wellington* (1851); *Life of the Duke of Marlborough* (1852); and a *History of British India* (1852). D. in 1858.

Macfarlane, ROBERT: editor and author; b. in the Highlands of Scotland in 1734; was educated at the University of Edinburgh, and is alleged to have assisted Macpherson in the preparation of *Ossian*. He published a Latin translation of *Temora* (1769), one of the Ossianic epics; wrote vols. i. and iv. of a *History of the Reign of George III.* (4 vols., 1770–96); edited *The Morning Chronicle* and *The Morning Packet*; published an *English and Gaelic Vocabulary* (1795) and *The Poems of Ossian in Gaelic, with a Literal Translation into Latin* (1807). He was engaged upon a vindication of the genuineness of *Ossian* at the time of his death, which occurred in 1804.

Macfarren, GEORGE ALEXANDER: musician; b. in London, Mar. 2, 1813; educated entirely in that city. He was a prolific and for a time a highly popular composer. In opera he produced *Don Quixote*, *The Devil's Opera*, *Robin Hood*, *Jessy Lea*, *Helvellyn*, *She Stoops to Conquer*, *Charles II.*, *El Malechor*, and *The Prince of Modena*. In oratorio may be mentioned *St. John the Baptist*, *Joseph*, *The Resurrection*, *King David*; in cantatas, *The Sleeper Awakened*, *Leonora*, *Mayday*, *Christmas*, *The Lady of the Lake*, *Around the Hearth*, *Songs in a Cornfield* (these last two for female voices only), *Outward Bound*, and music to Sophocles's *Ajax*. He also composed five symphonies, several overtures, much church music, many songs and smaller works. He wrote a number of theoretical musical works, musical biographies, analyses of great compositions, etc. In 1875 he was appointed Professor of Music at Cambridge University, to succeed Sir William Sterndale Bennett, whom he also succeeded as principal of the Royal Academy of Music in London. In May, 1883, he was knighted. D. Oct. 31, 1887. During the greater part of his life he was blind, and most of his compositions were written from dictation by his wife. He was a musician of the old, conservative school, and was strongly opposed to Wagner. See his *Life and Works* (1891). D. E. HERVEY.

MacGahan, JANUARIUS ALOYSIUS: newspaper correspondent; b. in Perry co., O., June 12, 1844; visited Europe in 1868, and during the Franco-German war was correspondent for *The New York Herald*, describing the defeat and retreat of Gen. Bourbaki. He accompanied the Russian expedition against Khiva in 1873, and afterward published an account of his experiences in *Campaigning on the Oxus and the Fall of Khiva*. In 1875 he took part in the Arctic expedition of the Pandora, which he described in *Under the Northern Lights*, published on his return. Leaving *The Herald* he entered the service of the London *Daily News*, and in 1876 wrote for that paper a series of stirring letters about the Bulgarian atrocities. The effect of these was to arouse the keenest sympathy of the people of Great Britain with the victims, and to remove the danger of British opposition to Russian intervention. He followed the entire course of the war in his letters, which are the best journalistic correspondence of the time. D. in Constantinople, June 10, 1878.

McGarvey, JOHN WILLIAM: theologian; b. at Hopkinsville, Ky., Mar. 1, 1829; was educated in Bethany College, where he graduated with honors in 1850. He was ordained to the ministry among the Disciples in 1851, and preached in Missouri until 1862, when he accepted a call to Lexington, Ky. In 1862 he published a *Commentary on Acts*, which he has since thoroughly revised. Since 1865 he has held a chair in the College of the Bible, Kentucky University. In 1879 he made a tour in Palestine, and in 1881 published *Lands of the Bible*. In 1886 he published vol. i. of a work on Christian Evidence, *Text and Canon*, and in 1891 vol. ii., *Credibility and Inspiration of the Bible*. J. H. GARRISON.

McGee′, ANITA NEWCOMB: See the Appendix.

McGee, THOMAS D'ARCY: politician and writer; b. at Carlingford, Louth, Ireland, Apr. 13, 1825; went in 1842 to Boston, Mass., where he wrote for the Boston *Pilot*, and became its chief editor; became London correspondent of the Dublin *Freeman's Journal*, and afterward was secretary of the Irish confederation and an editor of *The Nation*. In 1848 he fled to New York, where he was, 1848–50, editor of a paper advocating the independence of Ireland. Displeased with the Knownothing movement, he went to Montreal, Canada; edited *The New Era*, disavowed republicanism, became an ardent royalist; entered the provincial Parliament

in 1857; beeame in 1864 president of the executive eouneil, and in 1867 Minister of Agrieulture. He denounced the Fenian movement, and was assassinated at Ottawa, Canada, Apr. 7, 1868. His principal works are *O'Connell and his Friends* (Dublin, 1845); *Canadian Ballads* (1858); *Irish Settlers in America* (1851); *Protestant Reformation in Ireland* (1853); *History of Ireland* (New York, 1862); *Catholic History of North America* (1854); *Speeches and Addresses on the British American Union* (London, 1865). A volume of his poems appeared in 1870 (New York).

McGee, W J: anthropologist and geologist; b. near Dubuque, Ia., Apr. 17, 1853; was self-educated. In 1879 he began a geologic map of his own and neighboring counties, and eventually the geologic mapping was expanded into a systematic survey of an area of 17,000 sq. miles in Northeastern Iowa. The maps and other results were published in 1891 in the *Eleventh Annual Report* of the U. S. Geological Survey. In 1881 he examined and reported on the building-stone and quarry industries of Iowa for the tenth census, and in 1882 beeame conneeted with the U. S. Geological Survey. In 1885 he laid the plans for surveys and mapping by the U. S. Geologieal Survey before the International Geologie Congress at Berlin; and a year later made a study of the Charleston earthquake, on the ground, immediately after its oeeurrenee. On the organization of the Geologieal Society of Amcriea in 1888 he beeame its editor, and held the position for four years; he has also edited *The National Geographic Magazine* for several years. In 1885 and again in 1892 he compiled geologic maps of the U. S., and he has prepared a geologic map of the State of New York. In 1893 he resigned from the Geological Survey, and was appointed ethnologist in eharge in the Bureau of Ethnology. His published writings exeeed 100 titles.

McGiffert, Arthur Cushman, Ph. D., D. D.: theological professor; b. at Sauquoit, N. Y., Mar. 4, 1861; was edueated at Western Reserve College, Union Theological Seminary, the Universities of Berlin and Marburg, in Paris, and in Rome. In the department of ehureh history, in Lane Seminary, he was instruetor 1888–1890, and professor 1890–93; and in 1893 he became professor in the same department in Union Seminary, New York. He has published *Dialogue of Papias and Jason* (1889); and a translation, with prolegomena and notes, of the *Church History of Eusebius Pamphilus*, in *Nicene and Post-Nicene Fathers* (1890).

McGiffin, Philo N.: See the Appendix.

McGill, James: founder of McGill College, Montreal; b. Oct. 6, 1744, in Glasgow, Seotland and was edueated there; removed to Canada about 1770. For some time after his arrival he was engaged in the Northwest fur-trade; subsequently beeame a merehant in Montreal; was for many years a member of the Lower Canada Parliament, and afterward of the legislative and exeeutive eouneils. He held the rank of brigadier-general of militia during the war of 1812, and was mainly instrumental in founding the eollege (now university) in Montreal whieh is named after him. He died in Montreal, Dee. 19, 1813. Neil Macdonald.

McGil'livray, Gen. Alexander: a Creek ehief, son of Laehlan McGillivray, a Scoteh trader, by the half-breed daughter of a Freneh officer; b. in Alabama about 1740; was well educated at Charleston, and was for some time engaged in eommercial pursuits at Savannah, but returned to his tribe, in whieh, at the time of the Revolution, he had beeome a prominent leader and head of the royalist party. After the war, in whieh he took little part, he indueed the so-called Museogee Confederaey, embracing Creeks, Seminoles, and other tribes, to beeome allies of the Spanish colonial government of West Florida; was the eommissary of that government among his countrymen, and coneentrated their trade at Pensaeola. In 1790 he visited New York by invitation of Washington; was reeeived with honor; signed a treaty eeding to the U. S. the disputed territory on the Oconee river, and by a secret artiele of the same instrument reeeived the appointment of U. S. agent, with the rank and pay of brigadier-general. D. at Pensaeola, Feb. 17, 1793. McGillivray was a man of culture and politieal talent, and exereised a splendid hospitality. He was unele to the eelebrated ehief William Weatherford.

McGillivray, William, LL. D.: naturalist; b. in the isle of Harris, Seotland, in 1796; beeame in 1823 Assistant Professor of Natural History at the University of Edinburgh; was afterward eonservator of the museum of the Royal College of Surgeons in that city, and in 1841 was appointed Regius Professor of Natural History in Marischal College, Aberdeen. He published *Lives of Eminent Zoölogists from Aristotle to Linnæus* (1834); *A History of British Birds, Indigenous and Migratory* (5 vols., 1837–62); and wrote the major part, if not all, of the systematic portion of the text of Audubon's *Birds of America*. D. at Aberdeen, Sept. 5, 1852. He left unfinished a treatise on *The Natural History of Deeside and Braemar*, illustrating the vieinity of Balmoral. The manuscript was purehased by Queen Victoria and printed in 1856. Revised by F. A. Lucas.

McGlynn, Edward: clergyman; b. in New York city, Sept. 27, 1837; was edueated at the College of the Propaganda in Rome, and in 1866 beeame pastor of St. Stephen's ehureh in New York eity, where he rapidly gained great influenee over his eongregation. His opposition to the establishment of parochial schools and his championship of the doetrines of Henry George brought him into disfavor with the Chureh authorities, and he was removed from his eharge and summoned to the Vatiean. On refusing to obey he was excommunicated. In 1887 he aided in founding the Anti-Poverty Society, and became its president. A reconeiliation was effeeted betweeu McGlynn and the Chureh in 1893, and he was restored to his rank and dignity. D. Jan. 7, 1900.

McGoun, Archibald: See the Appendix.

McGready, măk-grā'di, James: clergyman; b. in Western Pennsylvania about 1760; was edueated at Jefferson College; beeame a Presbyterian minister in North Carolina; removed to Southwestern Kentucky in 1796, where he direeted a remarkable revival of religion, whieh, begun in 1797, lasted for some years, and led to the organization in July, 1800, of the first camp-meeting. The religious movement thus begun was carried on by young men who were ordained to the ministry without a regular edueation in theology. This step gave rise to opposition, and the eeclesiastieal difficultics eulminated in 1810 in the organization of a new Church, whieh took the name Cumberland Presbyterian Church (*q. v.*) from the region of its origin. Two years later he withdrew from the new body and returned to his former presbytery. He died in Kentucky in 1817. His *Collected Sermons* appeared in 1831–33 (Nashville). See his *Life* by Rev. J. B. Lindsley (Nashville).

Revised by C. K. Hoyt.

McGreg'or: city; Clayton co., Ia. (for loeation of eounty, see map of Iowa, ref. 3–J); on the Mississippi river, and the Chi., Mil. and St. P. Railway; opposite Prairie du Chien, Wis., 55 miles N. W. of Dubuque. It is in a picturesque valley in an agrieultural region; has large grain and live-stock interests; contains railway ear and repair shops, carriage and wagon faetory, blank-book manufactory, bindery, and two weekly newspapers; and is an attractive summer resort. Here are eurious pietured roeks and Pike's Peak, the highest point on the Mississippi river. Pop. (1880) 1,602; (1890) 1,160; (1900) 1,498. Editor of "News."

MacGregor, James MacNaughtan, D. D.: minister of the Free Church of Seotland; b. in Callander, Perthshire, Jan. 6, 1830; edueated in the University and the New College of Edinburgh; minister of the Barry Free ehurch 1857–61; of the Paisley Free High ehureh 1861–68; Professor of Systematic Theology, New College, Edinburgh, 1868–81; minister of Columba church, Oamaru, New Zealand, from 1882. Besides pamphlets, reviews, and articles on *Hegel* and *Jacobi* in the eighth edition of the *Encyclopædia Britannica*, Dr. MacGregor has published *Text-book on Christian Doctrine* (Edinburgh, 1861); *The Sabbath Question* (1865); *Handbook on Galatians* (Edinburgh, 1875); *Handbook on Exodus* (Edinburgh, 2 vols., 1889); *Presbyterians on Trial by their Principles* (Dunedin, 1890); *The Apology of the Christian Religion* (Edinburgh, 1892); *The Revelation and the Record* (Edinburgh and New York, 1893); in press, *The Catholic Doctrine of the Person of Christ*, and *Studies in the History of Christian Apologetics*.

C. K. Hoyt.

MacGregor, John: author; b. in Stornoway, Ross-shire, Seotland, in 1797; emigrated to Canada in youth, and was long engaged in commereial pursuits; published *A Sketch of British America* (1828); *Emigration to British America* (1829); *My Note-book* (1835); *Commercial and Financial Legislation of Europe and America* (1841); *Commercial Statistics of all Nations* (5 vols., 1844–50); *Progress of America from the Discovery by Columbus to 1846* (2 vols., 1847); *Holland and the Dutch Colonies* (1848); *Germany and her Resources* (1848); and a *History of the British Empire from*

the Accession of James I. (2 vols., 1852). Returning to England, he was employed on commercial missions to several European governments; was in 1840 a secretary of the Board of Trade; advocated free-trade measures: was elected to Parliament for Glasgow 1847; was made governor of the Royal British Bank, on the failure of which he retired to Boulogne, France, where he died Apr. 23, 1857.

MacGregor, John: traveler and author; b. at Gravesend, England, Jan. 24, 1825; entered Trinity College, Dublin, but removed to Trinity College, Cambridge, where he graduated 1844; entered at the Middle Temple 1847; made a tour of Europe, the Levant, Egypt, and Palestine 1849–50; was called to the bar 1851; visited Russia and every country in Europe, as well as Algeria, Tunis, the U. S., and Canada; wrote and sketched for *Punch* and other periodicals; made in 1865 a canoe-voyage, and in the following year published his log-book, under the title *A Thousand Miles in the Rob Roy Canoe on Rivers and Lakes of Europe*; in later years made other voyages, recorded in the volumes *The Rob Roy on the Baltic, The Voyage Alone in the Yawl Rob Roy*, and *The Rob Roy on the Jordan*, all of which have been very popular and have found numerous imitators. Mr. MacGregor was captain of the Royal Canoe Club (1866); was a prominent member of the London school board, and was active in philanthropic work. D. at Bournemouth, England, May 16, 1892.

Mácha, maa'kă, Karel Hynek: poet; b. at Prague, Bohemia, Nov. 15, 1810; studied philosophy and law at the University of Prague. In 1836 he finished his legal studies, and entered a lawyer's office at Litoměřice, where he died Nov. 7, 1836. His fame rests upon his lyrico-epic poem *Máj* (May, Prague, 1836), which introduced into Bohemian poetry the Byronian pessimistic view of life. It contains passages of great beauty, and its language is highly musical. He also wrote a number of short lyric poems and stories: *Křivoklát* (in the *Květy*) and *Cikáni* (The Gypsies, Prague, 1857). His collected works were published in 1862, at Prague, by Kober. A German translation, by A. Waldau, appeared in 1862, at Prague. Mácha's genius, misunderstood by his contemporaries, was fully recognized by the succeeding generation. J. J. Král.

Machæ'rodus [Mod. Lat., liter., knife- or saber-toothed; Gr. *μάχαιρα*, knife, curved dagger + *ὀδούς*, tooth]: an extinct genus of carnivorous mammals allied to the cats, and distinguished by the enormously developed canines of the upper jaw. These teeth are long, curved, and compressed, with a trenchant and usually serrated edge behind and before, whence the name "saber-toothed tigers" applied to the group, which has been divided into three genera—*Drepanodon* (from *δρεπάνον*, a scimitar), *Smilodon* (from *σμίλη*, a chisel or graver), and *Machærodus*. Many species have been described from the Middle and Later Tertiary and the Quaternary deposits of Europe, Asia, North and South America. *Machærodus primævus*, from the Bad Lands of Dakota, was somewhat smaller than the cougar or American panther, and the skull resembles that of that animal in many respects. *M. sivalensis* is another Miocene species from the Sewalik Hills, India. *M. cultridens* from the Tertiary of the Val d'Arno is a large species, the upper canines measuring 8½ inches along the anterior curve. *M. latidens* from the Quaternary of Kent's Hole, England, was scarcely smaller, and equaled the largest living tiger in size, while *M. neogæus* from the Quaternary of the caverns of Brazil was a still larger species, the canines projecting about 8 inches from their sockets. The later species of *Machærodus* were doubtless contemporary with man, but the group became extinct before the beginning of the historic period.
O. C. Marsh.

McHale', John, D.D.: archbishop; b. in 1791 at Tubbernavine, Mayo, Ireland; studied for the Roman Catholic priesthood at Maynooth College, where he became Professor of Theology (1814); was appointed coadjutor Bishop of Killala in 1825; became titular bishop in May, 1834, and Archbishop of Tuam in August of the same year. He took an active part in the agitation which led to Roman Catholic emancipation, writing two series of letters on the subject; published in 1827 a treatise on the *Evidences and Doctrines of the Catholic Church*; built a cathedral at Ballina; built or rebuilt more than 100 churches; established numerous convents and Roman Catholic parish schools; preached at Rome in 1832 a series of sermons, which were translated into Italian; obtained from the pope in 1848 the condemnation of the queen's colleges in Ireland, and in 1869 procured from a council of Irish bishops a vote of censure against mixed education. He did much to revive the literary use of the Irish language, translating in the original meters sixty of Moore's *Irish Melodies*, published Irish translations of six books of the *Iliad* (1861) and of the *Pentateuch* (1863), etc. D. Nov. 7, 1881.

Macha'on (in Gr. *Μαχάων*): in Greek mythology, a son of Asclepius and Epione, and himself a skillful physician. Along with his brother Podalirius he conducted thirty Thessalian ships to Troy, where they acted as the physicians of the Greeks. He was wounded by Paris, but was saved from death by Nestor. He was one of the heroes in the wooden horse. He was killed afterward by Eurypylus, the son of Telephus. His friend Nestor brought his body to Messenia and buried it in Gerenia, where a heroum was built in his honor, and in a sanctuary connected therewith cures were effected in his name. J. R. S. Sterrett.

Machias, mā-kī'as: town; capital of Washington co., Me. (for location of county, see map of Maine, ref. 7–G); at the head of navigation on the Machias river, 12 miles from its entrance into Machias bay; 70 miles E. by S. of Bangor. It is engaged in the coasting trade, lumber business, and in ship-building, and has 3 banks, the Porter Memorial Library, and 2 weekly newspapers. Pop. (1880) 2,203; (1890) 2,035; (1900) 2,082.

Machiavel'li, Niccolò di Bernardo: historian and publicist; b. in Florence, Italy, May 3, 1469, of a respectable middle-class family; d. in Florence, June 22, 1527. Of his early life or occupation before his secretaryship hardly anything is known, and of his private life and family relations in later years we have only an occasional glimpse. His education was not that of a scholar; although he uses Latin as easily as Italian, and is thoroughly familiar with the authors he knows, his reading was not wide, and his acquaintance with Greek writers was almost certainly obtained through Latin and Italian translations. What we find in him is the practical and ready knowledge of the busy man of affairs. In 1502 he married Marietta Corsini, who bore him six children and apparently was attached to him; but his own sentiments toward her do not appear in his letters, in which he speaks of all that interests his active mind, and while he shows that he was not free from the gross licentiousness of his times, he is ever reticent as to his family affairs. Though the human and domestic side of the man eludes us, we have a complete picture of his public activity and intellectual development from the time he takes office to his death. He had grown to manhood in the Florence of Lorenzo the Magnificent, the brilliant center of the great revival of learning; had seen the rise of the new tyrannies in Italy, the ravages of the mercenaries, the invasion of the French under Charles VIII.; had seen the Medici driven out and Savonarola burned at the stake, when, after the re-establishment of the republic, he was in 1498 appointed chancellor, or secretary, of the second chancery in Florence, which transacted the business of the commission in charge of war and foreign affairs (*dieci di libertà e pace*). He continued in this office till the end of the republic and the return of the Medici in 1512. His position was that of a high subordinate official who must possess great technical knowledge, and who retains his place in spite of all changes in his superiors. He is trusted and consulted in matters of the greatest moment, but nowhere does he take a leading part or represent the state. This takes from him the responsibility of acting, and leaves him as an observer, high enough in rank to be present on important occasions and to have knowledge of all secrets of state, yet low enough not to be noticed. Machiavelli's years of public life were years of ceaseless activity and labor. The archives of Florence contain thousands of official papers in his handwriting, but his functions were not limited to the walls of his office. Almost yearly he was sent out with some embassy to guard the interests of Florence; to Cesare Borgia (*il duca Valentino*), whom he had abundant opportunity to study carefully, both at the height of his power and after his fall; to the Emperor Maximilian; twice to Pope Julius II.; four times to King Louis XII. of France; repeatedly to the little states of Italy. Of all these embassies he sent home elaborate reports, full of minute knowledge of politics, of shrewd observations, of suggestions of all kinds, and written in the simple, direct style which marks him as the foremost master of Italian prose. From this close contact with affairs, furthermore, he was constantly deriving those general views which appear again and again in his discussion of the larger problems of his time. Thus during his whole official

life Florence was engaged in an effort by the use of mercenaries to reduce rebellious Pisa. Machiavelli early perceived the evils of the system, and advocates in his reports the substitution of a national militia. He is convinced that no state can be strong save by the use of its own troops, which it must obtain by arming and drilling the whole population, and his never-failing example is republican Rome. Of this plan he never tires; it appears again and again in all his political writings. He had influence enough with Piero Soderini, the gonfaloniere, to have the experiment tried, but the troops when put to the test proved utterly inefficient. The failure did not discourage Machiavelli, and after his removal from office he fully developed his views in the book *Dell' arte della guerra* (1520). That system all the powers of continental Europe are now trying to maintain. Again, the interference of Charles VIII. and of Louis XII. in Italy filled him with horror, as the ravages of the French soldiery were even more brutal than those of the mercenaries. The remedy in his eyes is the formation of a united Italy that shall be able to protect itself. A republic like Rome can not be hoped for, so he looks for the prince who should be skillful and strong enough to bring about the union, and sees the needed qualities in Cesare Borgia.

After fourteen years of indefatigable activity the return of the Medici in 1512 put an end to Machiavelli's public life. In the following year, on the occasion of a conspiracy against the new government, he was arrested, subjected to torture, and imprisoned for a while, but soon set free, with the injunction not to leave the territory of Florence. He withdrew to the country, and in his enforced leisure engaged in the composition of the works that have made him famous. He continued to watch public affairs eagerly, as is shown by his *Lettere familiari*, almost all of which belong to this period. Here and there in these we find a charming description of his rural pleasures or of his intercourse with his literary friends, but the greater part, especially those to Vettori and Guicciardini, are filled with political news, criticism, and advice.

While in office he had produced a rhymed chronicle of the events of the ten years preceding 1504, the *Decennale primo* (followed by an incomplete *Decennale secondo*), which, though valuable for the historical information and judgments contained in it, is wretched doggerel in the form of *terza rima*. The purely literary verse which he wrote later is uniformly bad. His tale of *Belfegor* is bright and amusing, but hardly to be distinguished from the hundreds of similar productions in Italian. He wrote a few comedies in prose, of which one, *La mandragola* (1513 ?), is considered the masterpiece of the Italian stage in that century, some critics even thinking it the best in Italian. The piece is little more than a *novella* told in scenes in which the plot hardly admits of dramatic action and is highly immoral; but the dialogue is natural and sparkling, the characters fairly breathe with life, and are drawn with the realistic truth and accuracy of observation which mark all his writings and make even his official reports works of literature. His other plays are far inferior in merit.

In the year 1513 Machiavelli began to put into shape the results of his reading and reflection upon politics, and of his long experience in the affairs of state. Within the year, probably, he finished *Il Principe*, the book which is irrevocably connected with his name, and which has made *machiavellism* a synonym for evil. At the same time he was at work on the *Discorsi sopra la prima deca di Tito Livio*, and in each work refers to the other, so that the two can not be considered apart. The only forms of government which he understood and thought possible were the rule of the many and the rule of one; the republic (of which the most perfect example to him was Rome) and the absolute monarchy. The *Discorsi*, whose title is misleading, are his reflections on republican government—how it can be made to succeed, to what dangers it is exposed, how such governments grow and decay, with examples drawn from classical antiquity, from the history of the Italian states, and from what he himself had seen. In the *Principe*, in the same way, he investigates the rule of a single person—how it may be acquired, how retained, how made to succeed, and the qualities necessary to a prince. The most brilliant example of such a prince in his eyes is Cesare Borgia, of whose attempt to subdue the cities of Romagna he had been an eyewitness. The book is a purely scientific examination of the forces that come into play in the successful establishment of a strong and durable personal government; and from the problem are eliminated all extraneous factors like the rights of the persons affected and the morality of the acts committed. The investigation is carried out with the pitiless logic of a mathematical demonstration; every step is proved by examples from contemporary history, which unfortunately were abundant; and the conclusions reached are profound principles, of which many, however startling when expressed plainly and stripped of their conventional dress, are accepted as true by all statesmen and historians, and are followed by practical men in daily life. Some, however, if unmodified, would demand the ideal villainy of Machiavelli's model in order to be put into practice. The book was dedicated first to one, then to another of the Medici; but there is no evidence that it was ever presented. The dedication was intended rather to bring to public notice a work containing the author's ripest thought, which was not written for a special occasion. Like the *Discorsi* (published in 1531), it appeared after the author's death (in 1532). The *Principe* has given birth to an endless controversial literature, dating from its publication, in which it is attacked, defended, excused; in which question is raised as to what Machiavelli really meant, whether the book expresses his real convictions, whether it is not a satire—questions that are likely to remain matters of opinion. In his bold breaking away from all mediæval and even humanistic traditions of the state, and from all scholastic forms of thought, in his purely objective treatment of his question, as a purely scientific one, in his thoroughly modern way of looking the facts in the face, Machiavelli produced a work of genius, which at once made politics a science, and will stand forever as a masterpiece of Italian prose style. In 1521 Machiavelli, who had long been trying to draw closer to the Medici in the hope of again entering the active life for which he was so well fitted, was commissioned by them to write the history of Florence, and by 1525 had completed the work to the death of Lorenzo the Magnificent; his intention to continue it to his own time was prevented by death. Anxious to give his story a form worthy of it, in the *Istorie Fiorentine* Machiavelli turns to older historical models, and departs in some degree from his usual simple style; but it is the new method of treating history that gives the book its merit. No trace of the ancient chronicler is left; careless and often inaccurate in matters of detail, not always critical in the choice of authorities, with little sympathy for the Middle Ages and dead institutions, the author seeks everywhere for motives, for causes and results, for lessons to be drawn, for what can be of use in the present and the future, and applies to the task the clear, judicious, dispassionate intelligence that is his chief characteristic. This it is that makes him the first of modern historians, and places his name by the side of those of Tacitus and Thucydides.

The end of Machiavelli's life was clouded. He had acquired the esteem of the Medici, but hardly had they begun to make use of his talents when in 1527 they were again driven out of Florence and the republic was re-established. It was not to be hoped that Machiavelli would be restored to his office; yet he seems to have been bitterly disappointed that he was not; and in that same year he died, and was buried in the family chapel in Santa Croce, leaving his family in great poverty.

The change of party, the desire to serve both the republic and the Medici, has been made a reproach against Machiavelli, but not with entire justice. In all his public life he was first and foremost a citizen of Florence; his loyalty, his patriotism were for his city alone. In all his writings he shows his preference for a republic, and he had served his republic faithfully; but when the government changed he continued a Florentine and was ready to serve his country under the Medici. A practical man of business, he sought for good government first; he was constantly striving against the disorders that weakened the state, and so was ready to accept a tyranny, which was strong and preserved order, in place of a republic which retained only the form of liberty. From the conviction that Florence could be free and powerful only if foreigners were kept out of Italy, he was led to think out the remedy, and found it in the idea of a united Italy. In seeking the cure of the evils which afflict his country he goes to the very foundation of things, and deduces principles that apply to all states at all times. Living in an age when individual effort, for good and for bad, produced results which have never been equaled, his name stands among the foremost as a thinker; while as a writer of prose he is acknowledged as the greatest that Italy can boast. The Giunti published an edition of his complete works, the *Testina*, in 1551, and they have often been reprinted since.

The best modern edition is that printed at Milan, 1810–11, or *Italia*, 1813, in eleven volumes. An edition begun in 1873 by Passerini and others was never completed. An English translation by Detmold appeared in 1882. Of the *Principe* there is an excellent edition by E. A. Burd (Oxford, 1892). The best and latest biography is by Pasquale Villari, *N. Machiavelli e i suoi tempi* (3 vols., 1877–82; English trans. by Linda Villari, new ed. 2 vols., London, 1892). The literature on the *Principe* will be found in Mohl, *Geschichte und Literatur der Staatswissenschaft* (vol. iii.) See also O. Tommasini, *La Vita e gli scritti di N. Machiavelli* (Turin, 1882); Nitti, *Machiavelli nella vita e nelle opere* (1876, *seq.*); Nourrisson, *Machiavel* (Paris, 1883).

G. Bendelari.

Machines and Machinery [viâ O. Fr. from Lat. *machina*, from Gr. μηχανή, device, expedient, contrivance, deriv. of μῆχος, means, expedient]: combinations of fixed and moving parts contrived with an intent to utilize force and motion for the attainment of a desired result. Mechanical machinery may be classified in general terms as follows: First, the machinery of prime movers, which includes every kind of machine by which natural forces are controlled and made available; second, the machinery of transmission, which includes every means for the transmission of power from a prime mover to the place where it is to be used; third, the machinery or apparatus which utilizes power in the doing of work.

The active elementary constituents of machinery, arranged in the order of discovery, are: 1, sliding contact; 2, rolling contact; 3, links or connecting-rods; 4, hoisting-tackle, etc.; 5, wrapping connections, belts, etc.; 6, fluid connections. The elementary movements employed in machinery are: 1, rectilinear motion; 2, circular motion; and 3, combination of the two kinds of motion. A well-known illustration of the three kinds is supplied by the connecting-rod of a steam-engine. The end of the rod coupled to the crosshead has a rectilinear movement, while the other end coupled to the crank moves in a circle, while any other point on the rod describes a closed curve whose form and proportions are determined by the position of the point on the rod. The results produced by machinery are accomplished by the combination of suitable constituents of operation with force and motion in one or more of the three elementary ways named.

Machines may be classified in a general way as follows: 1, machines for use as prime movers, such as water-wheels, windmills, steam-engines; 2, for moving solid bodies: 3, for moving fluids; 4, for cutting or dividing bodies; 5, for making textile fabrics; 6, for pressing or squeezing: 7, for printing; 8, for acoustic purposes; 9, for optical purposes; 10, for calculation; 11, for measuring; 12, for weighing; 13, for recording; 14, for copying; 15, for developing and storing up electricity; 16, for miscellaneous purposes. Many of the items in this list may be subdivided into a large number of special types, each representative of certain peculiarities of construction intended to adapt the machine to particular situations or uses. The general considerations which should be kept in view by the constructors of machines are: Sufficient strength, wearing surface, and accessibility of parts; their adaptation to their functional requirements, with special reference to a silent smoothness of action in the moving elements, convenience of lubrication, safety to the attendants, and avoidance of complication. Noise and vibration in machines are usually evidences of a waste of power.

W. F. Durfee.

Machine-tools: machines used in shaping materials, as distinguished from tools used for such purposes which are worked by hand. The term is ordinarily restricted to those machines employed in working metals. Machine-tools commonly change the form of the stock upon which they work by cutting, as in turning, planing, drilling, and milling; but many important machine-tools, as grinding-machines, steam-hammers, and drop-presses, employ other processes.

The most familiar standard cutting machine-tools are the lathe, planer, and drill-press. By means of the lathe a piece may be turned (shaped externally) or bored (shaped internally) to almost any desired figure of revolution; flat surfaces can be faced, screw-threads can be cut, and, by special devices, various irregular forms can be produced. The hand-lathe, or speed-lathe, is the simplest form of the metal-working lathe, and it differs little in its essentials from the wood-turning lathe. The lathe-tool is held in the hands of the workman and simply supported on a rest. To facilitate such operations as those indicated above, upon stock of various sizes and shapes, many additional features are applied to the metal-working lathe in its more complete forms. The live spindle is driven by a stepped cone, so that by placing the belt upon different steps a speed appropriate to the material and size of stock is obtainable. For all but the smaller lathes it is desirable to have greater changes of speed than could be conveniently obtained in this way, and back-gears are applied. A lathe with back-gears is *double geared*. The *self-acting lathe* has a carriage with a feed along the bed. The tool is secured to this carriage, and cylindrical work can be produced automatically by this arrangement. This feed is usually derived from a spindle-rod or a screw parallel to the bed and driven by the spindle. When the screw is used, it is connected to the spindle by positive gearing, thus insuring a definite relation between the feed or longitudinal motion of the tool and the rotation of the work. This arrangement constitutes a *screw-cutting lathe*. The rod-feed is used for less exacting work, thus saving the lead-screw from unnecessary wear. Besides the screw-cutting lathe there are many modified forms, as pulley-lathes, shafting-lathes, turret-lathes, screw-machines, etc., designed to operate very efficiently upon limited classes of work.

For many operations, such as boring and turning large wheels, cylinders, etc., the *boring-mill* is advantageously employed. It has an adjustable vertical tool-support above a horizontal turning-table, upon which the work is placed.

The *planer* is used principally for dressing flat surfaces, though it is also employed for producing other ruled surfaces. The work is mounted upon a moving-table or platen, and the tool is held stationary during the cutting stroke, and fed horizontally, vertically, or at an angle during the return stroke. The time lost in the return stroke seriously affects the cost of work done on the planer. Various expedients have been tried to reduce this effect, but the one generally employed is that of returning the platen at a higher speed than would be permissible in cutting. The ratio of time required in cutting to that of the return stroke is about three to one, though five to one is sometimes employed, and higher ratios have been attained, but are extreme and unusual.

The size of work which can be operated upon in the ordinary type of planer is limited by the distance between the vertical supports or housings, and by the clear height under the cross-rail. For planing surfaces on wide work, without the use of excessively large planers, the open-side planer has been designed.

To avoid moving very heavy or unwieldy pieces, special forms of the planer, as the *plate-planer* and *shaping-machine*, are used; in these the tool is moved while the work remains stationary.

The *pillar-shaper* is very convenient for dressing small, light work; it resembles the shaping-machine, but has more limited capacity.

The *slotter* or *slotting-machine* resembles the shaper in its operation, but the cutter-bar has a vertical stroke, and the table upon which the work rests is placed below the cutter; so that the general design of the machine is somewhat suggestive of the drill-press.

The *drill-press* is largely restricted to drilling; but it is employed advantageously in tapping, reaming, and simple boring operations.

The *milling-machine* is used for a great variety of operations, and in its most general form—the "universal" milling-machine—it probably has a wider range than any other machine-tool. The cutter is a piece of steel having the general form of some figure of revolution, with teeth at the outer edge or along the faces. In the simplest form the cutter is similar to a circular saw, but the meridian section may be of almost any desired form. The cutter is mounted on a rotating arbor, and the work is fed toward the cutter. Plane surfaces are produced on the milling-machine by a long cylindrical cutter. The teeth of gears are cut on the milling-machine by giving the cutter the form of the space between two teeth of the gear. Most of the gear-cutting machines in use are only special forms of the milling-machine. The head of the universal milling-machine is used for subdividing circles, as in cutting gear-teeth and the flutes of taps and reamers; and the spindle is also capable of continuous rotation by the screw which imparts the longitudinal feed to the table. By this combination of motions the stock held by the head can be given a spiral movement under the cutter, with any desired pitch, and such grooves as are seen on twist-drills, spiral-reamers, and milling-ma-

chine cutters are thus produced. Many other (1,100) operations of a peculiar character may be carried on by the milling-machine, with proper devices. J. H. Barr.

Machine-work: work done and objects made or partly made by machinery, as distinguished from work produced by simple tools guided by the workman's hand. The term is especially used to denote what is intended for ornamentation, but, being made by machinery, has of necessity all its successive parts or members alike—a succession of parts exactly similar; whereas hand-work has not and can not have such close resemblance of its parts to one another. What is called the tame and lifeless character of machine-work is caused by this exact similarity of parts, as in machine-made lace, carpets woven on power-driven looms, wood-carving, and that which is called so, but is really carbonized or burnt work done by swift-moving patent appliances. All these fail to be pretty or interesting because of the constant succession of parts mechanically exact in their likeness to one another. There is no other cause for the general ugliness of machine-work that can not be done away with. The pattern may be as carefully designed for the steel die as for the workman to follow with his tools; the design for lace may be made as delicate and refined for the mill as for the needle-workers of Belgium or the bobbin-workers of Auvergne. If a design which is made for the machine is not generally so good as that used by the hand-workmen, this is because the same indifference to beauty of result which allows of the use of the machine at all governs also the choice of the design. There is no insuperable difficulty in getting fine designs ready for machine-work—some special patterns only, or some peculiar effects, are out of its reach. The real difference is that, whereas no two leaves, no two sprays, scrolls, curves, no two roundings, or sinkings, or notches are exactly the same in hand-work, machine-made ornament is always a series of exact repetitions.

A partial remedy for the stiffness and feebleness of machine-work is, then, to increase the length of the unit. In a machine-carved scroll, for instance, let the pattern which has to be repeated be 10 inches long and made up of four successive different whirls, or clusters, or "bouquets," rather than half as long and made up of two units only; then, when the fifth of these follows, and resembles the first one exactly, it will be so far from it, and will have so much differing work between, that the monotony of repetition will be greatly diminished. Another partial remedy is to make the pattern very irregular, very unsymmetrical, as is done, indeed, with many of the cheap laces of 1892–94, or to use a Japanese irregular sprinkle of flowers or sprays instead of an equally spaced arrangement of the same figures.

Russell Sturgis.

Machine and Rapid-fire Guns: A machine-gun is one that is loaded and fired by machinery. A rapid-fire gun is distinguished from a machine-gun by the fact that it is loaded by hand, and may be fired either by hand or by machinery; it is generally of larger caliber, and has but one barrel, while the machine-gun may have more. In both classes there is practically no recoil. The fire of the machine-gun is more rapid than that of the rapid-fire gun, but the latter delivers a comparatively rapid, well-aimed fire of large, armor-piercing projectiles, with relatively small weight of gun, while the former is generally limited in caliber to the small-arm ammunition; or, if it goes beyond this, as with the Hotchkiss revolving cannon, the weight of the gun becomes very great for the caliber. For these reasons machine-guns are restricted to infantry fighting, and can not cope with artillery. At present machine-guns are preferably used on land for defensive purposes in fixed positions, such as the defense of ditches or defiles, and on shipboard they are mounted in the tops, and are intended to sweep the decks of the adversary. Rapid-fire guns are almost exclusively used in the navy against torpedo-boats. By their power they are enabled to penetrate any armor that torpedo-boats can carry, and by their rapidity and accuracy the chances of hitting in a given time are greatly increased. The development of both machine and rapid-fire guns has been rendered possible by the development of metallic ammunition, and the limit of caliber of rapid-fire guns appears to be the weight of ammunition that can be conveniently handled by one man.

Machine-guns.

Mitrailleuse.—Probably the best known of the early machine-guns is the French mitrailleuse. This gun had twenty-five barrels, grouped in parallel rows of five. They were loaded by a single breech-block, which was movable, and contained twenty-five short chambers corresponding to the different barrels. Each gun had several of these breech-blocks, which were loaded beforehand. Each barrel had a separate firing-pin, and these pins were released in succession by mechanism operated by a crank.

Passing over a number of machine-guns which were tried during the civil war in the U. S. (1861–65), and which were generally unsuccessful, the next one to claim attention is the Gatling gun.

Gatling Gun.—This consists of a group of barrels (caliber 0·45 inches) around a central shaft. This shaft and the barrels are caused to rotate by a crank, which may be applied directly to the shaft, or indirectly, by means of a worm-gear. In rear of the barrels, and in prolongation of them, is a brass cylinder, whose surface contains a series of grooves, one for each barrel. Each of these grooves carries a bolt, which is made to slide in its groove parallel to the axis by the action of a fixed cam in rear of the bolts. Each bolt carries a firing-pin, a spiral mainspring, and an extractor. As the barrels and cylinder rotate, the bolts are pushed forward in their grooves. A cartridge being dropped from the magazine in front of a bolt, is pushed forward by the latter into the barrel. When it reaches this position the barrel is closed by the bolt, while the firing-pin, which has been drawn back during the forward motion, is released, and fires the cartridge. By a reversal of the motion of the bolts, caused by a change in the direction of the fixed cam, the empty case is now removed from the barrel and ejected. This process goes on continually, the bolts on one side advancing toward, and on the other side retiring from, the barrels.

The ammunition was formerly fed from a tin case in which the cartridges rested one above the other, and, the case being held vertically over the grooved cylinder, the cartridges were deposited in the grooves and in front of the bolts by the action of gravity. This was open to many serious objections, and is now abandoned.

For low angles of elevation the Bruce feed is used. This consists of an upright standard of brass, on the front of which is hinged a plate having two grooves into which the heads of the cartridges fit. By removing the top from the paper box in which the cartridges are packed, they can be slipped into the grooves of the swinging plate, and the box pulled off. One column of cartridges is then ready to feed into the gun. When this column is exhausted, the weight of the second column causes the hinged plate to swing over, and brings the opening of its groove over the magazine. A wheel is mounted below the mouth of the feed, which rotates with very little friction. The cartridges strike this and are delivered to the grooves parallel to the barrels, and thus jamming is avoided.

For high angles of elevation a positive feed, and one independent of gravity, is required. For this purpose the Accles feed is designed. It consists of a drum whose heads are separated by a distance a little greater than the length of the cartridge. The cartridges are held in spiral grooves in this drum, the pole of the spirals being at the center of the drum. Radial arms revolve about the center of the drum, the rotation being caused by projections on the grooved cylinder of the gun engaging with the extremities of the arms. By this rotation the arms push the cartridges along the spiral grooves of the drum, and deliver them to the barrels. The cartridges being held by the grooves are always fed parallel to the axis of the barrels, no matter what the angle of elevation may be.

The latest model feed consists of a strip of tin, to which the cartridges are attached by punching long, narrow pieces out of the strip, and wrapping these pieces around the cartridges. This strip of tin with the cartridges attached is fed into the gun, the cartridges acting as the teeth of a rack, and the fluted cylinder which carries the locks as a toothed wheel to move the strip transversely. A wedge-shaped projection frees the cartridges from the strip, and they are then pushed into the barrels by the locks as before. This feed is simple, light, and independent of gravity.

The Gardner Gun.—This has two barrels, which are parallel and side by side. Each barrel has its own bolt, as in the Gatling, and these bolts move backward and forward alternately in rear of the barrels and parallel to them, by the action of two cams, which are rotated by a crank. These cams are 180° apart, and, consequently, while one bolt is moving forward, the other is moving back. When the cams are on the center, one barrel is fired, while a cartridge

is dropped in front of the other bolt, ready to be pushed home. From the nature of eircular motion, the bolt is drawn baek slowly at first, thus giving power for the extraction of the empty ease. The feeding of the ammunition is somewhat similar to that of the Bruce in the Gatling gun. As the bolt moves forward it opens a valve and allows a cartridge to drop from the feed-guide in front of the opposite barrel, at the same time shutting off the feed from the barrel whose bolt is advaneing. This gun is not capable of delivering so many shots in a given time as the Gatling, owing to its smaller number of barrels.

The Nordenfelt Gun.—This is eomposed of a number of parallel barrels, varying from two to seven, arranged as in the Gardner gun. Eaeh barrel has its bolt, and the bolts are moved forward or backward together by a horizontal hand-lever on the right. Above each barrel is a magazine. When the bolts are drawn baek the eartridges drop in front of eaeh, and when the bolts are moved forward the cartridges are pushed by them into the barrels. As the bolts move forward the hammers are retained by a eomb. When the barrels are elosed by the bolts, and loeked by loeking bolts, the eomb whieh retains the hammers moves sidewise and releases them one after the other, so that the barrels fire sueeessively and not simultaneously. The effeet is that of a volley, but the shoek to the gun is not so great. This gun is used prineipally in England.

The Hotchkiss Revolving Cannon.—This differs from the Gatling, however, in having but one loading, one firing, and one extracting meehanism, whieh aet in turn on eaeh barrel. The caliber is 1½ inehes, and the projectiles steel shot, shell, or eanister. The breech is solid, and is of east iron and very heavy, to resist the shoek of discharge and assist in overcoming recoil. The barrels are made to revolve by the aetion of a peculiar gearing, driven by a erank on the right-hand side of the pieee. This gearing is for one-half its eireumferenee a screw, and for the other half the screw-threads become planes parallel to the axis of the gun. This gearing engages with heavy studs on the rear end of the central shaft, and by its arrangement, while the crank makes one continuous revolution, the barrels revolve during one-half of the revolution and remain still during the other half. While the barrels are rotating the firing-pin and loading-piston are moving to the rear, and the extractor to the front. While the barrels stand still the cartridge is fired, the empty case extraeted, and a new cartridge inserted. The rotation of the barrels then begins again as before. This gun is used principally in the U. S. navy, and was originally intended to act against torpedo-boats, but its relatively great weight and small caliber have caused it to be replaced for this purpose by the rapid-fire gun.

The Maxim Automatic Machine-gun.—This gun differs from those previously described in being, as its name indicates, automatic; that is, after firing one shot, if the finger be kept on the trigger, the gun will load and fire automatically till the supply of ammunition is exhausted. The inventor is Hiram S. Maxim, of the U. S. The gun consists essentially of a barrel attaehed to a frame. This barrel and frame are mounted in a casing, and have a sliding motion in it. The breech-block has a motion with reference to the barrel and frame. When the cartridge is fired, the barrel and frame reeoil together in the casing for a short distanee. At the end of this recoil a eam attached to the sliding frame strikes a fixed cam attached to the casing. The action of these cams draws back the breech-block from the rear end of the barrel. As it moves back it withdraws the empty shell from the barrel and draws a fresh cartridge from the magazine. The reeoil of the barrel and frame has also compressed a strong spiral spring, which now acts to pull the barrel and frame forward to its firing position. The block having extraeted the empty shell and drawn out a new cartridge, as above explained, its front portion or carrier, which slides vertieally, is caused to drop. The new cartridge is now in prolongation of the barrel, and the empty shell opposite the ejeetor-tube. The strong spiral spring before mentioned now moves barrel and block forward, and at the same time moves the bloek forward relatively to the frame, pushing the new cartridge home and the empty shell into the ejector-tube. As a final operation, when the block is in place the firing-pin will be released automatieally and the cartridge be fired, if the pressure on the trigger be maintained. After the insertion of the cartridge and just before the breech is closed, the front portion of the block or carrier rises and engages with a new cartridge. The cartridges are fed from belts, which may be hooked together end to end, and the supply thus made eontinuous. The belt is fed automatically, in a direction at right angles to the axis of the gun, and just above the chamber.

Rapid-fire Guns.

The Hotchkiss Rapid-fire Gun.—This is made of various ealibers, from the 1-pounder, 1·46 inehes, to the 100-pounder, 6·10 inehes. In all rapid-fire guns the distinguishing feature is the breeeh meehanism, and henee speeial attention will be given to that. The ballistic qualities are about the same for all guns of the same ealiber. In the Hotehkiss gun the breech-bloek moves vertieally in a slot in the breeeh. A lever with two handles projeets from the right side of the breeeh, and when rotated by the hand it moves a erank-arm on the inner faee of the breech, which arm earries a stud. This stud moves in a groove in the side of the breech-bloek, which groove is at first concentrie, and afterward eeeentric with referenee to the center of motion of the crank-arm. While the stud is moving through its coneentrie groove, the hammer is eoeked by the motion of the lever; when the stud reaehes the eeeentrie part of its groove, it causes the block to fall vertically in the breech-slot. In falling, the bloek draws baek an extraetor, whieh throws out the empty eartridge-ease as soon as the bloek falls far enough to uneover the rear end of the barrel. A new cartridge is then inserted by hand, and by reversing the motion of the hand-lever the block rises, pushing the eartridge home and elosing the breeeh. The gun is then fired by pulling the trigger. A shoulder-pieee is attaehed to the gun or to the carriage by whieh it may be aimed.

The Driggs-Schroeder Gun.—This was invented in the U. S. The breech-bloek has a combined sliding and rotating movement, and the upper part of the breeeh is not cut through as with most of the other systems. The breech-bloek has, on its upper convex surfaee, projeeting ribs, which fit into corresponding grooves in the upper part of the breeeh, and thus resist the reeoil. After firing, a handle is rotated, and this moves a cam which aets upon the block and forees it downward. This downward motion of the block continues until the ribs are disengaged from the grooves in the breeeh-reeess, when the bloek revolves to the rear. During the downward motion of the bloek, the hammer is coeked by the action of this eam, and when the breeeh is open the eartridge is ejected by the action of the breech-bloek upon the extractor. The cartridge being inserted by hand, a reversal of the motion of the lever first revolves and then raises the block, thus elosing the breech. The advantage of this rotatory motion of the block is that the cartridge need not be inserted by hand so far into the breeeh as in the ease of a sliding bloek, for the rotation tends to push the cartridge home, while the sliding tends rather to guillotine it.

The Nordenfelt Rapid-fire Gun.—In this gun the same object is sought as in the Driggs-Schroeder, but by different means. The breeeh-block is divided into two parts by a plane transverse to the axis of the gun. The rear part acts as a wedge and the front part as the block proper. The whole has a combined vertical sliding and rotatory motion in a slot in the breeeh. By moving a hand-lever, the rear seetion of the breeeh-block slides downward, the front section remaining fixed. When the rear section has moved down a certain distanee, by the aetion of the eam on the hand-lever, the whole bloek revolves together to the rear. In this revolution the hammer is eocked and the empty cartridge-case ejeeted. A reversal of the motion of the lever-handle eauses the bloek first to rotate as a whole, thus pushing the cartridge into its place, and then the rear or wedge part of the bloek rises vertically and presses the front part firmly against the breeeh.

The Maxim Rapid-fire Gun.—This differs from the other guns of its class by being semi-automatic—that is, after the first fire all the operations are performed by the gun itself, except that it is neeessary to introduee the cartridge by hand. The act of introducing it completes the cycle, and the gun fires and returns automatically to the position for the insertion of the next cartridge. The gun eonsists of a barrel and breech-block, which slides in a jacket. The motion of barrel and bloek to the rear is caused by the discharge; the motion to the front, by a strong spiral spring aeting on the barrel.

The breeeh-block slides vertically in the barrel. When a cartridge is fired, the barrel and block slide together to the rear. As they move forward again under the action of the spiral spring, a projecting arm on a shaft which passes

through the barrel strikes a spring catch attached to the jacket. This causes the shaft to rotate, and on this shaft is an arm that acts on the breech-block, thus causing the latter to fall. The fall of the block acts on the extractor and causes it to eject the empty cartridge-case. The rotation of the shaft above described compresses a spring. This spring, after the cartridge-case is ejected, causes the block to rise vertically till it is caught by projections on the extractor fitting into corresponding cuts in the front of the block. In this position the insertion of the cartridge causes it to strike against the extractor, and move it forward. This disengages the latter from its hold on the block, when the latter rises and closes the breech. As in the case of the machine-gun, if the trigger be kept pressed the gun will fire automatically at the instant the breech is closed.

These descriptions include the best-known rapid-fire guns. Among others not described are the Albini, Armstrong, Canet, Gruson, and Krupp, but the principal types are included in the above descriptions.

As an illustration of the characteristics of each caliber, as regards weight, projectile, velocity, power, etc., the following data relating to the Hotchkiss rapid-fire gun is given:

Caliber of gun, inches.	Weight of projectile, pounds.	Weight of powder, pounds.	Muzzle velocity, feet per second.	Penetration into wrought-iron plate, with steel shell, at muzzle, inches.
1·49	1·87	0·70	1,968	3·43
1·85	3·31	1·76	2,001	4·13
2·24	6·00	2·03	1,968	5·08
2·99	14·11	7·06	2,034	7·36
3·93	33·07	13·22	1,968	9·84
4·72	55·11	29·76	2,132	13·38
6·10	99·21	48·50	2,001	14·17

For detailed descriptions of all these guns, see *Reports* of the chief of ordnance of the army and navy, *Reports* on naval progress for 1887 and subsequently, and the handbooks published by the manufacturers giving very full and complete data. LAWRENCE L. BRUFF.

Machray, măk-rā′, ROBERT, D. D., LL. D.: Anglican archbishop: b. in Aberdeen, Scotland, in 1832; was educated at King's College, Aberdeen, and at Cambridge, where he graduated in 1851. He was ordained priest in 1856, and appointed vicar of Madingley the same year; became dean of Sidney Sussex College, Cambridge, in 1858; was university examiner 1860–61; Ramsden university preacher in 1865; and in that year was consecrated Bishop of Rupert's Land. The diocese at that time included the present Manitoba and the Northwest Territories, and the new bishop suffered many privations in visiting the mission stations scattered over this vast territory. In 1874 the diocese was subdivided and Bishop Machray was appointed metropolitan of the Northwest country. In 1881 he became chancellor of the University of Manitoba; in 1888 Professor of ecclesiastical History in the Theological College of Manitoba; and in 1893 archbishop of the Northwest country. N. M.

Maciejowski, mă-tsyĕe-yov′ski, WACLAW ALEKSANDER: Polish historian; b. at Kalwarya, 1793; educated at the Piarist schools at Piotrkow; in 1812 entered the Academy of Cracow; studied philology, history, and law at the Universities of Breslau, Berlin (under Savigny), and Göttingen, and upon his return was appointed Professor of Greek and Roman Literature at the Lyceum, and later Professor of the History and Institutions of the Roman Law at the University of Warsaw; lectured on the Pandects 1825–31; became Professor of Ancient Literatures at the Catholic Academy, and a member of the appellate court in 1838. D. at Warsaw, Feb. 10, 1883. Besides numerous essays, he wrote *Pamiętniki o dziejach, piśmienictwie i prawodawstwie Slowan* (Notes on Slavonic History, Literature, and Jurisprudence, 2 vols., Warsaw, 1839); *Polska aż do pierwszéj połowy XVII. wieku pod względem obyczajów i zwyczajów* (Poland down to the First Half of the Seventeenth Century, its Customs and Manners, 4 vols., Warsaw, 1842); *Pierwotne dzieje Polski i Litwy* (Early History of Poland and Lithuania, 1846); *Piśmienictwo polskie od czasów najdawniejszych aż do roku 1830* (Polish Literature since the Earliest Times down to 1830, 3 vols., 1851); *Historya prawodawstw słowiańskich* (History of Slavonic Legislation, 4 vols., 1832–35; 2d ed. 6 vols., 1856–65; a history of peasants' uprisings in Poland, Warsaw, 1874), etc. Maciejowski is a Panslav writer, whose theories have aroused considerable opposition. J. J. KRÁL.

MacIlvaine′, CHARLES PETTIT, D. D., LL. D., D. C. L.: bishop and educator; b. at Burlington, N. J., Jan. 18, 1798; graduated at Princeton in 1816; took orders in the Protestant Episcopal Church 1820; officiated at Georgetown, D. C.; was chaplain at West Point, N. Y., and Professor of Ethics and History 1825–27; became rector of St. Ann's, Brooklyn, N. Y., in 1827; was Professor of the Evidences of Revealed Religion in the University of the City of New York in 1831; was consecrated Bishop of Ohio in 1832, on the resignation of Bishop Philander Chase; was president of Kenyon College 1832–40, and afterward president of the theological seminary at Gambier, O. His *Evidences of Christianity* (1832) has gone through many editions. Among his other works are *Oxford Divinity* (1841): *The Holy Catholic Church* (1844); *Valedictory Offering* (1853); *The Truth and the Life* (1855). D. at Florence, Italy, Mar. 12, 1875.

McIlvaine, JOSHUA HALL: See the Appendix.

Mc'Intosh, Gen. LACHLAN: soldier; b. at Borlam, Inverness, Scotland, Mar. 17, 1727. His father, John More McIntosh, the head of the Borlam branch of the clan McIntosh, accompanied Oglethorpe to Georgia in 1736 with 100 of his tribesmen, and settled in New Inverness (now Darien), in what is now McIntosh County. Lachlan had few opportunities for education, but, aided by Gov. Oglethorpe, studied mathematics and surveying; became a clerk at Charleston in the counting-house of his friend Henry Laurens; was afterward a surveyor in the Altamaha region; studied military tactics; became colonel of the First Georgia Regiment, and brigadier-general in the war of the Revolution (1776); killed Button Gwinnett in a duel May, 1777; commanded the Western department 1778, and led an expedition against the Indians of the Ohio valley; was actively engaged in the siege of Savannah 1779, and in the defense of Charleston 1780, where he became a prisoner of war. He was a member of the Continental Congress 1784, and commissioner to treat with the Southern Indians 1785. D. in Savannah, Feb. 20, 1806.

McIntosh, MARIA JANE: author; grand-niece of Gen. Lachlan McIntosh; b. at Sunbury, Ga., in 1803; was educated at Sunbury Academy; removed to New York in 1835; suffered a reverse of fortune in the financial crisis of 1837, when she determined to earn a support by authorship: published in 1841 a juvenile story entitled *Blind Alice*, which was followed by other juveniles (1843); the whole series was issued in 1847 in one volume as *Aunt Kitty's Tales*. They were republished in London, as also her later works, among which were *Conquest and Self-conquest* (1844); *Woman an Enigma* (1844); *Two Lives, or to Seem and to Be* (1846); *Woman in America, her Work and her Reward* (1850); *The Lofty and the Lowly* (1853); and *Meta Gray* (1858). D. at Morristown, N. J., Feb. 28, 1878. Revised by H. A. BEERS.

Mackar'ness, JOHN FIELDER, D. D.: bishop; b. in England, Dec. 3, 1820; educated at Merton College; became a fellow of Exeter College, Oxford; took holy orders in 1845; was vicar of Tardebigge, Worcestershire, 1845–55; rector of Honiton, Devonshire, 1855–58; prebend of Exeter 1858; proctor in convocation for the clergy of the diocese of Exeter 1865; favored the disestablishment of the Irish Church, and was appointed in Dec., 1869, Bishop of Oxford. Owing to failing health he took measures for the resignation of his see in 1888, but before the legal formalities had been fully carried out he died at Cuddesdon, near Oxford, Sept. 16, 1889. Revised by W. S. PERRY.

Mackay′, CHARLES: author; b. in Perth, Scotland, in 1812; was educated in London, Brussels, and Aix-la-Chapelle; was employed on the staff of *The London Morning Chronicle* 1834–43; editor of *The Glasgow Argus* 1844–47; was long editorially connected with *The Illustrated London News*; founded *The London Review* in 1860; contributed a series of poems—*Voices from the Crowd*—to the London *Daily News*; lectured in the U. S. in 1858, and was a war-correspondent of the London *Times* in the U. S. 1862–65. Is best known by his songs, some of which were set to music composed by himself. Among his numerous works are *Songs and Poems* (1834); *History of London* (1837); *The Thames and its Tributaries* (1840); *Longbeard*, a romance (1840); *Memoirs of Extraordinary Popular Delusions* (1841); *Legends of the Isles* (1845); *Education of the People* (1846); *The English Lakes* (1846); *Town Lyrics* (1848); *Under Green Leaves* (1857); *Studies from the Antique* (1864); *Lost Beauties of the English Language* (1874); *Poetry and Humor of the Scottish Language*; *The Founders of the American Republic*; and for some time preceding his

death was occupied in writing a book on *The Gaelic Etymology of the English Language*. He died in London, Dec., 1889. His son Eric, author of *The Love-letters of a Violinist*, *Nero and Actea*, a tragedy, etc., wrote an introduction for the *Posthumous Poems* of his father. The sister of the latter, under the pseudonym *Marie Corelli*, has written popular novels.

Mackaye, James Steele: See the Appendix.

McKean, Thomas, A. M., LL. D.: a signer of the Declaration of Independence: b. at Londonderry, Pa., Mar. 19, 1734; was admitted to the bar, and early held important public trusts in Delaware and Pennsylvania. He was sent to the general Congress of 1765, where he took a bold stand for the rights of the colonies. He became in 1765 judge of the quarter sessions and the orphans' court, and sole notary and tabellion public for Delaware. In 1771 he was made collector of the port of Newcastle, and was 1774–83 a member of Congress from Delaware, president of Congress in 1781, and president of Delaware in 1777, although he had for some years been a citizen of Pennsylvania. He wrote the constitution of Delaware in a single night, with no book for reference, and it was adopted unanimously on the following day. He was (1777–99) chief justice of Pennsylvania, and its Governor 1799–1808. He was one of the ablest and most determined of the Revolutionary patriots. D. in Philadelphia, June 24, 1817.

McKeesport: city; Allegheny co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Monongahela river at the mouth of the Youghiogheny river, both of which are here navigable for steamboats, and on the Balto. and O., the Penn., and the Pitts. and Lake Erie railways; 14 miles S. E. of Pittsburg. It is the center of the greatest bituminous coal region in the country and of the natural-gas wells. The census returns of 1890 showed that 116 manufacturing establishments (representing 40 industries) reported. These had a combined capital of $10,942,537; employed 6,283 persons; paid $3,433,029 for wages and $10,610,618 for materials; and had products valued at $17,383,125. The principal industry was the manufacture of iron and steel, which had 3 establishments, $10,191,652 capital, and 5,665 persons employed; paid $3,114,845 for wages, and had products valued at $16,235,177. Among these establishments were the largest wrought-iron pipe-works in the world. Other manufactures are sawed lumber, locomotives, cars, and glass. There were 7 public-school buildings, and public-school property valued at $140,000. The city has 3 national banks, with combined capital of $500,000, a State bank with capital of $100,000, and 3 daily and 2 weekly newspapers. Pop. (1880) 8,212; (1890) 20,741; (1900) 34,227. Secretary of Board of Trade.

McKee's Rocks: village; Allegheny co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Pitts., Chartiers and Youghiogheny Railway; 4 miles from Pittsburg, the county-seat. It contains iron, steel, and planing mills, iron-bridge works, glass-factory, machine-shops, and railway repair-shops, and has two weekly newspapers. Pop. (1880) not in census; (1890) 1,687; (1900) 6,352.

MacKel'lar, Thomas: poet; b. in New York, Aug. 12, 1812; entered at the age of sixteen years the printing establishment of the Harpers; removed to Philadelphia in 1833; became proof-reader in the great stereotype foundry of Lawrence Johnson & Co.: rose to be foreman, and ultimately a partner. He published several volumes of poetry —*Droppings from the Heart* (1844); *Tam's Fortnight Ramble* (1847); *Lines for the Gentle and Loving* (1853); and *Rhymes Atween-times* (1873). He published a typographical manual, entitled *The American Printer*, in 1866, and a volume of *Hymns and Metrical Psalms* in 1883. His best-known poem is the popular song *Let Me Kiss Him for His Mother*. D. Dec. 29, 1899. Revised by H. A. Beers.

McKen'dree, William, D. D.: the first bishop of the Methodist Episcopal Church born in America; b. in King William co., Va., July 6, 1757. At the beginning of the Revolutionary war, 1775, he entered the Continental army; was an adjutant and commissary, and witnessed the surrender of Cornwallis. He joined the Methodist itinerant ministry in 1778. In 1801 he was sent over the Alleghanies into Kentucky, and became one of the principal founders of his denomination in the Western States. His travels were extensive, his labors extraordinary, his eloquence remarkable, his success general, and his endurance of privation and suffering heroic. In 1808 he was elected bishop. McKendree College was founded at Lebanon, Ill., in the year of his death. D. near Nashville, Tenn., Mar. 5, 1835.

Mackenna, Benjamin Vicuña: See Vicuña Mackenna.

McKenna, Joseph: See the Appendix.

McKenzie: town; Carroll co., Tenn. (for location of county, see map of Tennessee, ref. 6–C); on the Louis and Nash. and the Nash., Chat. and St. L. railways; 113 miles N. E. of Memphis, 119 miles W. of Nashville. It is in an agricultural region, has considerable trade, and contains Bethel College (Cumberland Presbyterian, opened in 1849), which in 1890 had 6 instructors, 281 students, and $10,000 invested in grounds and buildings, and McTyeire Institute (Methodist Episcopal, founded in 1882), which in 1890 had 3 instructors, 110 students, and $90,000 invested in grounds and buildings. Pop. (1900) 1,266.

Mackenzie, Sir Alexander: b. at Inverness, Scotland, about the middle of the eighteenth century; removed to Canada when young; entered the service of the Northwest Fur Company; passed eight years at Fort Chippewyan on Lake Athabasca, where he formed a project of an exploring expedition to the Northern Ocean; spent a year in England in the study of astronomy and navigation; set out from Fort Chippewyan June 3, 1789, with four canoes and a party of twelve persons; discovered and explored to lat. 69° the great river to which he gave his name; and in a second expedition from Fort Chippewyan, begun in Oct., 1792, reached the Pacific Ocean at Fort Menzies in July, 1793. Returning to England in 1801, he published *Voyages from Montreal through the Continent of North America to the Frozen and Pacific Oceans in the Years 1789 and 1793* (4to, with maps); was knighted in 1802, and died at Dalhousie, Scotland, Mar. 12, 1820.

Mackenzie, Alexander, P. C.: Canadian statesman; b. near Dunkeld, Scotland, Jan. 28, 1822; was educated there and at Perth; removing to Canada in 1842, became a contractor and builder. He represented East York in the Canada Assembly 1861–67; the same constituency in the Dominion Parliament 1867–92; sat for West Middlesex in the Ontario Assembly 1871–72, and was treasurer of the province during that period. He declined a seat in the Canadian cabinet in 1865; led the Ontario opposition in the Dominion Parliament from 1867 till 1873, when he was elected leader of the entire reform opposition of Canada. Upon the resignation of Sir John Macdonald, Mr. Mackenzie was called on to form a new administration, which he succeeded in accomplishing Nov. 7, 1873, taking the positions of Premier and Minister of Public Works, which he held till he and his cabinet resigned in 1878, in consequence of the Conservatives being returned to power. He proceeded to Scotland in 1875, and while there was presented with the freedom of Irvine, Dundee, and Perth; and during a subsequent visit in 1881 was presented with the freedom of Inverness. He visited the Queen at Windsor, and was thrice offered the honor of knighthood, which he declined. He was instrumental in securing the enactment of various important measures; possessed great administrative abilities; was a fluent and convincing speaker. D. at Toronto, Apr. 17, 1892. He was the author of *Life and Speeches of Hon. George Brown* (Toronto, 1882). Neil Macdonald.

McKenzie, Alexander, D. D.: clergyman; b. in New Bedford, Mass., Dec. 14, 1830; was educated at Harvard College and Andover Theological Seminary; was pastor of the South Congregational church, Augusta, Me., 1861–67; pastor of the First church (Congregational), Cambridge, Mass., in 1867; was an overseer of Harvard College 1872–84; is trustee of Phillips Academy, Andover, Wellesley College, Hampton Institute, and Cambridge Hospital; lecturer at Andover Theological Seminary and Harvard University; is author of *History of the First Church in Cambridge* (1873); *Cambridge Sermons* (1883); *Some Things Abroad*; *The Two Boys*; and numerous addresses.

Mackenzie, Alexander Campbell: composer; b. in Edinburgh, Scotland, Aug. 22, 1847; was educated at first by his father, himself a fine violinist, and then at Schwarzburg-Sondershausen, Germany, where he entered the Grand Ducal orchestra as a violinist when fourteen years old. In 1862 he removed to London, and became a king's scholar in the Royal Academy of Music; in 1865 returned to his native city, and began a professional career as violinist and teacher. His first composition was a quartet for piano and strings in B flat, which was published in Leipzig; soon after came his overture *Cervantes* and other orchestral compositions. His

first choral composition was the cantata *The Bride* (1880), followed by *Jason* (1882), which was performed at the Bristol festival in that year; then came *The Rose of Sharon* for the Norwich festival of 1884; *The Story of Sayid* for the Leeds festival of 1886; *Jubilee Ode* (1887); *The New Covenant* (Glasgow, 1888); *The Cottar's Saturday Night* (1890); *The Dream of Jubal* (London, 1889); *Veni Creator Spiritus* (1891); *Bethlehem* (1894); and the two operas *Colomba* (1883) and *The Troubadour* (1886), both composed to order for the Carl Rosa Company. He has also composed much excellent orchestral music and many songs, part songs, piano and organ pieces. He received the degree of Mus. Doc. from the University of St. Andrews in 1886, and was elected principal of the Royal Academy of Music in Feb., 1888, to succeed Sir George A. Macfarren. D. E. Hervey.

Mackenzie, Alexander Slidell: originally named Slidell, brother of Senator John Slidell; naval officer and author; b. in New York, Apr. 6, 1803; entered the navy in 1815; cruised in the Mediterranean and on other stations; became lieutenant 1825, commander 1841, serving on the West Indian, Brazilian, Pacific, and Mediterranean squadrons, and took in 1837 the name of Mackenzie. In 1842 Commander Mackenzie was placed in charge of the U. S. brig Somers, sent to the West African coast, manned chiefly by naval apprentices, and on the return voyage an intention of mutiny said to have been discovered on board led, by a decision of council of officers, to the hanging from the yardarm (Dec. 1, 1842) of three young men, one of whom, a midshipman, was a son of John C. Spencer, the Secretary of War. This tragical event naturally created a great sensation, and Mackenzie's conduct was severely criticised and as warmly defended. Though his conduct was approved by a court of inquiry, and he was acquitted of blame by a court martial, the difference of opinion was not set at rest, and the affair embittered the subsequent life of Mackenzie. He was ordnance officer at the siege of Vera Cruz during the Mexican war, and commanded the artillery division which stormed the town of Tabasco June 16, 1847. D. at Tarrytown, N. Y., Sept. 13, 1848. Mackenzie had considerable literary ability, and published *A Year in Spain* (1829; revised ed. 1836); *Popular Essays on Naval Subjects* (1833); *The American in England* (1835); *Spain Revisited* (1836); *Life of John Paul Jones* (1841); *Life of Oliver Hazard Perry* (1841); and *Life of Stephen Decatur* (1846).

Mackenzie, Charles Frederick, D. D.: bishop; b. in Peeblesshire, Scotland, Apr. 10, 1825; graduated at Cambridge in 1848; took orders in the Church of England; labored for some time as a parish minister; obtained a fellowship and lectured at Cambridge; went to South Africa in 1854 with Bishop Colenso, and officiated as Archdeacon of Natal until 1859, when he returned to England to urge the establishment of other African missions; was consecrated Bishop of Central Africa at Cape Town Jan. 1, 1861; sailed for the Zambezi with a corps of missionaries, and began operations at a village named Magomero, where the climate soon undermined his constitution, and he died Jan. 31, 1862. His *Life* (2d ed. 1865) by Harvey Goodwin, D. D., Dean of Ely (afterward Bishop of Carlisle), is a work of deep interest.

Revised by W. S. Perry.

Mackenzie, Sir George: lawyer and statesman; b. at Dundee, Scotland, in 1636; was educated at the Universities of Aberdeen and St. Andrews; studied law three years at Bourges, France; was admitted to the bar in Edinburgh in 1656, and soon became celebrated as an advocate; warmly but unsuccessfully defended the Marquis of Argyle on his trial for treason 1661; was knighted, became judge of the criminal court, member of Parliament, and king's counsel (1677), in which capacity he maintained the doctrine of passive obedience. His conduct as criminal prosecutor in the persecution of the Covenanters caused him to be stigmatized by the title of Bluidy Mackenzie. He was also memorable for the witchcraft trials over which he presided. Mackenzie was a friend of Dryden and other poets, was himself an elegant scholar, and one of the first Scotchmen to write the English language correctly. He published *Religio Stoici* (1663), *A Moral Essay upon Solitude* (1665), *Moral Gallantry* (1667), a *Discourse on the Laws and Customs of Scotland in Matters Criminal* (1678), and *Institutions of the Laws of Scottand* (1684), besides *A Vindication of the Government of Charles II.* He was the chief founder of the Advocates' Library in Edinburgh. In 1688 he retired to Oxford. D. in London, May 8, 1691. His complete *Works* were published in 1716–22.

Mackenzie, Henry: author; b. in Edinburgh, Scotland, Aug. 26, 1745; was educated at the university of that city; became an attorney of the Scottish court of exchequer; published anonymously in 1771 a novel, *The Man of Feeling*, which enjoyed great popularity, and led to the composition of a second part, which was issued under the author's name in 1773 as *The Man of the World*. Another novel, *Julia de Roubigné*, appeared in 1777. In 1779–80 Mackenzie edited a weekly literary paper, *The Mirror*, for which he wrote a series of admired essays; in 1785–87 he conducted *The Lounger*, a paper of a similar character; wrote political tracts espousing Tory principles; made a report to the Highland Society adverse to the genuineness of the Ossianic poems; wrote three tragedies and biographical sketches of Thomas Blacklock, John Home, Lord Abercromby, and William Tytler, besides various minor publications. In 1804 he received the appointment of comptroller of taxes for Scotland; gave to the world his collected works in 8 vols. (1808); and made his house in Edinburgh the center of the most distinguished literary and political society. D. Jan. 14, 1831.

Mackenzie, James Cameron: See the Appendix.

Mackenzie, Sir Morell, M. D.: laryngologist; b. at Leytonstone, Essex, England, July 7, 1837; was the son of a physician; entered London University, where he took M. B. in 1861 and M. D. in 1862; in 1858 studied in Paris, and in 1859 in Budapest, where he met Czermak, who was introducing the laryngoscope, in the use of which Mackenzie soon became expert, and which he introduced into London. In 1860 he became resident medical officer to the London Hospital, holding the office eighteen months, then became its first registrar; in 1866 became assistant physician and in 1873 physician, resigning the latter in 1874. In 1863 he founded the Throat Hospital. His skill and dexterity in operating and the fertility of his resources combined to give him the largest practice in his specialty in England, and to necessitate his services for the Crown Prince, subsequently Frederick III., of Germany. For these latter services he was knighted in 1887 by the Queen of England, and had conferred on him the Grand Cross and Star of the Hohenzollern Order of Germany. He was president of the laryngological section of the international medical congress held at Copenhagen in 1884, and was the first president of the British Laryngological Society. His treatise on the *Use of the Laryngoscope* (London, 1866) passed through several editions. His *Essay on Growths in the Larynx* (1871) raised him to the front rank of laryngologists. His other important works are *A Manual of Diseases of the Throat and Nose* (New York, 1880); *The Hygiene of the Vocat Organs* (London, 1886). D. in London, Feb. 13, 1892.

S. T. Armstrong.

Mackenzie River: one of the largest streams on the globe. It rises in Great Slave Lake, and flows in a N. N. W. direction to the frozen ocean. It is navigable in the open season from its mouth to Fort Simpson, where there are rapids; above which it is again navigable to Great Slave Lake. Its three great head-streams are the Peace, Athabasca, and English rivers. Its extreme length is 2,300 miles; its area of drainage, 590,000 sq. miles. Lignite-beds occur upon its banks, and a large part of its upper basin is fertile and habitable land.

Mackerel [from O. Fr. *maquerel* > Fr. *maquereau*; cf. Lat. *ma'cula*, spot]: a name of various salt-water fishes of the genus *Scomber* (family *Scombridæ*). The most important species is the common mackerel, *Scomber scombrus*, found in the North Atlantic, and caught on the shores of both continents in immense numbers, both by hooks and nets. As a fresh fish, the mackerel is of rich and excellent

Mackerel.

flavor; it is also salted in great quantities. Gloucester and Yarmouth, Mass., are the great centers of the mackerel-fishery in the U. S. Their fleets visit all parts of the coast from the Carolinas to the Bay of Chaleurs, according to the season of the year. Spain, Spanish America, and the South

and West of the U. S. are the great markets for salted mackerel. The name mackerel is also applied to various other species of *Scombridæ*, as the chub-mackerel (*Scomber colias*), the Spanish-mackerel (*Scomberomorus maculatus*), and the frigate-mackerel (*Auxis thazard*). See also SCOMBRIDÆ and FISHERIES. Revised by D. S. JORDAN.

Mackerel-gull: a popular name for the terns (see TERN), given them on account of their habit of hovering over schools of mackerel in search of fish driven to the surface, or to pick up scraps of food left by the fishes.

Mack'ey, ALBERT GALLATIN, M. D.: writer on Freemasonry; b. in Charleston, S. C., in 1807; graduated in 1832 at the Medical College of South Carolina, where he became demonstrator of anatomy in 1838, but in 1844 devoted himself wholly to literature, chiefly in connection with Masonry. He wrote for several periodicals in Charleston; published a *Lexicon of Freemasonry* (1845); *The Mystic Tie* (1849); *Principles of Masonic Law* (1856); *The Book of the Chapter* (1858); *Text-book of Masonic Jurisprudence* (1859); *Cryptic Masonry and Masonic Ritualist* (1867); *The Symbolisms of Freemasonry* (1868); and *Manual of the Lodge* (1870). He also edited the *Ahiman Rezon*, or *Book of Constitutions of the Grand Lodge of Ancient Freemasonry of South Carolina*. He established a Masonic monthly in Charleston in 1850, and a quarterly in 1858; lectured on the Middle Ages, and was active in politics after the civil war. A much enlarged edition of the *Lexicon* appeared in 1875, called *Encyclopædia of Freemasonry*. D. June 20, 1881.

McKibbin, CHAMBERS: See the Appendix.

Mackinac, măk'-i-naw: village; Mackinac co., Mich. (for location see map of Michigan, ref. 2–I): on the Mackinac island, in Lake Huron, N. E. of Mackinac Strait, which connects Lake Huron with Lake Michigan; nearest railway, the Duluth, S. Shore and Atlantic; 300 miles by water N. by W. of Detroit. The island, which is 3 miles long by 2 miles wide, contains a post-office and a telegraph-station, and was a place of much importance in the colonial period. It was settled by the French; made a missionary station in 1669; captured and its inhabitants massacred by Pontiac in 1763; and captured by the British in 1812. The island is a popular summer resort, has a good harbor, and has large exports of fish. Pop. of village (1890) 750; (1900) 665.

McKinley, WILLIAM, twenty-fifth President of the U. S.; b. in Niles, Trumbull co., Ohio, Jan. 29, 1843; d. in Buffalo, N. Y., Sept. 14, 1901. The long low two-story frame building in which he was born was a country store and dwelling. His birthplace stood until late in 1895, when it was torn down, and the hard woods of the mantels and baseboards were made into canes and sold among his admirers. Authentic records trace the McKinlays in Scotland to 1547, and it is believed that James McKinlay, "the trooper," was one of William's ancestors. The crest of the McKinlay clan was a mailed hand holding an olive branch, and its motto "Not too much." The Rev. James McKinlay—mentioned by Burns in his poems *The Ordination* and *Tam Samson's Elegy*—was a kinsman, contemporary with the McKinleys of the Revolution in this country. The change in spelling the final syllable from *a* to *e* is explained by the reply that Major McKinley himself made at a meeting of the descendants of the clan in Chicago, in 1893, to a lady of the same name but spelled in the old way. "Your ancestors of the McKinlay clan," said he, "came to this country directly from Scotland, while mine came from the north of Ireland; but we are probably of the same original Covenanter stock." About 1743 one of the Scotch-Irish McKinleys settled in Chanceford Township, York co., Pa., where his son David (the McKinley of the Revolution, great-grandfather of the President) was born in May, 1755. He served as a private in the Pennsylvania line about two years, and participated in the capture of Paulus Hook and in the engagements of Amboy and Chester Hill. After the Revolution he resided in Westmoreland and Chester counties, Pa., until 1814, when he went to Ohio, where he died in 1840, at the age of eighty-five. James McKinley, son of David, moved to Columbiana co., Ohio, in 1809, and in that State the family has since mainly resided, although James and his wife, who died on the same day, are buried in the same grave at South Bend, Ind. The grandmother of the President, Mary Rose, came from a Puritan family that fled from England to Holland and emigrated to Pennsylvania with William Penn. Her father, Andrew Rose, Jr., was also a patriot of the Revolution, who participated in the battle of Monmouth and manufactured ammunition for the American army. William McKinley, Sr., father of the President, born in Mercer co., Pa., in 1807, married in 1829 Nancy Campbell Allison, of Columbiana co., Ohio, whose father, Abner Allison, was of English extraction, and her mother, Ann Campbell, of Scotch-German. Of their nine children, William was the seventh. Both the grandfather and the father of the President were iron manufacturers. His father was a devout Methodist, a stanch Whig and Republican, and an ardent advocate of a protective tariff. He died in November, 1892. The mother of the President died Dec. 12, 1897.

Birthplace of William McKinley, Niles, Ohio.

William received his first education in the public schools of Niles, but when he was nine years old the family removed to Poland, Ohio, where he studied at Union Seminary until he was seventeen. He excelled in mathematics and the languages, and was the best equipped of all the students in debating public questions of the day. In 1860 he entered the junior class of Allegheny College, Meadville, Pa. Intense application to his studies weakened his system and he was obliged to return home for rest. But as soon as he was able, he sought a change by engaging as a teacher in the public schools. A friend says of him at this time: "He was always studying, studying—studying all the time." He was fond of athletic sports, and was a good horseman. At the age of sixteen he became a member of the Methodist Episcopal Church in Poland, and was noted for his study of the Bible and his interest in discussions in the Bible class. When the civil war broke out, in the spring of 1861, he was a clerk in the Poland post-office, and he was among the first to enlist. He went with the recruits to Columbus, and was mustered in as a private in Company E of the Twenty-third Ohio Infantry, June 11, 1861. This regiment numbered among its field and staff officers Gen. William S. Rosecrans, Gen. E. Parker Scammon, Gen. Rutherford B. Hayes, Gen. James M. Comly, minister to Hawaii, Col. Stanley Matthews, United States Senator and Associate Justice of the Supreme Court, Gen. Russell Hastings, Dr. Joseph T. Webb, a noted surgeon, and Robert P. Kennedy and William C. Lyon, Lieutenant-Governors of Ohio. From the date of its organization, June 1, 1861, to the time it was mustered out, July 26, 1865, its rank and file included 2,095 men, of whom 169 were killed in battle and 107 died of wounds or disease. It was engaged in nineteen battles, marched hundreds of miles, endured great privation, and encountered all the perils and hardships of war with bravery and fidelity.

Young McKinley found the drill, discipline, and out-of-door life of the soldier beneficial to his health, and emerged from his four years' arduous service stronger than when he entered the army. Concerning this period of his life, he said: "I always look back with pleasure upon the fourteen months I served in the ranks. They taught me a great deal. I was but a schoolboy when I went into the army, and that first year was a formative period in my life, during which I learned much of men and facts. I have always been glad

that I entered the service as a private and served those months in that capacity." He participated in all the early engagements in West Virginia. The first of these was at Carnifex Ferry, Sept. 10, 1861, and its effects were of much consequence to the regiment. "It gave the boys confidence in themselves," he once said, "and faith in their commander. We learned that we could fight and whip the enemy on their own ground." In the winter's camp at Fayetteville he received his first promotion, commissary sergeant, Apr. 15, 1862. "Young as McKinley was," said ex-President Hayes in 1891, "we soon found that in business and executive ability he was of rare capacity, of unusual and surpassing capacity, for a boy of his age. When battles were fought or a service to be performed in warlike things, he always took his place. When I became commander of the regiment, he soon came to be on my staff, and he remained on my staff for one or two years, so that I did literally and in fact know him like a book and love him like a brother." He participated in the engagements at Clark's Hollow, May 1, and Princeton, May 15, 1862. In the summer the regiment went to Washington, and a few days after its arrival joined McClellan's forces and drove the enemy out of Frederick, Md. On Sept. 14 and 17 it participated in the battles of South Mountain and Antietam. The Twenty-third made three successful charges in the first of these battles, and lost heavily in both. "During the day [at South Mountain] the Twenty-third," says Whitelaw Reid in *Ohio in the War*, "lost nearly 200 men, of whom almost one-fourth were killed on the field or afterward died of their wounds. Only seven men were unaccounted for at the roll-call after the action. The colors of the regiment were riddled, and the blue field almost completely carried away by shells and bullets." At Antietam the regiment held its position in the hottest of the fight. It was engaged from dawn until nearly night without food or refreshment of any sort, save that brought by the youngest of the comrades. Sergeant McKinley was in charge of the commissary department of his brigade, and necessarily his post of duty was with the supplies, about two miles from the firing line where his famished comrades were fighting to hold their advanced position. As is the case in all hot fights, some stragglers found their way back to the supplies, and these McKinley utilized to get together provisions and coffee and carry them to the front. It was nearly dark when suddenly there was tremendous cheering along the front of the Twenty-third Ohio. McKinley had filled two wagons, and in the midst of the desperate fight had hurried the cans of coffee and other supplies to his comrades, who took fresh courage after the refreshment. The mules of one wagon became disabled under the terrific fire, but this boy of nineteen pushed on and got the other wagon safely through to the regiment. Col. Hayes was badly wounded at South Mountain, and when he went home to Ohio he told Gov. Tod the story. "Let McKinley be promoted to lieutenant," said the Governor, and it was accordingly done, his commission dating from Sept. 24, 1862. In his speech at the Lakeside Chautauqua, in 1891, Gen. Hayes described this incident and said: "From Sergeant McKinley's hand every man in the regiment was served with hot coffee and warm meats, a thing which had never occurred under similar circumstances in any other army in the world. He passed under fire and delivered with his own hands these things so essential for the men for whom he was laboring."

The regiment returned to winter quarters near Parkersburg. During the year it had marched more than 600 miles. It intercepted the Confederate raider John Morgan at Buffington's Ford, July 19, 1863, and assisted in his capture. In May, 1864, it took part in the battle of Cloyd's Mountain, from whose summit the enemy was driven, after a long march by what was supposed to be an impassable route. "It was a rough and trying march over mountains and through deep ravines and dense woods," McKinley once described it, "with snows and rains that would have checked the advance of any but the most determined. We penetrated a country where guerrillas were abundant, where it was not an unusual thing for our men to be shot from the underbrush—murdered in cold blood."

He had been promoted to first lieutenant, Feb. 7, 1863, and under his leadership his company was the first to scramble over the enemy's fortifications and silence their guns. His only reference to this achievement is to be found in his address upon President Hayes, at Delaware, Ohio, in 1893. "The advance across the meadow, in full sight of the enemy," said McKinley, "and in range of their guns, through the creek, and up over the ridge, was magnificently executed, and the hand-to-hand combat in the fort was as desperate as any during the war. Still another charge was made, and the enemy again driven back. On we hurried to Dublin depot, on the Virginia and Tennessee Railroad, burning the bridges there, tearing up the track, and rendering the railroad useless. There the New River bridge was destroyed, and then, with frequent encounters, we went to Staunton, Va." They again advanced until within two miles of Lynchburg, where the regiment camped so near the enemy that men of both sides took rails for their fires from the same fence. Four days later they were attacked by a superior force, which they at first repelled, but were compelled to retire. "All our commissary supplies were consumed," says McKinley; "but almost without food we marched and fought our way back, closely pursued by the enemy." It began on June 19, near Lynchburg, and continued until June 27, when a supply train was reached on Big Sewell Mountain, and there, to quote Col. Hayes's diary, "we stopped and ate, marched and ate, camped about dark, and ate all night." In these nine days the Twenty-third marched 180 miles, fighting nearly all the time. They had crossed three ranges of the Alleghanies four times, the ranges of the Blue Ridge twice, and marched several times all day and all night without sleep. In this memorable expedition the Twenty-third participated in engagements at Cloyd's Mountain, New River Bridge, Buffalo Gap, Lexington, Buchanan, Otter Creek, Lynchburg, and Buford's Gap, and finally got back to camp and fought under Gen. Crook in the battle of Kernstown, near Winchester, July 24, 1864. Lieut. McKinley had conducted himself with gallantry in every emergency, and at Winchester won additional honors. Crook's army was attacked by the whole of Early's, the National forces being 6,000 strong, and the Confederate 20,000. Hayes had charge of the first brigade on the extreme right, and was soon attacked with such fury that he was obliged to fall back. The movement was successfully executed, except that the Thirteenth West Virginia Regiment failed to retire and was in imminent danger of capture. McKinley was directed to go and bring it away, and, putting spurs to his horse, he galloped obliquely toward the advancing enemy. Russell Hastings, then major of the Twenty-third, said: "None of us expected to see him again as we watched him push his horse through the open fields, over fences and across ditches, while the fire from the enemy poured upon him, with shells exploding around and over him. Once he was completely enveloped in the smoke of an exploding shell, and we thought he had gone down; but no, out of this smoke emerged his wiry little brown horse, with McKinley still firmly seated and erect as a hussar. Now he had passed under cover from the enemy's fire, and a sense of relief came to us all. McKinley gave the colonel the orders to fall back, and added, 'I supposed you would go to the rear without orders.' The colonel replied: "I was about concluding I would retire, and am now ready to go wherever you lead; but, lieutenant, I p'intedly believe I will give them fellows a volley or two before I go.' McKinley commanded, 'Then up and at them as quickly as possible,' and as the regiment arose to its feet the enemy came into full view. Col. Brown's boys gave them a crushing volley, and, following it with a rattling fire, retreated toward some woods in their rear. As Crook and Hayes saw the regiment safely off, they turned, and following the column, with it moved slowly to the rear, down the Winchester pike. At a point near Winchester, McKinley brought the regiment to the column and its place in the brigade." Continuing the retreat, they came upon a battery of artillery of four guns and their caissons, which had been left in the way. McKinley asked permission to bring it off, but his superior officers thought it impossible, owing to the exhausted condition of the men. "The Twenty-third will do it," said McKinley, and called for volunteers. Every man of his company stepped out, and the guns were hauled off to a place of safety. The next day, July 25, 1864, McKinley was promoted to captain.

The brigade continued its fighting up and down the Shenandoah valley, skirmishes occurring almost daily. A fierce engagement took place at Berryville, Sept. 3, 1864, in which Capt. McKinley's horse was shot under him, and the fighting between Crook's and Longstreet's forces continued until nightfall, when both commanders withdrew their men.

Hayes dispatched McKinley for this purpose with the proper orders, but he encountered a strange situation, which is best described in his own words: "This engagement," he

once said, "will not soon be forgotten. It was a brilliant scene; the heavens were illuminated by the flashes of our own and the enemy's guns. Later, when both armies determined to retire, it became my duty to direct a regiment at some distance from the others to move. A stranger, and in the darkness, I knew nothing of the country. When I started on my mission some one on the other side was doing just what I was, as I could tell from what I could hear. I had not gone far when I was halted by a sentinel with 'Who comes thar?' The distinct Southern brogue was warning enough, and I hastened the other way. Very soon I was stopped by a voice with a shrill Western accent demanding, 'Who comes there?' and recognized friends. I gave the countersign, and soon had the regiment moving."

At Opequan and Fisher's Hill McKinley again distinguished himself. In the former battle as an aide on Gen. Crook's staff, he was sent with an order to Gen. Isaac H. Duval to move his command quickly to a position on the right of the Sixth Corps; but Duval, not knowing the topography of the country, asked the young aide, "By what route shall I move my command?" Capt. McKinley was without definite orders or knowledge of the country, but having a general idea of the direction of the water courses and location of the troops, replied, "I would move up this creek." Duval then said, "I shall not move without definite orders." McKinley knew that any delay was hazardous, and so, acting on his own view, at once replied: "This is a case of great emergency, general, and so I order you, by command of Gen. Crook, to move your command on the road up this ravine to a position on the right of the army." The movement proved exactly right; Duval's command was soon in position, and it drove the enemy from their works and contributed to the victory of the day.

In describing the fight at Fisher's Hill, McKinley called it "one of the most brilliant of the many brilliant achievements of Gen. George Crook. It was a flank movement through the mountains and woods to the enemy's right. Never did troops advance with greater difficulty, on what appeared to be an impassable route, over the mountain side, where it seemed the foot of man had never trod. Hayes led the charge down the gorge and up the hill. He led repeated charges. I can see him now, encouraging his men to make another and still another charge—until we had captured the whole of the enemy's works and every piece of their artillery. Nothing was more brilliant or decisive during the entire war, considering the numbers in the affair."

Soon after this battle the regiment was detailed as train guard to Martinsburg and marched to Winchester, where a brigade of the enemy's cavalry was reported to be. On the march (Oct. 11) the men voted in the election that decided whether the war should be continued to success or abandoned and acknowledged a failure. Capt. McKinley's first ballot was cast for Lincoln.

On the morning of Oct. 19, 1864, the National forces at Cedar Creek were surprised by Early's army, and for a time were thrown into confusion and routed. Gen. Sheridan had been at Winchester, "20 miles away," but, hearing the roar of the artillery, rode rapidly to the scene of action. On working to the front, he met Capt. McKinley, who, with other officers, had been striving to keep the men in line and establish a position. He had just returned from planting a battery. "Where's Crook?" asked Sheridan. Capt. McKinley turned, and together they rode off to find the general, and as Sheridan dashed down the line he yelled to the troops, amid their enthusiastic cheers: "Never mind, boys, we'll whip them yet. We'll sleep in our quarters to-night." Gens. Crook and Wright soon came up and briefly described the events of the morning to Sheridan, and under his leadership the National forces eagerly attacked and badly defeated the confident enemy.

A short time after this battle a successful cavalry raid by the Confederates on the Baltimore and Ohio Railroad, at New Creek, caused Gen. Crook to move one of his divisions to that place. He admired Capt. McKinley and took him along. Here Gens. Crook and Kelley were captured, and Gen. Hancock took charge of the department. He retained McKinley on his staff several months. McKinley was then assigned as acting assistant adjutant general on the staff of Gen. Samuel S. Carroll, commanding the Veteran Reserve Corps at Washington, where he remained through that exciting period which included the surrender of Lee to Grant at Appomattox and the assassination of Lincoln. Just a month before this tragedy, or on Mar. 14, 1865, he had received from the President a commission as major by brevet in the volunteer U. S. army, "for gallant and meritorious services at the battles of Opequan, Cedar Creek, and Fisher's Hill," signed "A. Lincoln." He participated in the last great act of the war, the final grand review in Washington, where the armies of Grant, Sherman, and Sheridan were united in May, 1865, with the same modest deportment that had characterized his entrance into the service in 1861. He was urged to remain in the army, but, wisely deferring to the judgment of his father, he was mustered out July 26, 1865, and returned to Poland, where the family was again reunited, his younger brother, Abner, having been a volunteer in the National army. He never was absent a day from his command on sick leave; he had only one short furlough in his four years of service; he never asked or sought promotion; he was present and active in every engagement in which his regiment participated; and he performed bravely and well every duty assigned him. On his return to Poland with his old company, a complimentary dinner was given to them, and he was selected to respond to the welcoming address, which he did in a speech of rare eloquence.

He at once began the study of law under the preceptorship of Judge Charles E. Glidden and his partner, David M. Wilson, of Youngstown, Ohio, applying himself diligently during the week at Poland, and going to their office on Mondays for review and examination. He completed his course at the law school in Albany, N. Y., and in Mar., 1867, was admitted to the bar at Warren, Ohio. On the advice of his elder sister, Anna, he settled in Canton, Ohio, where she was for many years a teacher in the public schools. Here he soon attracted attention, and by his exemplary life and devotion to his profession achieved success at the bar and great popularity. In the autumn of 1867 he made his first political speeches in favor of negro suffrage, a most unpopular doctrine throughout the State. Republican nominations in Stark County were considered empty honors; but when, in 1869, he was placed on the ticket for prosecuting attorney he made an energetic canvass and was elected. He discharged the duties of this trust with fidelity and fearlessness, but in 1871 he failed of re-election by 45 votes. He thereupon resumed his practice, and was remarkably successful.

He married, Jan. 25, 1871, Miss Ida Saxton, daughter of James A. and Catherine Dewalt Saxton. Her father was a banker of large means, who, after giving Ida, his youngest daughter, many advantages of education and travel, began her business training as cashier in his bank. At this time Mr. McKinley was superintendent of the Methodist Sunday-school, and his bride was a teacher in the Presbyterian. Two daughters were born to them—Katie on Christmas, 1871, and Ida in 1873—but both were lost in early childhood. Mrs. McKinley's health, not robust at any time, never has rallied from the terrible blow of these two deaths in quick succession. Her comfort, her wish, her happiness, under every conceivable circumstance, was her husband's first thought and constant concern. At home no hour passed that he did not see her; and she rewarded this homage with all the intensity of a proud, ardent, unselfish affection.

In the gubernatorial campaign between Hayes and Allen, in 1875, at the height of the greenback craze, he made numerous effective speeches in favor of honest money and the resumption of specie payments. The Hon. Stewart L. Woodford, of New York, spoke at Canton that autumn, and McKinley was prevailed upon to close the meeting. Animated by the eloquence of their visitor, McKinley captivated both the audience and the orator who had preceded him. On his return to Columbus, Mr. Woodford made it a point to see the State Committee and urge them to put McKinley upon their list of speakers. They had not heard of him before, but they put him on the list. The next year, 1876, McKinley was nominated for Congress and was elected over Leslie L. Lanborn by 3,300 majority. During the progress of the canvass, while visiting the Exposition in Philadelphia, he was introduced by James G. Blaine to a great audience at the Union League Club, and scored so great a success that he was at once in demand throughout the country. He spoke hundreds of times, and in almost every State and Territory, to more of his fellow-countrymen than ever were addressed by any other public man in the history of the republic. He was more like Webster in personal appearance, style, and delivery than any other American orator.

He entered Congress on the day when his old colonel as-

sumed the presidency. He delivered a notable address that year at the dedication of a soldiers' monument at Fremont, Ohio. But he devoted himself strictly to his congressional duties, and on Apr. 15, 1878, made a speech in opposition to what was known as "the Wood tariff bill," from its author, Fernando Wood, of New York, the first of the measures designed (according to its opponents) to cripple our protective system. He not only exposed the incongruities and absurdities of the proposed law, but the impolicy and recklessness of such legislation, and, although the House was Democratic, the measure was postponed until the short session, and then was abandoned altogether. His speech was widely circulated by the Republican Congressional Committee. Mr. Blaine, in his "Twenty Years of Congress," says, in reviewing the Forty-fifth Congress: "William McKinley, Jr., entered from the Canton district. The interests of his constituency and his own bent of mind led him to the study of industrial questions, and he was soon recognized in the House as one of the most thorough statisticians and one of the ablest defenders of the doctrine of protection."

In 1877 Ohio went strongly Democratic, and the Legislature gerrymandered the State, so that McKinley found himself confronted by an adverse majority of 2,580 in a new district. His opponent was Gen. Aquila Wiley, who had lost a leg in the National army, and was competent and worthy. McKinley entered the canvass with great energy, and after a thorough discussion of the issues in every part of the district, was re-elected to Congress by 1,234 majority. As chairman of the Republican State Convention of Ohio of 1880, he made an address devoted principally to the Federal election laws. Speaker Randall gave him a place on the Judiciary Committee, and in December, 1880, appointed him to succeed Garfield as a member of the Ways and Means Committee.

The Ohio Legislature of 1880 restored his old congressional district, and he was unanimously nominated to the Forty-seventh Congress. His election was assured, but he made a vigorous canvass, and was chosen over Leroy D. Thoman by 3,571 majority. He was chosen by the Chicago convention as the Ohio member of the Republican National Committee, and accompanied Gen. Garfield on his speaking tour through New York. He opened the State campaign at Portsmouth, Ohio, in July, and also spoke in Maine, Indiana, Illinois, and other States.

The Forty-seventh Congress was Republican, and it proceeded to revise the tariff. After much discussion it was agreed to constitute a commission, who should report at the next session. In the debate on this project McKinley delivered an interesting speech, Apr. 6, 1882, in which, while not giving his unqualified approval to the creation of a commission, he insisted that a protective policy should never for an instant be abandoned or impaired.

The elections of 1882 occurred while the tariff commission was still holding its sessions, and the Republicans were defeated. The Democracy carried Ohio by 19,000, and elected 13 of the 21 congressmen. McKinley had been renominated, after a sharp contest, and was elected by eight votes over his Democratic competitor, Jonathan H. Wallace. At the short session an exhaustive report by the tariff commission was submitted, and from this the Ways and Means Committee framed and promptly introduced a bill reducing existing duties, on the average, about 20 per cent. McKinley supported this measure in an explanatory and argumentative speech, Jan. 27, 1883, but it was evident from the start that it could not become a law, and the Senate substitute was enacted instead. In contrasting the respective advantages of the two revenue systems, he said: "If labor was degraded on this side of the Atlantic as on the other, we might compete with the best manufacturers of the world in any market. No lover of his race, no friend of humanity, wants reduced wages. I do not speak for capital. Capital can take care of itself. Rob it of its profits in any of the so-called protected industries, and it will seek other avenues of investment and profit. I speak for the workingmen of my district, the workingmen of Ohio, and of the country." Here Mr. Springer, of Illinois, interjected: "They did not speak for you very largely at the last election." McKinley replied, amid great applause on both sides of the Chamber: "Ah, my friend, my fidelity to my constituents is not measured by the support they give me! I have convictions upon this subject which I would not surrender or refrain from advocating if 10,000 majority had been entered against me." He delivered a speech on the Morrison tariff bill, Apr. 30, 1884, which was everywhere accepted as the strongest and most effective argument made against it. At the conclusion of the general debate, May 6, 41 Democrats, under the leadership of Mr. Randall, voted with the Republicans to defeat the bill.

At the Ohio Republican State Convention of that year, 1884, McKinley presided, and was unanimously elected a delegate at large to the National convention. He disliked to oppose Senator Sherman, but he was an avowed supporter of Mr. Blaine for the presidency, and did much to further his nomination. He served on the Committee on Platform, drafted its tariff planks, and read it to the convention. In the campaign he was equally active and prominent. The Democrats had carried the Ohio Legislature in 1883, and he was again gerrymandered into a district supposed to be strongly against him. He accepted a renomination, made a diligent canvass, and defeated David R. Paige, then in Congress, by 2,000 majority. He accompanied Mr. Blaine on his Western tour, speaking constantly with him from the same car or platform, and, after the October election in Ohio, devoted his time to the campaign in West Virginia and New York.

In the Ohio gubernatorial canvass of 1885 Major McKinley was equally active, conspicuous, and popular. He also went to Virginia in October and spoke for Mahone and Wise at Petersburg, urging the people of the Old Dominion to declare for protection as the best promoter of their material prosperity. "Make it possible," said he, "to break down the prejudices of the past. Get out from under your ancestral tree. Recognize and give force to the Constitution, permit every man to vote for the party of his choice, and have his ballot honestly counted. Push to the front where you belong as a State and a people. Be assured that the Republicans of the North harbor no resentments—only ask for the results of the war. They wish you the highest prosperity and greatest development." His district had been restored in 1886, and he was again unanimously nominated for Congress for the sixth time, and elected by 2,550 majority over Wallace H. Phelps.

In Congress, Apr. 2, 1886, he made a notable speech on arbitration as the best means of settling labor disputes. "I believe in arbitration as a principle," said he. "I believe it should prevail in the settlement of international differences. It represents a higher civilization than the arbitrament of war. I believe it is in close accord with the best thought and sentiment of mankind; I believe it is the true way of settling differences between labor and capital; I believe it will bring both to a better understanding, uniting them closer in interest and promoting better relations, avoiding force, avoiding unjust exactions and oppression, avoiding the loss of earnings to labor, avoiding disturbances to trade and transportation; and if this House can contribute in the smallest measure, by legislative expression, or otherwise, to these ends, it will deserve and receive the gratitude of all men who love peace, good order, justice, and fair play."

The State of Ohio designated James A. Garfield as one of the two of her sons, "illustrious for their heroic renown or distinguished by civic or military services," whose statues should be placed in the Statuary Hall at the Capitol, and he delivered a memorial address on the occasion of its presentation to Congress, Jan. 19, 1886. "Great in dealing with all public questions," he said of Garfield, "dull and commonplace in none, to me he was the strongest, broadest, and bravest when he spoke for honest money, the fulfillment of the Nation's promises, the resumption of specie payments, and the maintenance of the public faith. He contributed his share, in full measure, to secure National honesty, and preserve inviolate our National honor. None did more, few, if any, so much to bring the Government back to a sound, stable, and constitutional money. He was a very giant in those memorable struggles." At the second session, Feb. 16, 1887, he delivered a memorial address on Gen. John A. Logan, of Illinois, much admired for its beauty and tenderness. "The old soldiers will miss him," said he; "the mighty oak around which their hearts were entwined, to which their hopes clung, has fallen. The veterans have lost their steady friend, Congress one of its able counselors, the Republican party one of its great leaders, the country one of its noble defenders."

He advocated the passage of the dependent pension bill, Feb. 24, over President Cleveland's veto, as a "simple act of justice," and "the instinct of a decent humanity and our Christian civilization."

The attention not only of Congress, but of the country,

was sharply arrested by Mr. Cleveland's third annual message, Dec. 6, 1887, for it was devoted to an assault on the protective tariff laws, upon which he was previously thought to hold a conservative position. A bill was immediately introduced in the House by Mr. Mills, embodying the President's views and policy, and the two parties were arrayed in support or opposition to it. Then occurred a most remarkable debate. Absenting himself from Congress a few days, Mr. McKinley returned to Canton, Dec. 13, 1887, and delivered a masterly address before the Ohio State Grange on "The American Farmer." In this he declared against alien landholding, and advised his hearers to remain true to their faith in protection. "We must avoid in this country," said he, "the holding of large tracts of land by nonresident owners for speculative purposes, and set our faces against alien landholding in small or large tracts. Our public domain must be rededicated to our own people, and neither foreign syndicates nor domestic corporations must be permitted to divert it from the hallowed purpose of actual settlement and cultivation by real farmers." He also went to Boston and discussed before the Home Market Club, Feb. 9, 1888, the question of "free raw material," upon which the majority in the House counted confidently to divide their Republican opponents, with such breadth and force that the doctrine was abandoned in New England, where it was supposed to be strongest.

On Feb. 29 he addressed the House on the bill to regulate the purchase of Government bonds, not so much in opposition to the measure, for he heartily favored their retirement as speedily as possible, but because of the wrong impression sought to be conveyed. The President and the Secretary of the Treasury, he said, had always had abundant authority to buy bonds as fast as the revenues admitted, and "their ulterior motive in piling up a surplus of $60,000,000 in the Treasury, without retiring any of them, was evidently for the purpose of creating a condition of things in the country which would get up a scare and stampede against the protective system." He was willing to do anything to help "put in circulation the millions they had been hoarding, and pay off that amount of Government debt, but he would first have the country understand why the Administration had not done this long ago."

On April 2 he presented to the House the views of the minority of the Ways and Means Committee on the Mills tariff bill, which he had himself mainly prepared. In concluding this report, they said: "The minority regard this bill not as a revenue reduction measure, but as a direct attempt to fasten upon this country the British policy of free foreign trade. So viewing it, their sense of obligation to the people, and especially the working people employed in manufacturing and agriculture in all sections of our common country, impel them to resist it with all their power. They will assist the majority in every effort to reduce the redundant income of the Government in a direct and practicable way; but every effort of fiscal legislation which will destroy or enfeeble our industries, retard material development, or tend to reduce our labor to the standard of other countries will meet with their persistent and determined opposition." On May 18, the day the general debate was to close, McKinley delivered what was described at the time as "the most effective and eloquent tariff speech ever heard in Congress." In a well-turned illustration, at the expense of his colleague, Mr. Morse, of Boston, he showed, by exhibiting to the House a suit of clothes purchased at the latter's store, that the claims of Mills as to the prices of woolens were absurd, and by equal tact he convinced his hearers of the bad policy of our Government importing foreign blankets for the army, at the expense of domestic manufacturers and home labor, for the sake of saving about 30 cents apiece on them. Some of his objections to the bill, as it was then before the House, were so conclusive that its authors felt constrained to amend it in the particulars enumerated. He held that protection was from first to last a contention for labor, whether it should be well paid and independent, as befitted citizens of the republic, or poorly paid and degraded, as was conspicuously the case in governments where its opportunities and privileges were most contracted. "The hope of the country," said he, in conclusion, "is in the ballot. The future, and, as I conceive, the welfare and progress of the republic, the future condition of the wage-earners, depends upon the issue to be settled in November. Americans who love their country must be on guard on that day of supreme concern; it is their duty, their one great opportunity. Parties must be subordinated to the great interests of the masses. No party necessity is great enough to force its adherents against the country's best interests. I care not what in the future may be the party name which stands for this system, which stands for the people, I will follow its flag under whatever designation or leadership, because it is my country's flag and represents its greatness and its glory." Both Congress and the country heartily applauded this speech. The feeling among his colleagues may be shown by an incident of the day. Judge Kelley, the Republican leader of the House, had chosen McKinley to close the debate, but Mr. Haskell had begged that privilege, and McKinley at once conceded it to him. When McKinley sat down, Haskell leaned over his desk, just back of McKinley's, and, clasping the latter's hand enthusiastically, declared, "Major, I shall speak last, but you have closed the debate." The press of the country gave it unusual attention, Republican committees scattered millions of copies of it, and it became a text-book of the campaign.

At the Ohio convention of 1888 McKinley was elected a delegate at large to the Republican National Convention, and took an active part in its proceedings. As chairman of the Committee on Resolutions he had a large share in the preparation of the platform, reported it to the convention, and secured its unanimous adoption. He was from the start the choice of many delegates for President, and when it was ascertained that Mr. Blaine would not accept the nomination, a movement in his favor began. All the Republican congressmen then in Washington, considering his availability greater than that of any name presented, united in a telegram urging his selection. But he had gone to the convention committed to John Sherman, and viewed with abhorrence the idea of himself accepting an honor which he was earnestly seeking for another. The first day's balloting was indecisive, but on Saturday morning it was evident that sentiment was rapidly centering upon him, and this the next roll call soon developed. McKinley leaped upon his chair at the head of the Ohio delegation, and in the hush of the moment was heard by every man in the hall. "I am not insensible to the honor you would do me," he said, "but in the presence of the duty resting upon me I can not remain silent with honor. I can not consistently with the wish of the State whose credentials I bear and which has trusted me; I can not with honorable fidelity to John Sherman, who has trusted me in his cause and with his cause; I can not consistently with my own views of personal integrity, consent, or seem to consent, to permit my name to be used as a candidate before this convention. I would not respect myself if I could find it in my heart to do, or permit to be done, that which could even be ground for any one to suspect that I wavered in my loyalty to Ohio, or my devotion to the chief of her choice, and the chief of mine. I do not request. I demand, that no delegate who would not cast reflection upon me shall cast a ballot for me." The effect on the convention was as he intended; but the pressure from the country for his nomination was by no means abated. The Connecticut and New Jersey delegations both determined to vote for him unanimously; but he went to their rooms and, in the words of a delegate, implored them "almost with tears in his eyes" not to do so. To one who suggested that he had done as noble a thing as was ever known in politics, he simply asked, "Is it such an honorable thing not to do a dishonorable act?" Although Congress remained in session through most of the campaign, he spoke throughout the country as widely and frequently as his official duties admitted. His best address, perhaps, was at Atlanta, Ga., Aug. 21, on the benefits of protection to the South, ever a favorite topic with him. "The protective system must stand as a whole or fall as a whole," he declared. "As Burke said of liberty, it is the clear right of all or of none. It is only perfect when universal. Men of Georgia, upon this great industrial question there should be no North or South. To us of every section the interests of our homes are uppermost; we have not been intrusted with the care of other nations and other peoples. We will not interfere with them; we bid them not to interfere with us. In this conflict, influenced by patriotism, National interest, and National pride, let us be Americans."

He was for the seventh time nominated and elected to Congress in the following November, defeating George P. Ikert by 4,100 votes.

In the Ohio campaign of 1889 he made about 60 speeches in half as many counties. One of the best of these was on "Protection and Revenue," before a great audience in Cleveland, Oct. 5. At the organization of the Fifty-first

Congress he was a candidate for Speaker, but was beaten on the third ballot in the Republican caucus by Thomas B. Reed. He resumed his place on the Ways and Means Committee, and on the death of Judge Kelley became its chairman.

Thus devolved upon him, at a most critical juncture, the leadership of the House, under circumstances of peculiar difficulty, his party having only a nominal majority, and it requiring always hearty concord and co-operation to pass any important measure. The minority had resolved upon a policy of obstruction and delay, declaring they would clog the wheels of legislation, and, by refusing to participate in business, prevent anything being done. They held that, though actually present, they were constructively absent whenever they refused to respond to roll call, and could not then be counted to make up a quorum. The Speaker proceeded nevertheless to count them, and this brought about a bitter contest over the rules of procedure, upon which McKinley spoke (Jan. 30, 1890) with moderation, thoroughness, and strength, and with his usual effectiveness. His argument in favor of the Republican position was pronounced the ablest made, and has been characterized as "more like the brief of a great lawyer than a speech in a heated political controversy." The Republican side had wavered in the first attack of the opposition, but they now rallied solidly to McKinley's support, and the cause was won, the Speaker himself heartily thanking him for his great and timely assistance. On Apr. 24, 1890, he spoke in favor of sustaining the civil-service law, to which there was decided opposition. "The Republican party," said he, "must take no step backward. The merit system is here, and it is here to stay."

On Dec. 17, 1889, he introduced the first important tariff measure of the session—a bill "to simplify the laws in relation to the collection of the revenue." Its object, as explained by him, was "to protect the honest importer in the U. S. against the unscrupulous and dishonest importer; to protect American producers and dealers from the undervaluations and frauds that had long been practiced upon them; to take the business of importing out of the hands of dishonest men and place it, as it once was, in the hands of honest agents, factors, and merchants." The bill passed the House Mar. 5, and the Senate, as amended, Mar. 20, went to a conference committee, and was approved June 10, 1890. It is known as the "customs administration bill." Meanwhile (Apr. 16) he introduced the general tariff measure that has since borne his name, and that for four months had been under constant consideration by the Ways and Means Committee, during which time every interest in the country that had asked for it had had a hearing. All this entailed a burden of work and trouble upon the chairman that it is impossible to conceive, but it was borne with patience and consideration. His speech in support of the measure, May 7, sustained his high reputation, and, despite the many sharp differences of opinion as to the particular schedules or items, its reception by the House proved conclusively that the passage of the bill was assured. The bill was passed by the House on May 21, but was debated for months in the Senate, that body finally passing it, as amended, on Sept. 11. The House accepted the reciprocity amendment, proposed by the Senate, which McKinley had unavailingly supported before the House Committee, the Senate accepted the internal-revenue sections insisted upon by the House, and the bill became a law Oct. 6, 1890. This bill received the support of all the Republicans in Congress who voted upon it, except three. Its passage was hardly effected, however, before the general election occurred, and in this the Republicans were, as anticipated, badly defeated. His own district had been gerrymandered again, so that he had 3,000 majority to overcome. He accepted the nomination for Congress, and entered the fight with the determination to deserve success, even though the odds against him were invincible. His competitor was Hon. John G. Warwick, a wealthy merchant and coal operator, who was ably supported by the strongest Democratic leaders of the country. Despite the fact that the tide of public sentiment was clearly against his party, and that the most outrageous imposition was practiced upon the people in the outcry about the prices of all kinds of goods being advanced by the new tariff, McKinley still ran largely ahead of his ticket and came within 300 of being elected. No Republican had ever received nearly so many votes in the counties composing the district. Immediately after the election a popular movement began in Ohio for his nomination for Governor, and the State convention in June, 1891, made him its candidate by acclamation. In Congress he spoke and voted for the eight-hour law; he advocated efficient antitrust and antioption laws; he supported the direct-tax refunding law, in an argument that abounds with pertinent information; and he presented a resolution declaring that nothing in the new tariff law should be held to invalidate our treaty with Hawaii. On the occasion of the seventieth anniversary of the birth of Judge Thurman, at Columbus, in Nov., 1890, Mr. Cleveland spoke upon "American Citizenship," and "made cheapness the theme of his discourse, counting it one of the highest aspirations of American life." McKinley, replying to this address at the Lincoln banquet in Toledo, Feb. 12, 1891, held that such a boon as "cheap coats" meant inevitably "cheap men," with all the evils of cheap and degraded labor. He spoke of the future most confidently, and, while not arrogating to himself undue credit, he in nowise shirked responsibility for the new tariff law, which was then condemned throughout the country by both the Democratic and independent parties and press, as well as by many wavering Republican leaders and journals.

His popularity with the old soldiers was great. He spoke frequently at their National Encampments—at San Francisco, Indianapolis, Washington, and Pittsburg—and made many patriotic addresses by their special request, such as that on "The American Volunteer Soldier," Memorial Day, 1889, in New York, or on "Pensions and the Public Debt," Canton, Ohio, May 30, 1891. He opened the Ohio campaign at Niles, Aug. 22. In this speech, as in every other of the 134 made by him in that campaign, during which he visited all the eighty-eight counties in Ohio but three, and often spoke to three or four audiences at different points in a single day and night, he declared his unalterable opposition both to free trade and free silver. "My opponent, Gov. Campbell," said he, "declared in a recent newspaper interview that, while he had his doubts about it, he was 'willing to chance the free and unlimited coinage of silver.' I am not willing to 'chance it.' Under present conditions, the country can not afford to chance it. We can not gamble with anything so sacred as money, which is the standard and measure of all values. I can imagine nothing which would be more disturbing to our credit and more deranging to our financial affairs than to make this the dumping-ground of the world's silver." McKinley polled the largest vote ever cast for Governor in Ohio. Campbell had been elected in 1889 by 11,000 plurality in a vote of 775,000; McKinley now defeated him by 21,500 in a total of 795,000. His inaugural address, Jan. 11, 1892, was devoted exclusively to State topics, except in its reference to congressional redistricting, in which he advised that "partisanship should be avoided." He declared that "free suffrage was of little service to the citizens if its force could be defeated by legislative machinations in the form of gerrymanders."

Soon after his inauguration as Governor the presidential campaign began, and he was importuned to allow the use of his name as a candidate. To every such suggestion he promptly replied that he believed Gen. Harrison justly entitled to another term, and heartily favored his renomination. He was again a delegate at large from Ohio to the national convention, and was its permanent chairman. The opponents of the president persisted in urging his name, and the delegations from Kansas and West Virginia told him that they intended to vote for him. He asked them not to do so, but urged them to support Harrison, and made the same request of every individual delegate who approached him on the subject. His wishes were so well known that no delegate ventured to present his name, knowing he would immediately withdraw it; but when the ballot was taken many persisted in voting for him, the Ohio delegation responding 44 to 2 for him. He at once challenged this vote, from the chair, and put himself on record for Harrison, who on the entire roll call received 535 votes; Blaine, 182; McKinley, 182; Reed, 4; and Lincoln, 1. During the canvass McKinley spoke in Maine, Massachusetts, New York, Pennsylvania, Michigan, Illinois, Indiana, Missouri, Kansas, Nebraska, Iowa, and Ohio, to great and enthusiastic audiences. His principal political addresses of the year were those at Ann Arbor, Mich., May 17, to a national convention of college clubs; on "The Triumph of Protection," before the Nebraska Chautauqua at Beatrice, Aug. 2; and on "The Issues of 1892" at Philadelphia, Sept. 23.

The fight was lost, the people seemed to have repudiated protection, and, as in 1890, the law bearing his name, as well

as he himself, was the subject of sneers and jests from every quarter. But he lost neither courage nor confidence. He had no apologies or excuses to offer. He had not sought credit for his efforts for protection, and he feared no criticism.

In his first annual message, Jan. 3, 1893, he called attention to the financial condition of the State, enjoined economy in appropriations, and the application of strict business principles in every part of the public service. His sympathy with laboring men is apparent in his recommendation of additional protection to steam and electric railroad employees, and his interest in the problems of municipal government by his approval of what is called the "Federal plan" of administration. On the seventy-first anniversary of the birth of Ulysses S. Grant he delivered an address in Galena, Ill., and on June 20 a memorial address on Rutherford B. Hayes in Delaware, Ohio, both of which were admired for their research and beauty. At the Republican convention in Ohio he was unanimously renominated for Governor, and he was re-elected by an overwhelming majority, the greatest ever recorded (with a single exception during the war) for any candidate up to that time in the history of the State. His competitor was Lawrence T. Neal, who, as a member of the Committee on Resolutions at the Democratic National Convention of 1892, had written the plank denouncing the new tariff law as a "fraud," as "unconstitutional," as a "sham," and as "the culminating atrocity of class legislation." The issues discussed were National, and McKinley's voice was again heard in every locality in the State in earnest condemnation of "those twin heresies, free trade and free silver." In his second annual message he recommended biennial sessions of the Legislature; a revision of the tax laws by a commission created for the purpose; condemned any increase of local taxation and indebtedness; enjoined the necessity for economy; and warned his party, which had elected three fourths of the Legislature, that the greater its power the vaster were its responsibilities, and the less excusable was needless or reckless legislation.

On Feb. 22, 1894, McKinley delivered an address on the life and public services of George Washington, under the auspices of the Union League Club in the Auditorium at Chicago, which gave much gratification to his friends and admirers. He reluctantly consented to speak in Minneapolis on the tariff question Mar. 28, fearing it would be impossible to procure a representative audience at so early a season. Every county and town in the State was represented, and the large exposition hall in which the National Convention had been held was filled to its utmost capacity by an enthusiastic audience. Beginning at Bangor, Me., Sept. 8, and continuing through the next two months, he was constantly on the platform. The Wilson-Gorman tariff law had just been enacted, and to this he devoted his chief attention.

At Indianapolis, Sept. 26, Gen. Harrison introduced him to an audience such as had never before assembled in that city on the occasion of the opening of a State campaign, in the following felicitous words: "Major McKinley has endeared himself to all by his record as a gallant soldier, battling for the flag. He has honored himself, his State, and the country by his conspicuous services in high legislative and executive places. No man more than he is familiar with the questions that now engage public thought. No man is more able than he lucidly to set them before the people. I do not need to invoke your attention to what he shall say. He will command it." After returning to Ohio to open the State campaign at Findlay, Gov. McKinley set out for the West, and in a series of speeches through Missouri, Kansas, Nebraska, Iowa, Minnesota, Wisconsin, Illinois, Indiana, Michigan, and again in Ohio, was greeted apparently by the entire populace. He proved himself one of the most remarkable campaigners the country ever has known. His meetings began at daybreak and continued until nightfall or later from his car, or from adjacent platforms, crowds greeting him at every station, and, whether stops had been arranged or not, blocking the track until he appeared and addressed them. He frequently spoke a dozen times a day, and two, three, or four times at night. In his trip through Wisconsin he spoke twenty-three times in sixteen hours. At Chicago the greatest political meeting in the history of the city greeted him; and at daylight he was speeding through Ohio, to conclude the campaign by a tour of his own State. On undertaking the journey he had agreed to make 46 speeches. He made them, and 325 more, in 300 towns. For more than eight weeks he averaged seven speeches a day, ranging in length from ten minutes to an hour; and in this time he traveled over 16,000 miles and addressed 2,000,000 people. Never were more effective speeches delivered, for at every point visited his party achieved phenomenal victories, and it carried the popular branch of Congress by more than a two-third majority.

During the ensuing winter his official duties as Governor were made the more arduous by the prevalence of great distress in the mining districts of the Hocking valley. Gov. McKinley, by appeals to the generous people of the State, raised by voluntary contributions sufficient funds and provisions to meet every case of actual privation, the bulk of the work being done under his personal direction. Several serious outbreaks occurred during his administration, at one time requiring the presence of 3,000 of the National Guard in the field and entailing an outlay of more than $60,000, but this extraordinary expense was met by most advantageous arrangements with private capitalists without the expense and delay of an extra session of the Legislature. On three occasions prisoners were saved from mobs and safely incarcerated in the State prison. His declaration that "lynchings must not be tolerated in Ohio" was literally made good for the first time in any State administration. In Feb., 1895, he delivered notable addresses at Albany, N. Y., before the Unconditional Republican Club, on Lincoln, and at Rochester, on "The Business Man in Politics." In the following April he visited Hartford, Conn., and spoke to a State club that bore his name, and on Memorial Day he delivered an oration on Grant at his tomb in Riverside Park, New York city. In the ensuing political canvass he confined his speaking to Ohio, where, under his leadership, a decisive Republican victory was won.

On the expiration of his term as Governor he returned to his old home at Canton, at which he quietly remained during the next six months, except for a visit to Chicago to address the Marquette Club on Lincoln, Feb. 12, 1896. The country was already ablaze with political excitement, and many friendly advisers urged him not to speak there, as he might give his rivals the advantage of any possible mistake on such an occasion. But he spoke with his usual candor and sincerity, and, using Lincoln's views on the tariff as a text, boldly advanced his views upon what should constitute the Republican platform in the pending campaign. Simultaneously throughout the country began a movement in his favor that proved almost irresistible in every popular convention. State after State and district after district declared for him, until, when the National Convention assembled, he was the choice of more than two-thirds of the delegates for President, on the very platform that four months before he had so clearly outlined. Early in the contest he announced his determination not to engage in the speaking campaign, his only contribution to the cause to be his letter of acceptance. This proved to be one of the strongest papers of its kind in the annals of American politics, but the people were not content. Realizing that they could not induce him to set out on what he thought an undignified vote-seeking tour of the country, they began to flock by thousands to his modest home in Canton, and here from his doorstep he welcomed and spoke to them. In this manner more than 300 speeches were made from June 19 to Nov. 2, 1896, to the more than 750,000 strangers who came in from all parts of the country for that express purpose. His only departure from home during the campaign was a hasty trip to Cleveland to speak at the centennial anniversary of that city.

Enthusiastic visitors from States as distant as Nebraska, Kansas, Missouri, Tennessee, Virginia, Maryland, Vermont, and New York came daily to mingle with the shouting thousands from all parts of Illinois, Indiana, Michigan, Kentucky, West Virginia, Pennsylvania, and Ohio. About thirty States sent such delegations, and more than thirty times as many political clubs and organizations were represented in them. Men of both old parties and both old sections, and equally enthusiastic women and children, with every species of music and decorations. More than 50,000 came at the formal opening of the speaking campaign, and nearly as large crowds on three other great days. They tore down and carried away the wooden fences piecemeal, but were always good-natured and devoted to the leader, whose charming personality attracted them. His speeches were as remarkable for their good sense, originality, versatility, and effectiveness as these pilgrimages were unique and unprecedented. In spite of the enormous strain upon Major

McKinley's mental resources, his physical powers were put to the sorest trial, yet no visitor was ever repelled or disappointed. Not only was every delegation satisfied, but the country each morning was given some new text for contemplation and conversation, always patriotic and encouraging to the cause he espoused. Nothing like it was ever before known.

In the Republican National Convention in St. Louis in June, 1896, he was nominated for President on the first ballot, and in the ensuing election he received a popular vote of 7,104,779, and a plurality of 601,854 over his principal opponent, William J. Bryan. In the electoral college McKinley received 271 votes, against 176 for Bryan. The prominent issues in the canvass were the questions of free coinage of silver and restoration of the protective tariff system.

He was inaugurated Mar. 4, 1897, and appointed as his cabinet: John Sherman, Secretary of State: Lyman J. Gage, Secretary of the Treasury; Russell A. Alger, Secretary of War; John D. Long, Secretary of the Navy; Joseph McKenna, Attorney-General; James A. Gary, Postmaster-General; Cornelius N. Bliss, Secretary of the Interior; James Wilson, Secretary of Agriculture. Before the term ended Secretary Sherman retired and was succeeded by William R. Day, and he by John Hay. Secretary Alger was succeeded by Elihu Root, Attorney-General McKenna by John W. Griggs, Postmaster-General Gary by Charles Emory Smith, and Secretary Bliss by Ethan Allen Hitchcock.

President McKinley immediately called an extra session of Congress, to meet Mar. 15, for the purpose of revising the tariff. Mr. Nelson Dingley, of Maine, introduced the new measure on the first day of the session, and it was reported from the Ways and Means Committee on the 19th. It passed the House Mar. 31, and the Senate July 7; and after the question of amendments had been settled between the two Houses it received the President's signature July 24. The most important event of this administration was the war with Spain in 1898, which was brought on primarily by the condition of affairs in Cuba, and was perhaps hastened by the destruction of the battle-ship Maine in Havana harbor (Feb. 15). The President exhausted the resources of diplomacy to prevent the war, but, seeing the probability of it, hastened every preparation for a conflict. The result was the defeat of the Spanish forces in every battle, the end of Spanish dominion in Cuba, and the acquisition by the United States of Porto Rico and the Philippine Islands.

A treaty for the annexation of the Hawaiian Islands was signed on June 16, 1897, and was confirmed by the Senate July 7, 1898, and on Aug. 12 the formal transfer of sovereignty was made.

In 1900 the Republican National Convention unanimously renominated President McKinley, and placed Theodore Roosevelt on the ticket for Vice-President. The President's principal opponent, as before, was William J. Bryan, and the issues were the same. In the election, Mr. McKinley received a majority over all of 443,054, and a plurality over Mr. Bryan of 832,280. In the electoral college he received 292 votes, against 155 for Mr. Bryan.

At the Pan-American Exposition, held in Buffalo in the summer of 1901, Sept. 5 was set apart as President's day. The attendance was very large, and President McKinley spoke to an audience estimated at 30,000 persons. His address was not only appropriate to the occasion, but significant of his policy for his new term, and it at once attracted attention and excited comment, mainly favorable, all over the world. The chief interest centered in these passages:

"Expositions are the time-keepers of progress. They record the world's advancement. They stimulate the energy, enterprise, and intellect of the people, and quicken human genius. They go into the home. They broaden and brighten the daily life of the people. They open mighty storehouses of information to the student. Every exposition, great or small, has helped to some onward step. . . . Comparison of ideas is always educational and, as such, instructs the brain and hand of man. Friendly rivalry follows, which is the spur to industrial improvement, the inspiration to useful invention and to high endeavor in all departments of human activity. It exacts a study of the wants, comforts, and even the whims of the people, and recognizes the efficacy of high quality and low prices to win their favor. The quest for trade is an incentive to men of business to devise, invent, improve, and economize in the cost of production. Business life, whether among ourselves, or with other peoples, is ever a sharp struggle for success. It will be none the less in the future. . . . Without competition we would be clinging to the clumsy and antiquated processes of farming and manufacture and the methods of business of long ago, and the twentieth would be no further advanced than the eighteenth century. But though commercial competitors we are, commercial enemies we must not be. The Pan-American Exposition has done its work thoroughly, presenting in its exhibits evidences of the highest skill and illustrating the progress of the human family in the Western Hemisphere. This portion of the earth has no cause for humiliation for the part it has performed in the march of civilization. It has not accomplished everything; far from it. It has simply done its best, and without vanity or boastfulness, and recognizing the manifold achievements of others it invites the friendly rivalry of all the powers in the peaceful pursuits of trade and commerce, and will coöperate with all in advancing the highest and best interests of humanity. The wisdom and energy of all the nations are none too great for the world work. The success of art, science, industry, and invention is an international asset and a common glory. . . . My fellow-citizens, trade statistics indicate that this country is in a state of unexampled prosperity. The figures are almost appalling. They show that we are utilizing our fields and forests and mines, and that we are furnishing profitable employment to the millions of workingmen throughout the United States, bringing comfort and happiness to their homes, and making it possible to lay by savings for old age and disability. That all the people are participating in this great prosperity is seen in every American community and shown by the enormous and unprecedented deposits in our savings-banks. Our duty in the care and security of these deposits and their safe investment demands the highest integrity and the best business capacity of those in charge of these depositories of the people's earnings. . . . We have a vast and intricate business, built up through years of toil and struggle in which every part of the country has its stake, which will not permit of neglect, nor of undue selfishness. No narrow, sordid policy will subserve it. The greatest skill and wisdom on the part of manufacturers and producers will be required to hold and increase it. Our industrial enterprises, which have grown to such great proportions, affect the homes and occupations of the people and the welfare of the country. Our capacity to produce has developed so enormously and our products have so multiplied that the problem of more markets requires our urgent and immediate attention. Only a broad and enlightened policy will keep what we have. No other policy will get more. In these times of marvelous business energy and gain we ought to be looking to the future, strengthening the weak places in our industrial and commercial systems, that we may be ready for any storm or strain. . . . By sensible trade arrangements which will not interrupt our home production we shall extend the outlets for our increasing surplus. A system which provides a mutual exchange of commodities is manifestly essential to the continued and healthful growth of our export trade. We must not repose in fancied security that we can forever sell everything and buy little or nothing. If such a thing were possible it would not be best for us or for those with whom we deal. We should take from our customers such of their products as we can use without harm to our industries and labor. Reciprocity is the natural outgrowth of our wonderful industrial development under the domestic policy now firmly established. . . . What we produce beyond our domestic consumption must have a vent abroad. The excess must be relieved through a foreign outlet, and we should sell everywhere we can and buy wherever the buying will enlarge our sales and productions, and thereby make a greater demand for home labor. . . . The period of exclusiveness is past. The expansion of our trade and commerce is the pressing problem. Commercial wars are unprofitable. A policy of good-will and friendly trade relations will prevent reprisals. Reciprocity treaties are in harmony with the spirit of the times; measures of retaliation are not. If, perchance, some of our tariffs are no longer needed for revenue or to encourage and protect our industries at home, why should they not be employed to extend and promote our markets abroad? Then, too, we have inadequate steamship service. New lines of steamships have already been put in commission between the Pacific coast ports of the United States and those on the western coasts of Mexico and Central and South America. These should be followed up with direct steamship lines between the western coast of the United States and South American

ports. . . . We must build the Isthmian canal, which will unite the two oceans and give a straight line of water communication with the western coasts of Central and South America and Mexico. The construction of a Pacific cable can not be longer postponed. . . . Let us ever remember that our interest is in concord, not conflict; and that our real eminence rests in the victories of peace, not those of war. We hope that all who are represented here may be moved to higher and nobler effort for their own and the world's good, and that out of this city may come not only greater commerce and trade for us all, but, more essential than these, relations of mutual respect, confidence, and friendship which will deepen and endure. Our earnest prayer is that God will graciously vouchsafe prosperity, happiness, and peace to all our neighbors, and like blessings to all the peoples and powers of earth."

The next afternoon (Sept. 6) a reception was held in the Temple of Music, on the Exposition grounds, at which all who wished were invited to pass in line and shake hands with the President. In the line was a man whose right hand was wound about with a handkerchief. This concealed a revolver, and as the President offered his hand, turning it to accommodate the left hand of the stranger, the miscreant fired through the handkerchief and inflicted a slight flesh wound on the President's breast. Before the assassin could be knocked down or disarmed he fired a second bullet, which passed through the stomach. Surgical aid was close at hand, and very soon the wounded President was on the operating-table in the emergency hospital. The surgeons sewed up both wounds in the stomach, and as the shock appeared to be comparatively light Mr. McKinley was removed in the evening to the home of John G. Milburn, president of the Exposition. The patient progressed so rapidly toward apparent recovery that in five days he was pronounced out of danger; but the next day he showed signs of a relapse, and from that point he failed rapidly until he breathed his last 2:15 Saturday morning, Sept. 14. His bearing in that sorrowful week was in keeping with his whole life and character—courageous and charitable. When he was shot, fearing that the bystanders would take summary vengeance on the assassin, he exclaimed, "Let no one hurt him," and the only time that he inquired about the felon it was to be assured that he had not been lynched. When the surgeons announced to him that an operation was necessary, he said, "Gentlemen, I wish you to do whatever in your judgment is best." He was cheerful as he lay helpless during the days that followed, often speaking of his plans for the future. Forty-eight hours before the end came his physicians informed him what it must be. He took an affecting farewell of his wife, and then softly chanted portions of his favorite hymns—"Abide with me" and "Nearer, my God, to Thee." His last words were, "It is God's way—His will be done," and "Good-bye, all! Good-bye!" The story of his last hours, considered in connection with his character and the history of his life, reads like the close of some great Shakespearean drama.

The body was taken to Washington, where it lay in state in the Capitol, and thence to Canton, Ohio, where the funeral services were held on Thursday, Sept. 19—the twentieth anniversary of the death of President Garfield. The assassin had declared himself an anarchist, and when the President died it required a large force of militia as well as police to protect him from the crowd that surrounded the Buffalo jail.

The assassin was tried speedily, two eminent lawyers being assigned by the court for his defense, and was found guilty of murder in the first degree. On Sept. 26 he was sentenced to be executed by electricity in the week beginning Oct. 28—the earliest date permitted by law. He declared in court that he had no accomplices whatever.

A volume of Mr. McKinley's speeches, compiled by Joseph P. Smith, was published in New York in 1893, and a campaign life by Robert P. Porter in Cleveland in 1896.

McKinney: city (founded in 1846; named after Collin McKinney, an early settler); capital of Collin co., Tex. (for location of county, see map of Texas, ref. 2-I); near the east fork of Trinity river; on the Houston and Tex. Cent. and the Sherman, Shreve. and S. railways; 32 miles N. of Dallas, 135 miles N. E. of Austin. It is in an agricultural and cotton-growing region; contains 5 churches, McKinney Institute, a public-school building, and 4 weekly newspapers; and has a cotton-compress, cotton-oil mill, flour-mill, ice-factory, planing-mill, important live-stock interests, and electric lights. Pop. (1880) 1,479; (1890) 2,489; (1900) 4,342.

EDITOR OF "DEMOCRAT."

Mack'intosh, Sir JAMES, M. D., LL. D., F. R. S.: philosopher and politician; b. at Aldourie, Inverness-shire, Scotland, Oct. 24, 1765; graduated M. A. in 1784 at King's College, Aberdeen, and M. D. at Edinburgh 1787; went to London, and in 1791 published his *Vindiciæ Gallicæ*, an eloquent defense of the French Revolution against the strictures of Burke's *Reflections*, which at once won him the favor of the Whig leaders; supported himself by literary work, and in 1795 was called to the bar at Lincoln's Inn; delivered in 1799–1800 at Lincoln's Inn his brilliant *Lectures on the Law of Nature and of Nations*; won a splendid fame at the bar; was knighted 1803, and was recorder of Bombay 1804–06; judge of admiralty 1806–11; returned to England after a highly honorable career in the East, and entered Parliament in 1813 from Nairn; was Professor of Law and General Politics at Haileybury College 1818–24, still taking an important place in parliamentary business; in 1830 became a commissioner of Indian affairs. D. in London, May 30, 1832. Among his more important works are a brief *History of England* (1830), extending only to the reign of Elizabeth, but completed by Wallace and Bell (10 vols.); a *Dissertation on the Progress of Ethical Philosophy* (1830), written for the *Encyclopædia Britannica*; a *Life of Sir Thomas More*: a posthumously published *History of the Revolution in England in 1688*, which was a fragment of a projected history in several volumes; and a great number of miscellaneous articles, chiefly published in *The Edinburgh Review*, containing a mass of valuable criticism, especially regarding questions of psychology and ethics. They were collected into volumes and published in the U. S. in a series entitled *Modern British Essayists*. As a parliamentary orator he did not fill the expectations based upon his forensic achievements, among which the memorable defense of Peltier (Feb. 21, 1803) was perhaps the greatest effort of British eloquence at the bar. See his *Memoirs*, by his son, containing journals, etc. (1835).

McLane', LOUIS: Congressman and diplomat; son of Col. Allen McLane (1746–1829), jurist; b. at Smyrna, Del., May 28, 1786; entered the navy as midshipman at the age of twelve years, and cruised a year in the Philadelphia; pursued studies at Newark College, Delaware; studied law with James A. Bayard, and was admitted to the bar 1807; served as a volunteer in 1814 in a company commanded by Cæsar H. Rodney, which marched to the defense of Baltimore from the threatened attack by the British; was representative in Congress 1817–27, voting against the admission of slavery in Missouri or in the Territories: was chosen Senator 1827; sent by President Jackson as minister to England May, 1829; returned in 1831 to accept the post of Secretary of the Treasury; was transferred in 1833 to the department of State in consequence of his refusal to sanction the removal of the deposits from the Bank of the U. S.; retired to private life June, 1834, settling in Maryland; was president of the Baltimore and Ohio Railroad during its completion and early management 1837–47; accepted the mission to London to settle the Oregon difficulty June, 1845; was a delegate to the constitutional convention of Maryland 1850–51. D. in Baltimore, Oct. 7, 1857.

McLane, ROBERT MILLIGAN: son of Louis McLane, diplomat; b. in Wilmington, Del., June 23, 1815; resided with his father in London 1828–31; studied in colleges in Baltimore, Md., and Paris, France; graduated at West Point Military Academy 1837; served in the army in Florida, in the Cherokee country, and in the Northwest; resigned 1843; was admitted to the bar in Baltimore the same year; was a member of the Maryland Legislature 1845–47; member of Congress 1847–51; commissioner to China 1853–55; and minister to Mexico. While in Mexico he negotiated a treaty giving President Juarez the benefit of a U. S. loan and other substantial advantages, and purchasing Lower California for a sum of several millions of dollars. The treaty was never ratified, but the policy of intervention in Mexican affairs was carried out by the U. S. navy in capturing several vessels of war belonging to the reactionary government of Miramon. After his return from Mexico he practiced at the Baltimore bar. He was a delegate to the national Democratic conventions of 1856 and 1876; member of the Forty-sixth and Forty-seventh Congresses; Governor of Maryland 1884–85; U. S. minister to France 1885–89. D. April 16, 1898.

Maclaren, JOHN JAMES: See the Appendix.

MacLa'ren, William, D. D.: minister in the Presbyterian Church of Canada; b. in Tarbolton, Carleton County, Canada, Jan. 26, 1828; edueated in Knox College and the University of Toronto; pastor of the Church of Amherstburg, Ontario, 1853–57; then pastor of Knox church, now the Columbus Avenue Presbyterian church, Boston, Mass.; pastor of John Street church, Belleville, Canada, to 1870; of Knox church, Ottawa, 1870–73; lecturer on Apologetics in the Presbyterian College, Montreal, 1872; Professor of Systematic Theology in Knox College, Toronto, from 1873. He was moderator of the General Assembly of the Presbyterian Church of Canada 1884. Besides other articles and pamphlets he has published a series of theological monographs, including *The Inspiration of Scripture*, *The Romish Doctrine of the Rule of Faith*, *The Rule of Truth and Private Judgment*, *Calvinism in Relation to other Theistic Systems*, *Conditional Immortality*, and a volume *The Unity of the Church and Church Unions* (Toronto, 1890). C. K. Hoyt.

McLaren, William Edward, S. T. D., D. C. L.: bishop; b. Dec. 13, 1831, in Geneva, Ontario co., N. Y.; graduated at Jefferson College in 1851, and at the Western Theological Seminary, Pittsburg, in 1860; was ordained to the Presbyterian ministry in the same year, and went to South America as a missionary; returned in 1863, and became pastor to the Second Presbyterian church, Peoria, Ill.; moved in 1866 to Detroit, Mich., as pastor to the Westminster church; entered the Episcopal Church in 1872; became rector of Trinity church, Cleveland, O., and was elected Bishop of Illinois in 1875. The dioeese of Illinois having been divided into three sees—Illinois, Quincy, Springfield—in 1877 the name of the see of Illinois was changed to Chicago. Bishop McLaren has published *Catholic Dogma the Antidote of Doubt* (New York, 1884), and many sermons, charges, and addresses.

McLaws, Lafayette: See the Appendix.

MacLean, George Edwin: See the Appendix.

McLean, John, LL. D.: jurist; b. in Morris co., N. J., Mar. 11, 1785; settled with his parents in Warren co., O., in childhood; began studying law in 1803; was admitted to the bar, and began practice in 1807 in Lebanon; served in Congress from 1813 to 1816, when he became a judge of the Supreme Court of Ohio; was commissioner of the general land office in 1822, Postmaster-General in 1823, associate justice of the U. S. Supreme Court in 1829; was distinguished for the eloquence and ability of his charges to grand juries, of which a notable example was one delivered in Dec., 1838, concerning unlawful combinations against a foreign government, elicited by certain aspects of the Canadian "patriot war." His decision in the celebrated "Dred Scott case" (1857) was given to the effect that slavery has its origin in force, not in right, nor in general law, to which it is opposed, but in local law, which can not be respected by the national courts. In 1848 his name was brought before the Buffalo "Free Soil" convention as a candidate for the presidential nomination, and in 1856 he was the leading competitor of Fremont for the Republican nomination at Philadelphia. He again received some votes in the Chicago convention of 1860. D. Apr. 4, 1861. He published 6 vols. of *Reports of United States Circuit Court* (1829–55).

Maclean, John: See the Appendix.

Maclean, Letitia Elizabeth Landon: poet; b. in Brompton, England, Aug. 14, 1802; acquired considerable reputation by a number of poems published in 1820 in *The Literary Gazette* over the signature L. E. L., by which she was thenceforth known. She soon became a regular contributor of reviews, essays, poems, and miscellaneous articles to *The Gazette* and other newspapers, and to the annuals, and for fifteen years supported her family by her pen. She published several volumes of poems and four novels, of which many were reprinted in the U. S. In June, 1838, she married George Maclean, appointed governor of Cape Coast Castle, West Africa, and accompanied him to that place. D. Oct. 15, 1838. See *Life and Literary Remains of L. E. L.*, by Laman Blanchard (1841).

McLellan, Isaac: See the Appendix.

MacLeod, măk-lowd', Donald, D. D.: a minister of the Church of Scotland; b. in Campsie, Berwickshire, Scotland, Mar. 18, 1831: was educated at Glasgow University; was minister at Lauder 1858–62; at Linlithgow 1862–69; and since 1869 of the Park church, Glasgow. He is chaplain to the Queen, and since 1873 has been editor of *Good Words*. He has published *Memoir of Norman McLeod*, his brother (2 vols., London, 1872; 1 vol., 1876; New York, 1876); *The Sunday Home Service* (1885); *Christ and Modern Society* (1893); and has edited a *New Illustrated Bible* (1892).
C. K. Hoyt.

McLeod, Henry Dunning: financier; b. in Edinburgh, Scotland, in 1821; was educated at Eton and the University of Cambridge; was admitted to the bar in 1849; published *Theory and Practice of Banking* (1856); *Elements of Political Economy* (1858); and a *Dictionary of Political Economy* (1859). He was employed by the British Government 1868–70 in codifying the laws relating to bills of exchange.

MacLeod, James Farquharson, C. M. G.: military and civil officer; b. in Toronto, Canada, in 1836; graduated at Queen's University, Kingston, and became a barrister-at-law. He served as brigade-major of militia with the Red river expedition in 1870, and was created a Companion of the Order of St. Michael and St. George for his services; appointed captain in Northwest mounted police in 1873; commissioner in command of this force and member of Northwest Council in 1876; and stipendiary magistrate, with civil and criminal jurisdiction over the entire Northwest Territory, in 1880. D. at Calgary, Sept. 5, 1894. N. M.

MacLeod, Malcolm: Canadian explorer; b. in Stornoway, island of Lewis, Scotland, in 1788; removed to British North America in 1811, and entered the service of the Hudson's Bay Company. In 1815 he was detailed to assist the Selkirk settlement in its first establishment; commanded a small force which defeated, on the present site of Winnipeg, a larger force of a rival, the Northwest Company, and erected forts, houses, and barns on the territory he had secured. In 1822, on the coalition of the two companies, he was selected as a partner, and was appointed to the perilous task of crossing the Rocky Mountains by the Athabasca Pass, to organize an extended trade in furs and other products, to the Pacific Ocean, in conjunction with a projected line of shipping to and from England, Mexico, the Sandwich islands, and Russian America. He spent four years in this work, and opened trade routes by the Yellow Head Pass, the Thompson and Fraser rivers, and elsewhere, and removed the main post of the company on the Pacific from Astoria to Vancouver, where he established a large farm and erected grist and saw mills, the first on the Pacific coast N. of Mexico. In 1826 he returned to York Factory, on Hudson's Bay, to report to the general council of the company, and from that date till 1830 was stationed at the head of Lake Winnipeg, having a general supervision of the company's field of work in North America. In 1834 he retired on leave of absence, and died in Montreal, July 24, 1849.

MacLeod, Malcolm: lawyer and author; b. at Green Lake, Athabasca, Northwest Territories, Oct. 21, 1821; son of Malcolm MacLeod, the explorer; was educated in Edinburgh, Scotland; admitted as a barrister of Lower Canada in 1845; was judge of the distriet of Ottawa 1873–76, and appointed a queen's counsel in 1887. In addition to many contributions to the periodical press, he published *The Peace River*, descriptive of the Northwest and British Columbia, in 1872; sundry pamphlets in promotion of the Canadian Pacific Railway in 1869–80, and *Problem of Canada* in 1880. His writings on the Northwest directed public attention to the resourees of that region, and greatly facilitated the labors of surveyors in determining upon a route for the Canadian Pacific Railway. Neil Macdonald.

MacLeod, Norman, D. D.: b. at Campbelton, Scotland, June 3, 1812; educated in Edinburgh, Glasgow, and Germany; became minister of the National Kirk; parish minister of Loudoun 1838–43, of Dalkeith 1843–51, in Glasgow (Barony parish) 1851—a very large and difficult field; established schools and meetings for the workingmen, and labored with zeal and success; was a founder of the Evangelical Alliance 1847; took a leading part in the advoeacy of foreign missions; beeame chaplain to the Queen for Seotland 1857; edited *The Christian Magazine* (Edinburgh, 1850–60), *Good Words* (1860–72); was author of *The Earnest Student* (a biography of John Mackintosh, 1854), *Parish Papers* (1862), *Eastward* (1866), and *Peeps at the Far East* (1871, a narrative of travels in India), and several other works. D. in Glasgow, June 16. 1872. Dr. MacLeod made *Good Words* an important educational organ and a great literary success. He was noted for breadth and versatility. See *Memoirs* by his brother, Rev. Donald MacLeod (2 vols., London and New York, 1876).

Maclise, mak-lees', Daniel (real name perhaps McLeish or McLish): painter; b. at Cork, Ireland, probably Feb. 2,

1806; early displayed a remarkable versatility of talent in art. His first successes were gained by sketches of Irish scenery and life taken on a pedestrian excursion among the peasantry of Wicklow. He studied art at Cork Academy. In 1828 he went to London, was admitted to the Royal Academy, gained a medal in the antique school, and was made a member of the life school, where he also gained a medal for the best copy of a painting by Guido; was a contributor of drawings and verses to *Fraser's Magazine*; studied a year in Paris; won the gold medal of the Academy in 1831, by his historical painting, *The Choice of Hercules*, and from that time devoted his pencil mainly to subjects of a blended historical and romantic character—*All-Hallow Eve, Henry VIII. and Anne Boleyn, Francis I. and Diana of Poictiers, Charles I. and Cromwell, Puck Disenchanting Bottom, Macbeth and Witches, Bohemian Gypsies, Gil Blas Dressing as a Cavalier, The Sleeping Beauty, Origin of the Harp, Alfred in the Danish Camp*, and many others. His most important works were huge frescoes and water-glass paintings in the houses of Parliament, *The Death of Nelson* and the *Meeting of Wellington and Blücher after Waterloo*, both in the Victoria Gallery. He was a poor colorist, and his conception of incidents, gesture, and expression was theatrical and unreal; but he knew how to compose a large number of figures. Maclise was elected associate of the Academy in 1835, and academician in 1840. In 1866 he declined the presidency. D. in London, Apr. 25, 1870.

Revised by Russell Sturgis.

Maclure', William: geologist; b. in Ayr, Scotland, in 1763; visited New York in 1782; settled in London soon after as partner in a commercial house; gained a considerable fortune; emigrated to the U. S. in 1796; was one of the commissioners on the French spoliation claims in 1803; became interested about this time in geology, which he studied in Europe; conceived the plan of making a geological survey of the U. S., and for that purpose crossed the Alleghanies fifty times, and visited nearly every State of the Union, traveling chiefly on foot. He presented geological memoirs to the American Philosophical Society in 1809 and 1817. The second was accompanied by the first geological map of the U. S., and he thereby gained the title of "father of American geology." Settling in Philadelphia, he gave his books and collections to the Academy of Natural Sciences of that city, an institution of which he was president from 1817 until his death. He resided in Spain 1819–24; engaged in an unsuccessful attempt to establish a college on an agricultural basis; made an attempt of the same kind at New Harmony, Ind., where he bought a large tract of land and resided several years; went to Mexico for his health in 1827, returned there in 1828, and resided there until his death, which occurred at San Angel, near the city of Mexico, Mar. 23, 1840. He left $20,000 to the Academy of Natural Sciences, besides his library as already mentioned, and was a liberal benefactor of the American Geological Society, of which he was president in 1828. While in Mexico he wrote a work entitled *Opinions on Various Subjects* (2 vols., New Harmony, 1837).

MacMahon, măăk'măă'ōn', Marie Edme Patrice Maurice, de: Duke of Magenta, marshal of France, president of the French republic; b. at the château of Sully, near Autun, June 13, 1808; descended from an Irish family which took refuge in France after the fall of the Stuarts; entered in 1825 the military school of St.-Cyr; served in Algeria; returned after the July revolution to France, and was present at the siege of Antwerp. Once more transferred to Africa, he distinguished himself as a captain at the storming of Constantine; received the command first of a battalion, then of a regiment, of the foreign legion; became colonel in 1845, and brigadier-general in 1848. As such he stood at the head of the administration, first of the province of Oran, and then of that of Constantine. In 1852 he became general of division, and in 1855 he was recalled in order to assume the command of a division in the Crimean war. He arrived just in time to take part in the storming of Malakoff, and distinguished himself by an act of courage bordering upon disobedience. The French commander gave the order for MacMahon's return. His reply became historic "J'y suis; j'y reste." He remained in the Malakoff and drove out the Russians. For this heroic success he received the Grand Cross, and was created a senator. In this position he evinced a rare independence of character; he was the only senator who refused to vote for the Safety Bill which was proposed in consequence of the Orsini conspiracy (June, 1858), and placed France under the intolerable rule of the bayonet. In 1857 he fought again in Algeria, and in 1859 he made his name famous in the campaign against Austria. He commanded the Second Corps, and led the left wing of the army in the battle of Magenta, June 4, 1859, while Napoleon commanded the center. At the head of the guard the emperor was very hard pressed by the enemy, and there was danger of his being driven into the Ticino, but MacMahon came to his support, and by throwing himself on the right flank of the Austrian corps, which threatened the French center, he won the battle. For this brilliant exploit the emperor made him on the battle-field marshal of France and Duke of Magenta. In the battle of Solferino (June 24, 1859) he also played a conspicuous part. After the war he received the command of the division stationed at Lille, and in 1864 he succeeded Pelissier in the important position of governor-general of Algeria, where great reforms were to be introduced, and so far as the reigning system allowed the administration of MacMahon was beneficial. During the famine of 1867–68 he took good care of the poor people, and defended them with great energy against the clergy, who tried to use the aid which was given to the Arabs as a means by which to convert them. At the beginning of the war against Germany in 1870 the marshal received the command of the First Corps, consisting chiefly of African troops, and forming the right wing of the first line, nearest to the frontier, with headquarters at Strassburg. When (on Aug. 4) his advanced body, the division of Douay, was defeated at Weissenburg by the Crown Prince of Prussia, he drew re-enforcements from other corps, and occupied an excellent position at Wörth in order to detain the enemy. In spite of his brilliant valor, he was defeated in the bloody battle, and his army was almost completely routed in consequence of the long and obstinate resistance it made. The remnants he gathered at Châlons, and here he formed out of the First, Fifth, Seventh, and Twelfth Corps the army of Châlons, to which the emperor repaired after the defeat at Metz. From the regency in Paris he repeatedly received orders to push on toward Metz by a circuitous way, in order to extricate Bazaine. He understood the futility of this plan, and remonstrated, but at last he obeyed. Soon, however, his army was driven by the Germans out of its direction and toward Belgium, and at Sedan it was compelled to give battle. At the beginning of the contest, in which the French army, together with the emperor, was surrounded and taken prisoner, early in the morning (Sept. 1, 1870), MacMahon was severely wounded, and gave up the command. While a prisoner of war in Germany he was almost the only superior officer who was not accused of treason by his countrymen; both the purity of his character and his brilliant valor being generally acknowledged. Immediately after the conclusion of the armistice in the spring of 1871 he was intrusted by Thiers with the command of the army at Versailles, the only organized army of France at that moment. In political respects he enjoyed the confidence of all parties. He seemed to be nothing but a soldier, indifferent to politics, and without those qualities which make a man a blessing or a danger to his country. Nevertheless, events soon raised him to the most important political position. Having put down the revolution of the Commune in Paris in 1871, after which he published *L'Armée de Versailles depuis sa formation jusqu'à la complète pacification de Paris*, he became the man on whom those parties of the National Assembly which feared radicalism and revolution rested their hopes, and in May, 1873, the legitimists, clericals, and Bonapartists agreed in overthrowing Thiers, and MacMahon accepted the presidency of the republic, which was offered him by a deputation from the National Assembly. The hopes, however, which the Bonapartists entertained of a restoration of the dynasty of Napoleon, and the legitimists and clericals of a complete suppression of all liberty, were not realized. His government was one of order, aiming at the re-establishment of the power of France; and although the influence conceded to the Church was larger than the liberals considered sound, yet the stability of his own power seemed in his eyes the principal means of reaching his aim. On Nov. 19, 1873, his term of office was prolonged by the National Assembly to seven years. He resigned Jan. 30, 1879, occupying the leisure hours of several years in preparing his military memoirs, which are (1894) soon to be published. D. on his estate at Montcresson, Oct. 17, 1893, and had a national funeral, being buried in the Hôtel des Invalides, Paris.

Revised by James Grant Wilson.

McMas'ter, Guy Humphreys: jurist and poet; b. at Clyde, N. Y., Jan. 31, 1829; graduated at Hamilton College, and became a practicing lawyer, county judge, and surrogate in Steuben co., N. Y., a history of which county he published in 1849. He is chiefly remembered, however, as the author of the famous *Carmen Bellicosum*, originally contributed to *The Knickerbocker Magazine* in 1849. D. at Bath, N. Y., Sept. 13, 1887. H. A. B.

McMaster, John Bach, C. E., Ph. D.: professor of history; b. in Brooklyn, N. Y., June 29, 1852; educated in the public schools of New York city, graduated 1872, College of the City of New York; studied civil engineering; was instructor in civil engineering at Princeton College 1877–83; became Professor of American History, University of Pennsylvania, 1883; author of *The People of the United States* (1883, fifth vol. 1900): *Benjamin Franklin as a Man of Letters* (1887).

McMillan, Charles: civil engineer; b. in Moscow, Russia, Mar. 24, 1841; was educated at the Rensselaer Polytechnic Institute, Troy, N. Y., where he graduated in 1860 with the degree of C. E. He filled the positions of assistant engineer on the Brooklyn water-works and on the Croton water-works, Professor of Engineering in Rensselaer Polytechnic Institute and in the Lehigh University. Since 1877 he has been Professor of Civil Engineering in the College of New Jersey, Princeton, N. J. He was the editor of the revised edition of Smith's *Topographical Drawing* (1885).

MacMillan, Conway, M. A.: botanist; b. at Hillsdale, Mich., Aug. 26, 1867; educated in the Universities of Nebraska, Johns Hopkins, and Harvard; was appointed assistant in geology in the University of Nebraska 1886; entomologist to the Nebraska agricultural experiment station 1887; instructor in botany in the University of Minnesota 1888; Professor of Botany and State botanist, 1891. He has published *Twenty-two Common Insects of Nebraska* (1888), *The Metaspermæ of the Minnesota Valley* (1892), besides many articles in botanical journals.

Charles E. Bessey.

MacMillan, Hugh, D. D., LL. D., F. R. S. E., F. S. A. Scot.: minister and author; b. at Aberfeldy, Perthshire, Scotland, Sept. 17, 1833; educated at Edinburgh University; was minister at Kirkmichael, Perthshire, 1859–64; of Free St. Peter's, Glasgow, 1864–78; and since 1878 has been minister of the Free West church, Greenock. He has published among others the following books, most of them in several editions, some of which have been translated into several of the European languages: *First Forms of Vegetation* (1861; 2d ed. 1874); *Bible Teachings in Nature* (1866; 24th ed. 1886); *Holidays in High Lands* (1869; 2d ed. 1875); *The True Vine* (1871; 5th ed. 1886); *The Ministry of Nature* (1872; 5th ed. 1886); *The Garden and the City* (1872; 2d ed. 1873); *Sun-glints in the Wilderness* (1872); *Our Lord's Three Raisings from the Dead* (1875); *Sabbath of the Fields* (1875: 5th ed. 1886); *Two Worlds are Ours* (1880; 4th ed. 1880); *The Marriage in Cana* (1882; 2d ed. 1886); *The Riviera* (1885); *The Olive Leaf*; *Roman Mosaics*; *My Comfort in Sorrow*; and *The Gate Beautiful*; and contributed largely to periodicals. C. K. Hoyt.

McMillan, James: U. S. Senator; b. at Hamilton, Ontario, Canada, Mar. 12, 1838; prepared for college, but removed to Detroit, Mich., and entered business in 1855; with others established the Michigan Car Company 1863; has since been largely interested in manufacturing, railway and shipping business; was elected to the U. S. Senate as a Republican, Mar. 4, 1889, and re-elected in 1895.

McMillan, Samuel J. R.: See the Appendix.

McMinnville: city (founded in 1855, incorporated in 1876): capital of Yamhill co., Ore. (for location of county, see map of Oregon, ref. 2–B); at the head of navigation on the Yamhill river; on the S. Pac. Railway; 23 miles N. W. of Salem, 50 miles S. W. of Portland. It is in an agricultural, lumbering, and fruit-growing region, and has a large trade in wheat, wool, hops, and green and dried fruit. It is the seat of Oregon Baptist College, and has 6 churches, 2 public-school buildings, electric lights, water-works, 2 flour-mills, planing-mill, sash and door factory, and 2 weekly newspapers. Pop. (1880) 670; (1890) 1,368; (1900) 1,420.

Editor of "Yamhill County Reporter."

McMinnville: town; capital of Warren co., Tenn. (for location of county, see map of Tennessee, ref. 6–G); on the Nash., Chat. and St. L. Railway; 35 miles N. E. of Tullahoma, 75 miles S. E. of Nashville. It is in a farming and fruit-growing region; is the seat of Cumberland Female College; has 2 libraries, 2 weekly newspapers, public park, and manufactories of cotton and woolen goods and foundry products. Pop. (1880) 1,244; (1890) 1,677; (1900) 1,980.

McMur'rogh, Dermot: King of Leinster, Ireland, from 1140 till 1168, when he was expelled by his subjects; applied unsuccessfully for aid to Henry II. of England; obtained the services of Richard de Clare, Earl of Pembroke (surnamed Strongbow), by whom he was restored to power in 1170. Dermot gave Strongbow his daughter Eva in marriage, and dying in the same year was succeeded by the invader as a vassal to the English king, this being the foundation of the English claim of supremacy in Ireland.

McMurry, Charles Alexander: See the Appendix.

McMurry, Frank Morton: See the Appendix.

McNab, Sir Alan Napier: soldier and statesman; b. at Niagara, Canada, Feb. 19, 1798; became a midshipman in 1813; served under Sir James Yeo in the naval expedition against Sackett's Harbor and other U. S. ports of Lake Ontario; joined the army as an ensign; was present at the capture of Fort Niagara and at the battle of Plattsburg; studied law; practiced at Hamilton; was elected a member of the Assembly of Upper Canada in 1830; later became its Speaker; commanded the Canadian militia on the Niagara frontier during the insurrection of 1837–38, as colonel; routed the insurgents near Toronto Dec. 7, 1837; seized, burned, and sent over Niagara Falls the steamer Caroline; was knighted July 14, 1838; Speaker of the Legislature of Canada in 1844; Prime Minister 1854–56; made a baronet Feb. 1857. D. Aug. 8, 1862.

McNair, Frederick V.: See the Appendix.

Macnaughton, Edward: See the Appendix.

McNeill, măk-neel', Sir John, G. C. B., D. C. L., LL. D.: ambassador and commissioner; b. at Colonsa, Scotland, in 1795; was appointed assistant envoy at court of Persia in 1831, and envoy in 1836, in which capacity he became prominent through his prediction of aggressive designs on the part of Russia, a subject to which a great part of his career was devoted, and which he treated in numerous pamphlets and essays in the English and Indian periodicals, as well as in a volume entitled *Progress and Position of Russia in the East* (1854). Returning from Persia in 1844, Sir John was employed in many civil and military commissions in England and Scotland, and became a member of the privy council (1857) and chairman of the poor-law board. D. May 16, 1883.

Macneill, John G. S.: See the Appendix.

Macomb, ma-koom': city; capital of McDonough co., Ill. (for location of county, see map of Illinois, ref. 5–C); on the Chi., Burl. and Quincy Railroad; 58 miles N. E. of Quincy, 206 miles S. W. of Chicago. It is in an agricultural and fire-clay region; has manufactures of pottery, tile, and sewer-pipe, and contains a normal college (established 1833), high school, public library (founded in 1885), and three weekly newspapers. Pop. (1890) 4,052; (1900) 5,375.

Macomb, Alexander: soldier; b. in Detroit, Mich., Apr. 13, 1782; entered the army, and at the time of the declaration of war with Great Britain (June, 1812) was acting adjutant-general of the army; but preferring active field-service, he was appointed in July colonel of the Third Artillery, and distinguished himself at Fort Niagara and Fort George; promoted to be brigadier-general in Jan., 1814. On Sept. 11, with 1,500 men and a small number of militia from New York and Vermont, he fought the battle of Plattsburg, defeating a largely superior force of British veterans under Sir George Prevost, for which service he received the thanks of Congress and a gold medal: was also breveted major-general and commanded a military department in the Northwest 1815–21. Upon the reorganization of the army in the latter year he was retained as chief engineer, with the rank of colonel. In May, 1828, he succeeded Gen. Brown as major-general in command of the army. D. in Washington, June 25, 1841. He wrote a *Treatise on Martial Law* and *Courts Martial as practiced in the United States* (1809).

Mâcon, mă'kōn' (Lat. *Matis'co*, the ancient name): town of France; capital of the department of Saône-et-Loire; on the river Saône, which is lined with beautiful quays and crossed by a bridge of twelve arches (see map of France, ref. 5–G). Otherwise the town is ill built, with narrow, crooked, and dirty streets, but its trade in timber and Burgundy wine is considerable, as also its manufactures of

watches. It is a railway center of importance, the lines from Paris, Marseilles, and Mont Cenis meeting here. In the Quai du Midi there is a bronze statue of Lamartine, who was born in Mâcon in 1790. Pop. (1896) 18,739.

Ma'con: city; capital of Bibb co., Ga. (for location of county, see map of Georgia, ref. 4–H); at the head of navigation on the Ocmulgee river, and on the Ga., the Cent. of Ga., the Ga. S. and Fla., the E. Tenn., Va. and Ga., the Macon and N., and the Macon, Dublin, and Savannah railways; 80 miles S. E. of Atlanta. It is on both sides of the river, in an agricultural and fruit-growing region, with granite hills, hard-wood forests, and brick-clay deposits in the vicinity. The city is laid out with streets 130 and 180 feet wide and beautifully shaded, and has a public park of 237 acres, in which the State Agricultural Society has its buildings and holds its fairs. Water for domestic purposes is supplied from eighteen natural springs, 2 miles S. of the city, and is distributed from a reservoir on the top of the highest hill in the vicinity. There are about 30 churches, 45 public schools, public library, the Alexander Free School, the Julia Parkman Jones Home for Indigent Women, Methodist Episcopal and Protestant Episcopal Orphans' Homes, an academy of music, and a Roman Catholic academy for young ladies. The city is the seat of Mercer University (Baptist, founded 1831), Wesleyan Female College (chartered 1836), St. Stanislaus College (Roman Catholic, for preparatory education for the priesthood), and of the State Academy for the Blind (incorporated 1852). The census returns of 1890 showed that 161 manufacturing establishments (representing 40 industries) reported. These had a combined capital of $3,608,977; employed 3,142 persons; paid $1,085,716 for wages and $2,534,144 for materials, and had products valued at $4,974,914. The principal industry was the manufacture of textile fabrics, which had 4 establishments, $1,430,391 capital, and 1,038 employees; paid $219,135 for wages and $722,356 for materials; and had products valued at $1,115,366. The city has a wholesale trade of about $50,000,000 annually, and handles a large amount of cotton and lumber. There are 2 national banks with combined capital of $450,000, 5 State banks with capital of $1,050,000, and 2 private banks, and 2 daily, 3 weekly, and 2 other periodicals. Pop. (1880) 12,749; (1890) 22,746, with suburbs, 35,746; (1900) 23,272. EDITOR OF "TELEGRAPH."

Macon: town (founded in 1832); capital of Noxubee co., Miss. (for location of county, see map of Mississippi, ref. 6–H); at the head of navigation on the Noxubee river; on the Mobile and Ohio Railroad; 198 miles N. of Mobile, Ala. It is in an agricultural and cotton-growing region, and contains 5 churches for white and 3 for colored people, 2 public schools, a business and commercial college, railway machine-shops, cotton-compress, and 3 weekly newspapers. Pop. (1880) 2,074; (1890) 1,565; (1900) 2,057. EDITOR OF "BEACON."

Macon: city; capital of Macon co., Mo. (for location of county, see map of Missouri, ref. 2–G); on the Chi., Burl. and Quincy and the Wabash railways; 170 miles N. W. of St. Louis. It is in an agricultural and coal-mining region, has important trade interests, and contains St. Agnes Hall for young ladies (Protestant Episcopal, opened in 1885), St. James's Military Academy (Protestant Episcopal, opened in 1875), and three weekly newspapers. Pop. (1880) 3,046; (1890) 3,371; (1900) 4,068.

Macoy'a, called also **Macahuba Palm** and **Great Macaw-tree**: native name for a South American and West Indian palm-tree (*Acrocomia sclerocarpa*), which yields a pleasantly perfumed palm oil used in soapmaking, and, in its native regions, employed as an unguent in rheumatism.

McPher'son: city; capital of McPherson co., Kan. (for location of county, see map of Kansas, ref. 6–G); on the Atch., Top. and S. Fé, the Chi., Rock Is. and Pac., the Mo. Pac., and the Union Pac. railways; 84 miles W. of Emporia. It is in a wheat, corn, and dairy region, has live-stock interests, and is a shipping-point for a large territory. There are water-works, electric lights, street-railway, McPherson College (Dunkard), 2 national banks with combined capital of $100,000, a State bank (capital $20,000), and a daily, monthly, and 4 weekly newspapers. Pop. (1880) 1,590; (1890) 3,172; (1900) 2,996. EDITOR OF "REPUBLICAN."

Macpherson, Sir DAVID LEWIS: statesman; b. in Inverness, Scotland, Sept. 12, 1818; educated at Royal Academy, Inverness, and removed to Canada in 1835 He was a member of the firm of Gzowski & Co., constructors of several Canadian railways and other important works; a director of Molson's Bank and of Western Canada Permanent Loan and Savings Company: president of the Interoceanic Railway Company, and arbitrator for the Province of Ontario under the British North American Act. He represented Saugeen district in Legislative Council of Canada 1864–67; was called to the Senate May, 1867; Speaker of that body and member of cabinet, without portfolio, from Feb. 11, 1880, until Oct. 17, 1883, when he resigned the speakership and was appointed Minister of the Interior, which office he resigned Aug. 5, 1885. He was knighted in 1884. D. at sea, Aug. 16, 1896. He was the author of a pamphlet on *Banking and Currency* (Toronto, 1869) and of several political pamphlets between 1877 and 1882. NEIL MACDONALD.

McPherson, EDWARD, LL. D.: journalist and statistician; b. at Gettysburg, Pa., July 31, 1830; graduated at the University of Pennsylvania in 1848; was for a time a journalist; was a member of Congress 1859–63; clerk of the U. S. House of Representatives 1863–75; secretary of the Union national committee 1860–64; he engaged in journalism at Gettysburg, Pa. He published a *Political History of the United States during the Civil War*, a *Handbook of Politics*, and other works, including some admirable literary and other papers; was afterward editor of the Philadelphia *Press*, and was clerk of the House of Representatives in 1882 and 1883. D. Dec. 14, 1895.

Macpherson, JAMES: author; b. at Ruthven, Inverness-shire, in the Highlands of Scotland, in 1738; entered King's College, Aberdeen, 1752; studied also at Marischal College, Aberdeen, and at the University of Edinburgh, where he gave evidence of his literary taste by the publication of a heroic poem in six cantos entitled *The Highlander* (1758), which is admitted to be beneath criticism. After teaching at the Ruthven school he became a tutor in the family of Mr. Graham, of Balgowan, and made some essays in versification, which he showed to the celebrated John Home as translations of Gaelic poetry which he alleged that the Highland minstrels had preserved by memory from a remote period. The circumstance was communicated by Home to Drs. Hugh Blair and Alexander Carlyle, and by their advice Macpherson published a small volume of *Fragments of Ancient Poetry collected in the Highlands of Scotland, and translated from the Gaelic or Erse Language* (1760). The book met with great success and a subscription was raised to enable the "editor" to travel through the Highlands and recover all extant remains of early minstrelsy. Thus encouraged, Macpherson, whose knowledge of Gaelic was never more than a smattering, produced in quick succession *Fingal, an Ancient Poem in Six Books, together with Several other Poems composed by Ossian, Son of Fingal, translated from the Gaelic Language* (1762), and *Temora, an Ancient Epic Poem, in Eight Books*, etc. (1763), by which he gained £1,200 and a European reputation. These so-called "poems" were received with the utmost enthusiasm in Scotland, and even on the Continent they were immediately translated into the chief modern languages, and the mythical bard, Ossian the son of Fingal, at once took his place in biographical dictionaries as the rival of Homer and Vergil. Not long after the English critics began to call for the original Gaelic of Ossian in order to test the correctness of the translation, but it was not forthcoming, and the flimsy excuses put forth for its absence were sufficient evidence to impartial inquirers that, as Dr. Johnson said, the poems "never existed in any other form than that which we have seen." The Scotch enthusiasts, who had staked their reputation upon the genuineness of Ossian, took up the cudgels in behalf of Macpherson, and the battle raged with great bitterness for fifty years; even in 1875 there appeared an elaborate vindication of Ossian's genuineness. Macpherson accepted the post of private secretary to Gov. Johnstone, of West Florida, and spent nearly two years at Pensacola and in traveling through the American colonies; took up his residence in London (1766), wrote an *Introduction to the History of Great Britain and Ireland* (1771), and issued a prose translation of the *Iliad* of Homer (1773) cast in Ossianic mold, which was received with coldness by his friends and with contempt by his adversaries. In 1775 Macpherson published a *History of Great Britain from the Restoration to the Accession of the House of Hanover* (2 vols. 4to, 1775), in which he attacked the motives of the statesmen who effected the revolution of 1688. The copyright of this work brought Macpherson £3,000. He was employed by the Government to write a pamphlet, *The Rights of Great Britain asserted against the Claims of the Colonies* (1776), and another entitled *A Short History of the Opposition*

during the Last Session of Parliament (1779). Macpherson was an able pamphleteer, and in reward for his services he obtained the lucrative agency for the Nabob of Arcot in his negotiations with the Government. He wrote several pamphlets on Indian affairs, sat in Parliament for Camelford 1780–90, and built a handsome residence at Belleville, Inverness, where he resided for several years until his death, Feb. 17, 1796. At his own request he was buried in Westminster Abbey, the monument being erected at the expense of his estate. Upon the Ossianic controversy the standard work is that by Malcolm Laing, under the title *The Poems of Ossian, containing the Poetical Works of James Macpherson, with Notes and Illustrations* (1805), in which the memory of Macpherson is handled without gloves by a brother Scotchman. This masterly criticism disposed of the more or less plausible theories of Blair, Kames, Gregory, and the rest, but did not prevent Sir John Sinclair from publishing *Ossian in the Original* (1806), from the posthumous papers of the "translator," all of which, however, were in the handwriting of Macpherson himself or of his secretaries. Notwithstanding some modern counter-pleas, the verdict of the Highland Society of London, that no poems of the kind could be found to exist in the memories of the Highlanders, ought to be conclusive. At the same time, candid criticism must admit that a work which elicited the unbounded admiration of such dissimilar minds as Dr. Parr, Sir Walter Scott, Klopstock, and Napoleon Bonaparte must have in it elements of poetic excellence which escaped the prejudiced judgment of Macaulay and Sir James Mackintosh. See also Campbell's *Popular Tales of the West Highlands* (4 vols., Edinburgh, 1862); and Rev. Archibald Clerk's *Poems of Ossian in the Original Gaelic, with a Literal Translation into English* (2 vols., Edinburgh, 1870). Revised by H. A. Beers.

McPherson, Gen. James Birdseye: officer and engineer; b. in Sandusky co., O., Nov. 14, 1828; graduated at the U. S. Military Academy at the head of his class July 1, 1853, and was appointed to the Engineer Corps; in Aug., 1861, was made captain of engineers, and in November of that year was chosen by Gen. Halleck as aide-de-camp and assistant engineer of the department of the Missouri, with the rank of lieutenant-colonel; and was chief engineer on the staff of Gen. Grant, Feb. to Apr., 1862, being engaged in the operations against Forts Henry and Donelson and the battle of Shiloh, and as assistant engineer in the siege of Corinth. In May, 1862, he was promoted to be colonel and aide-de-camp, brigadier-general U. S. volunteers, and major-general in Oct., 1862. His brilliant career from the capture of Fort Henry in 1862 up to the surrender of Vicksburg in 1863 won the admiration of Gen. Grant, who recommended him for promotion to the rank of brigadier-general. The actions in which he had especially distinguished himself during this period were the siege of Corinth, the second battle of Corinth, the siege of Vicksburg, and the battles of Port Gibson, Raymond, and Champion Hill. On Aug. 1, 1863, he was appointed a brigadier-general in the regular army, and soon after surprised the Confederate camp at Canton, Miss. In Feb., 1864, he accompanied Gen. Sherman's famous raid to Meridian as second in command, and in March was assigned to command the department and army of the Tennessee, to the reorganizing of which he devoted several weeks, preparatory to the invasion of Georgia. During this famous campaign his services were invaluable; at Resaca, Dallas, and the almost daily severe fighting up to and including Kenesaw Mountain, he was conspicuous and greatly distinguished himself; in the battles before Atlanta he commanded the left grand division, and it was here on July 22, 1864, he was shot and almost instantly killed.

McPherson, John Roderic: Senator; b. in Livingston co., N. Y., May 9, 1833; engaged in farming and stock-raising, and settled in 1859 in Hudson City, N. J., where he established a stockyard in 1863. He was the originator, designer, and constructor of the great buildings used by the Central Stockyard and Transit Company at Harsimus Cove, N. J.; also of the abattoir and stockyard of Philadelphia; and the inventor of a new stock-car. Alderman of Hudson City 1863–69, and State Senator from Hudson County 1872–74. Elected U. S. Senator for New Jersey Jan. 24, 1877; re-elected 1883 and 1889. D. Oct. 8, 1897.

Macrauche'nia [Mod. Lat., fr. Gr. *μακρός*, long + *αὐχήν*, neck]: a genus of mammals of the order *Ungulata*, including one species from the Tertiary pampas deposits of Buenos Ayres and Patagonia. It had the body of a tapir, but a long neck and somewhat horse-like head. The dental series was almost uninterrupted. The canines were small. It may also be added that, while belonging to the perissodactyl (or odd-toed) division of the ungulates, it presents, especially in the skeleton, many points of resemblance to the even-toed camels and llamas. Thus in the elongated cervical vertebræ the canal for the vertebral artery instead of perforating the transverse processes, as in most mammals, is confluent with the neural canal in the posterior part of the vertebræ, and anteriorly perforates the walls of that canal. The radius and ulna are ankylosed together. The bones of the feet resemble those of the odd-toed ungulates, and, as in the rhinoceros, there were three toes both before and (probably) behind. These toes, in the fore feet at least, were nearly equal in size. The femur is long, and has a third trochanter. The fibula is entire, but confluent with the tibia. The astragalus is of the characteristic perissodactyl type. The single known species (*Macrauchenia patagonica*) has been made the subject of an elaborate monograph by Burmeister, who has almost completely restored the skeleton. It was originally described by Prof. Owen from remains brought by Charles Darwin from Patagonia, and on account of peculiarities of the cervical vertebræ compared with the camels. The *Macrauchenia* equaled in size the largest hippopotamus, but probably had a less broad and bulky body, and the neck was elongated. O. C. Marsh.

Macready, ma-kree'di, William Charles: actor; b. in London, England, Mar. 3, 1793; was sent by his father, a theatrical manager, to Rugby to be liberally educated, but his projected career was cut short by pecuniary embarrassments, and at the age of seventeen he essayed the stage, making his first appearance at Birmingham in *Romeo* (June 7, 1810). He first undertook Hamlet in 1811; played with Mrs. Siddons at Newcastle in *The Gamester* and *Douglas*; played at Glasgow, Bath, Berwick, and Dublin; was seen in London at Covent Garden as Orestes (Sept. 16, 1816). His success was slow, but steady, and was due to hard work rather than to genius. In 1822 his engagement began at Covent Garden, and his reputation rose in parts like Virginius and Mirandola till 1826, when he went to Drury Lane. From this time he took rank with the illustrious of his profession. The same year he visited the U. S.; the next year he made a continental tour; in 1828 played in Paris; returned to England, and for several years played in London and all the chief cities of the kingdom; revisited the U. S. in 1843–44, and made a long and successful professional tour; made another engagement in Paris, and performed in *Hamlet* at the Tuileries before Louis Philippe; returned to the U. S. again in 1849, during which year the Astor Place riot in New York occurred; in 1850 began the long series of "farewells" to the theaters in England which terminated at Drury Lane Feb. 26, 1851. Till 1860 he lived in retirement at Sherborne, enjoying society, taking an interest in public institutions, and occasionally giving readings. The last years of his life were spent at Cheltenham, where he died Apr. 27, 1873. Macready was one of the last of the great Shakspearean actors, a good scholar, a man of fine literary taste, of high professional ambition, of elevated character, generous, humane, modest, and just. See *Reminiscences and Diaries*, 1875. Revised by B. B. Vallentine.

Macri'nus, M. Opelius: Roman emperor from Apr., 217, to June, 218; b. in 164 of humble parentage at Cæsarea, in Mauritania; entered the service of Plautianus, the favorite of Septimius Severus; received different appointments in the imperial household; became prefect of the prætorians, and was chosen emperor by them after the assassination of Caracalla. Shortly after his accession he was defeated by the Parthians, and lost his influence with the army. The prætorians rose in rebellion, instigated by Elagabalus, and the emperor fled in disguise, but was discovered and put to death. G. L. Hendrickson.

Macro'bius, Ambrosius Theodosius: grammarian; flourished at the beginning of the fifth century, but of his personal life nothing is known. Of his writings there are still extant *Conviviorum Saturnaliorum Libri VII.*, containing much valuable historical and mythological information, as well as critical and grammatical disquisitions, four books being devoted to Vergil; *Commentariorum in Somnium Scipionis Libri II.*, a series of philosophical discourses based on Neoplatonic views (the *Dream of Scipio*, which suggested them, having formed a part of the sixth book of Cicero's *De Republica*); and an extract or abridgment of *De Differentiis et Societatibus Græci Latinique Verbi.*

Macrobius is the first pagan writer who mentions the massacre of the children of Bethlehem by Herod. The best editions of his works are those by Jan (2 vols., 1848–52) and Eyssenhardt (1893). There is no English translation.

Revised by M. Warren.

Macrochires [Mod. Lat. from the Gr. μακρόχειρ, long-handed]: a group, usually considered an order, of birds, distinguished by the great length of the bones of the hand as compared with those of the arm. The name was originally given by Nitzsch to a family of birds containing the humming-birds and swifts, but to these Huxley and others have added the goatsuckers (*Caprimulgidæ*). F. A. L.

Macropod'idæ [Mod. Lat., named from *mac'ropus*, the typical genus; Gr. μακρός, long + πούς, foot]: a family of mammals of the order *Marsupialia* and sub-order *Syndactyli*, containing the kangaroos and kangaroo-rats of Australia and New Guinea. They have immensely enlarged hind limbs, by means of which they progress by great leaps, and much reduced fore limbs, while the large thick tail serves as a fulcrum for support, etc.; the head is comparatively small, and somewhat deer-like; the teeth in the full series are as follows: molars, $\frac{5}{5}$; canines, $\frac{0}{0}$ or $\frac{1}{1}$; incisors, $\frac{3}{1}$; the second molar in each jaw in the young is deciduous, and followed by a permanent successor; all except the first are two-ridged; the canines are small or absent in the upper jaw, always absent in the lower; the incisors of the upper jaw (3+3) trenchant and nearly vertical, of the lower (1+1) large and horizontal; the stomach is large and sacculated and a long simple cæcum is developed; the marsupial pouch opens forward. The family is peculiar to Australasia and the islands of the Papuan Archipelago, and is quite rich in genera and species. It has been divided by systematists into two sub-families and many genera.

Macrospore: See Embryology.

Macru'ridæ [Mod. Lat., named from *macru'rus*, the typical genus; Gr. μακρός, long + οὐρά, tail]: a family of fishes of the order *Teleocephali* and sub-order *Jugulares*, distinguished by a body which gradually terminates in a tapering, long, and compressed tail, and is covered by keeled or ornamented scales. The family is related to the *Gadidæ* or codfishes, and contains numerous species, mostly of the deep seas or of the Arctic regions.

McTyeire, măk-teer', Holland Nimmons, D. D.: bishop; b. in Barnwell co., S. C., July 25, 1824; graduated at Randolph-Macon College, Virginia, in 1844; joined the Virginia conference in 1845; in 1846 took charge of St. Francis Street church, Mobile; served the churches at Demopolis, Ala., and Columbus, Miss.; was then transferred from the Alabama to the Louisiana conference, and was stationed in New Orleans; in 1854 was elected editor of the New Orleans *Christian Advocate*; in 1858 was elected editor of the Nashville *Christian Advocate*. During the war he was transferred to the Montgomery conference, and was pastor in Montgomery, Ala., when in 1866 he was elected to the episcopate. He became president of the board of trust of the Vanderbilt University, which owes its existence largely to his influence upon its founder. He is the author of *Manual of the Discipline*, *Duties of Masters*, *Catechism of Church Government*, and *A History of Methodism*. D. at Nashville, Feb. 15, 1889.

Revised by A. Osborn.

McVeagh, măc-vā', Wayne: lawyer and publicist; b. at Phœnixville, Pa., Apr. 19, 1833; educated at Yale College; admitted to the bar 1856; became district attorney of Chester co., Pa.; captain of cavalry 1862, when invasion of Pennsylvania was threatened; chairman of Republican central committee of Pennsylvania 1863; appointed by President Grant minister to Constantinople in 1870; leading member of U. S. "McVeagh commission" to Louisiana 1877, to investigate political affairs; appointed U. S. Attorney-General by President Garfield, Mar. 5, 1881; resigned same year; appointed ambassador to Italy by President Cleveland, Dec. 19, 1893.

McWhorter, Alexander, D. D.: clergyman; b. near Newark, Del., July 15 o. s., July 26 n. s., 1734; graduated at Princeton 1757: studied theology under William Tennent; was installed pastor of the Presbyterian church at Newark 1758; went on a mission to North Carolina in 1764, returned to Newark in 1866, and was sent again to North Carolina in 1775 by Congress to persuade the royalists of the western counties to join with their brethren in the Revolution; became in 1778 chaplain of Knox's artillery brigade; accepted in 1779 the pastorate at Charlotte, Mecklenburg co., N. C., and the presidency of Queen's Museum College, then called Liberty Hall; lost his library by the invasion of Cornwallis; returned to Newark in 1781; aided in drawing up the constitution of the American Presbyterian Church in 1788; was for thirty-five years a trustee of Princeton College; took a leading part in collecting funds in New England for rebuilding the college after the conflagration of 1802; published a centennial sermon at Newark in 1800, and two volumes of sermons in 1803. He was in charge of the Presbyterian church at Newark for twenty-six years till his death July 20, 1807.

Revised by C. K. Hoyt.

Madagas'car [called by the Arabs *Komr* or *Kamr*. The people themselves used to name the island *Izao rehetra Izao*, "this whole," because it was supposed to be the principal part of the world. In the time of Radama I. it was called *Ny anivon ny riaku*, "The [land] in the midst of the Flood." Madagascar, the name used by foreigners, is a corruption of *Magadaxo*]: the largest of the African islands, 975 miles long, 358 miles broad at the widest part, and comprising an area of about 228,500 sq. miles; is in the Indian Ocean, between lat. 11° 57′ and 25° 42′ S., and between lon. 43° 10′ and 50° 25′ E. It is separated from Africa by the Mozambique Channel, 250 miles broad. The fossils of Madagascar and its existing flora and fauna leave no room for doubt that it once had land connection with Asia, and probably also with Africa. The coast, much indented on the western side, and although more regular, affording several good harbors also on the eastern side, is generally low, presenting a belt of sand-plains or swamps, and containing many lagoons and lakes. From the coast the surface rises in the same manner as on the African continent, in terraces, broader and more gently sloping on the western, narrower, and divided by wall-like cuts on the eastern side. The interior forms a plateau from 3,000 to 4,000 feet high, traversed from N. to S. by a mountain-chain whose peaks rise from 6,000 to 12,000 feet, and which in the northeastern part of the island separates into many ranges, and forms mountainous regions of considerable extension. Of the rivers flowing down the eastern slope none is navigable, but of those descending the western slope the Tsidsubu (or Menabe) and the Mangooka (or St. Vincent's) are navigable, the former to the foot of the mountains. The climate of much of the interior plateau is comparatively healthful, but is very different in the low coast regions, where the heat is intense and a fever prevails, dangerous not only to Europeans, but even to the natives of the interior. The rainy season lasts from December to April. Iron, rock-salt, coal, and gold are found in quantities that will pay for development. Generally the soil is very productive; the vegetation is exceedingly rich. Ebony, mahogany, different kinds of gum-trees, figs, cocoanuts, bread-fruit trees, plantains, and bananas are frequent. Rice is extensively cultivated, and forms the principal article of food; also yams and arrowroot. The cotton-plant has been introduced from Fiji, the sugar-cane from Mauritius, and the coffee-tree from Java, and they thrive well. The silk-worm is indigenous, and is reared on the *Tapia edulis*; the cocoon is often used by the natives as an article of food. The inhabitants, numbering about 3,500,000, fall, ethnologically, into two groups—the black, or African, on the western slope, and the light-colored, or Malayan, on the eastern; and politically into four sections—the Hovas, Sakalavas, Betsileos, and Betsimisarakas. Of these, the Hovas are the ruling tribe, a race of middle height, but well-proportioned, with black, straight or curled hair, and hazel eyes, well-gifted and active. The Hova government was an absolute monarchy until wholly supplanted by the French government Feb. 27, 1897, and proclaimed a French colony. The island was mentioned in the thirteenth century by Marco Polo, but not actually known to the Europeans until the beginning of the sixteenth century, when in 1506 it was visited by Lorenzo de Almeida, the first Portuguese Viceroy of India. Not long afterward the Portuguese formed a colony on the river Franchere, in the province of Anosy, on the eastern coast, but the settlers were massacred by the natives. In 1642 the French, and in 1644 the English, planted colonies on the eastern coast, but these too failed, and for a long time Madagascar was known to the Europeans chiefly as the hiding-place of pirates and buccaneers, whom it took considerable force to finally suppress. In 1745 the French East India Company founded a colony on the island of St. Mary, and in 1768 another at Fort Dauphin. These succeeded better, but a lively and efficacious intercourse

with European civilization did not begin until the reign of Radama I. (1808–28). He received the British missionaries and artisans well who came to the country. The native language was reduced to writing, the Bible was translated and printed, a large number of the inhabitants were taught to read and converted to Christianity, the slave-trade, infanticide, and polygamy were abolished, at least nominally, etc. Under his successors the progress of civilization was several times stopped, and the people threatened to relapse into paganism and barbarity. Such was the case under the successor of Radama, one of his wives, Ranavalona I., 1828–61. In 1835 the profession of the Christian religion was declared illegal, and in the following year the missionaries were compelled to leave the country. Christian worship was to cease, Christian books were to be burned, etc. The time of persecution, however, ceased with the accession of Radama II., and under Queen Ranavalona II., who ascended the throne in 1868, Christianity became the state religion. The queen herself was baptized, the royal idols were burned, and a chapel was built in the palace. She died July 13, 1883, and was succeeded by Queen Ranavalona III. About 1,200 congregations have been formed in the island, and about 900 schools, with nearly 50,000 scholars, are in operation. By treaty of Dec. 12, 1885, Madagascar was nominally placed under French protection, but the Hova government soon disavowed the protective feature of the treaty. Much friction, therefore, prevailed, and France, desiring to make her protectorate more effective, dispatched an expedition to the country (Nov., 1894). In the face of many difficulties the French force made their way to the capital, Antananarivo (*q. v.*), which they captured Sept. 30, 1895. In the treaty then made the Hovas fully recognized the protectorate. Aug. 6, 1896, however, France promulgated a law declaring Madagascar and its dependencies a French possession, and in 1897 the queen was exiled to Réunion. Tamatave, on the eastern coast, in lat. 18° 10′ S., trades with Europe, Museat, Zanzibar, and the Cape of Good Hope. See Madagascar in the Appendix; Ellis, *History of Madagascar* (1838); *Three Visits to Madagascar* (1858); *The Martyr Church* (1870); McLeod, *Madagascar and its People* (1865); S. P. Oliver, *Madagascar and the Malagasy* (1866); W. Ellis, *Madagascar Revisited* (1867); J. Sibree, *Madagascar and its People* (1870) and *The Great African Island* (1880); and *The Quarterly Review*, July, 1896. Revised by C. C. Adams.

Madar′, or **Mudar** [= Hind. *madār*]: a large plant of the East Indies, *Calotropis asclepias gigantea*, now naturalized in the West Indies. Its fiber is used for making cloth and cordage, and the bark of its root is employed with apparent advantage in leprosy, elephantiasis, syphilis, and other diseases.

Maddalo′ni [Ital. < Lat. *Magdalo′num*, the ancient name]: town; in the province of Caserta, Southern Italy, about 18 miles N. from Naples (see map of Italy, ref. 7–F). Its chief interest for the visitor is the grand Carolino aqueduct, built about 1755, which brings the waters of the Tiburno to Caserta (3 miles from Maddaloni), where they form a fine cascade that supplies the lakes and fountains of the royal palace gardens. The whole length of this aqueduct is 30 miles, the tunnels and bridges being very numerous, the latter alone having cost nearly $1,000,000. The longest, the Ponte della Valle, consists of three tiers of arches, the upper of 43 arches; the second, 28; the lower, 19. It was at Maddaloni that Gen. Bixio in 1860 met the flying Bourbon troops after the battle of Volturno, and drove them into the fortress of Capua. Pop. 17,080.

Madden, Richard Robert, M. D.: author and traveler; b. at Dublin, Ireland, in 1798; traveled in Turkey, Asia Minor, and Egypt in 1824–27; became a fellow of the Royal College of Surgeons; was sent to Jamaica in 1833 as a special magistrate to supervise the working of the Emancipation Act; became superintendent of liberated Africans at Havana in 1836; was commissioner of arbitration in the mixed court of justice at Havana 1836–39; member of the commission of inquiry into the slave-trade on the west coast of Africa 1841; colonial secretary of Western Australia 1847, and secretary of the loan-fund board at Dublin Castle 1850–80. He published some volumes of travels in Turkey and the West Indies, *Lives* of Savonarola (1854) and Galileo (1863), and several works upon Ireland, of which the most important are *The Lives and Times of the United Irishmen* (1842–46; republished 1874), *Historical Notice of the Penal Laws against Roman Catholics* (1865), and *History of the Irish Periodical Literature* (1867). D. Feb. 5, 1886.

Madder [M. Eng. *mader* < O. Eng. *mædere*, Fr. *garance*, Germ. *krapp*]: a dyestuff obtained from the root of different species of *Rubia*, chiefly *Rubia tinctorum*. The main supply of commerce is from Holland, though the plant was originally a native of Southern Europe and Asia Minor, where it is still cultivated to a large extent. In Ohio, Delaware, and elsewhere in the U. S., the cultivation of the plant has been followed. Hindu madder, called *munjeet*, is the root of *Rubia munjista*, and gives the bright colors to the East India chintzes and calicoes. The term *Turkey red*, applied to one of the tints produced from this material, arose out of its importation from the Levant, where a common species, *Rubia peregrina*, has the popular name *alizari*, whence we get our chemical name for the chief tinctorial principle of madder, Alizarin (*q. v.*). A concentrated form of madder is called *garancin*. H. Wurtz.

Madder Family: the *Rubiaceæ*; one of the largest of the families of dicotyledonous plants, including about 4,500 species of mostly tropical herbs, shrubs, and trees. They have opposite or whorled leaves, and regular, gamopetalous flowers, with inferior two to several celled ovaries. The

Rubia tinctorum.

madder (*Rubia tinctorum*), a native of the south of Europe, and Western Asia, is grown in many parts of the world for its roots, which yield a red dye. Several species of South American trees of the genus *Cinchona* yield Peruvian bark, from which is extracted the well-known drug quinine. The coffee-tree (*Coffea arabica*) is a native of Abyssinia, now grown in many tropical countries. The emetic drug ipecacuanha is derived from the roots of a semi-shrubby Brazilian species of *Uragoga*. Bedstraw (*Galium*), bluets (*Houstonia*), and button-bush (*Cephalanthus*) are common representatives in the U. S.

Madeira, maă-dā′raă [Portug., timber, in allusion to the floating logs brought down by its current; Span. *Madera*]: a river of South America; the most important of the southern tributaries of the Amazon, draining, according to Keller, an area of 755,000 sq. miles, including nearly all of Northern Bolivia, with portions of Southeastern Peru and Western Brazil. Its length, to the head of its most remote affluent, the Guapay, is over 2,000 miles, and according to Keller it discharges, at medium flood, 517,000 cubic feet of water per second. The Madeira and its tributaries occupy a broad southern extension of the Amazonian depression, practically confluent with the Paraguayan depression, and separating the Brazilian plateau from the highlands of Bolivia and Peru. This region forms a vast low plain cov-

ered in great part with forest; the climate is warm (mean temperature at São Antonio 79° F.) and damp; from October to April rains are very frequent and heavy, and from this cause, as well as the melting of snow about the Andean affluents, the river during those months is subject to heavy floods, the difference between low and high water being from 25 to 40 feet. The lower Madeira, to which the name is generally restricted, is formed by the united waters of four great rivers—the Madre de Dios, rising in Peru; the Beni and Mamoré, flowing from Bolivia; and the Guaporé from Western Brazil. The Madre de Dios joins the Beni 125 miles above the mouth of the latter, and in a similar manner the Mamoré receives the Guaporé; the Beni and Mamoré finally unite to form the Madeira. The least known of these great tributaries is the Madre de Dios, which rises on the eastern slope of the Peruvian Andes, E. of Cuzco, and has a length of at least 700 miles to its junction with the Beni. The Beni rises on the Nevado de Chacaltayo, near La Paz, Bolivia, flowing as a rivulet through that city; after making a great curve to the S. and E. it turns N. and finally N. E. to its junction with the Mamoré. Its whole length is probably 950 miles; close to the mouth it is obstructed by rapids, but beyond is navigable for 620 miles. The Mamoré (called in its upper course the Guapay or Rio Grande) rises near Cochabamba, Bolivia, and after making a great eastern curve around Santa Cruz turns N. to its junction with the Beni. For about 45 miles above its mouth it is obstructed by rapids, beyond which it is freely navigable to Exaltacion, 375 miles, and above that small vessels go much farther; it is said that by removing obstacles it could be easily opened to beyond Santa Cruz. The extreme length to the head of the Guapay is between 1,300 and 1,400 miles. The Guaporé or Itenez rises on the Brazilian plateau (Serra dos Parecís), E. of the town of Matto Grosso, and very near streams which flow to the Paraguay (lat. 14° 43′ 3″ S., lon. 59° 50′ 21″ W., according to Almeida Serra). It soon takes a northwesterly course, joining the Mamoré in lat. 11° 54′ 13″ S., lon. 64° 40′ 12″ W., with a length of over 900 miles. It is navigable for light-draught vessels to the town of Matto Grosso, 150 miles from its source. From near lat. 14° S. (junction of the Rio Verde), the Guaporé and Mamoré form the boundary between Brazil and Bolivia. All these rivers receive numerous affluents, some of them hundreds of miles long, and navigable, but very little known. Finally, through the Beni and Mamoré, the whole system unites to form the Madeira proper, on the northern frontier of Bolivia (lat. 10° 22′ 30″ S., lon. 65° 22′ 6″ W.). From this point it flows entirely in Brazilian territory, and reaches the Amazon in lat. 3° 25′ 43″ S. and lon. 58° 47′ 41″ W. The length of this lower portion is about 935 miles, and the average width half a mile, increasing in parts to more than a mile. During the period of high water (November to July) ocean steamers of any size can ascend to São Antonio, 715 miles; and vessels drawing 8 feet reach that point at any season. The Madeira and its affluents flow through regions well fitted for agriculture, but almost deserted. The wild Indians are reduced to a few savage hordes, wandering in the forest, and the few settlements along the rivers owe their existence almost entirely to the rubber-gatherers, the Madeira basin being a chief source of the rubber-supply of the world. The banks are nearly everywhere low, and large areas are covered during the annual floods; it is on these lowlands that the rubber-trees grow; and as such regions and the vicinity of the falls are often malarious, the Madeira valley has acquired the reputation of being unhealthful. The scheme for building a railway around the falls of the upper Madeira and lower Mamoré, thus opening communication with the navigable upper rivers, has never been carried out; but careful surveys have been made, and several miles of the railway were constructed by U. S. contractors in 1877. See Gibbon, *Exploration of the Valley of the Amazon* (1854); Keller, *Vom Amazonas und Madeira* (1874; English translation, *The Amazon and Madeira Rivers*, 1875); Mathews, *Up the Amazon and Madeira Rivers* (1879); various pamphlets and papers by G. E. Church; F. B. de Sonza, *Commissão do Madeira* (1874); Julio Pinkas, *Relatorio da Commissão de estudos da estrada de ferro do Madeira e Mamoré* (1885); Fonseca, *Viagem ao redor do Brazil* (vol. ii., 1881).

HERBERT H. SMITH.

Madei'ra: an island belonging to Portugal, and situated in the North Atlantic Ocean, between lat. 32° 36′ and 32° 53′ N., and between lon. 16° 40′ and 17° 20′ W. It is about 360 miles from the coast of Africa, 535 from Lisbon, 1,215 from Plymouth, 240 from Teneriffe, and 480 from Santa Maria, the nearest of the Azores. By the Brazilian submarine telegraph, which touches it at Funchal, it is connected with Lisbon and Rio de Janeiro. Area, 315 sq. miles. The island is of volcanic origin, though earthquakes occur very seldom. The ground is high, the average elevation being 2,000 feet, and the surface mountainous. The coasts are steep, precipitous, and afford but few harbors. In the interior the land rises still higher until it reaches its greatest height in Pico Ruivo, 6,050 feet; but it is everywhere intersected by deep, well-watered, and fertile valleys, which, however, it has cost, and still costs, an immense amount of labor to cultivate, as the ground has to be terraced and the soil prevented by walls or other devices from being washed away by the rain, while the limited supply of water makes necessary a very intricate and expensive system of irrigation. The climate is equable, the average heat in the summer being 74° and in the winter 64°. In the valleys tropical plants are grown—rice, sugar, coffee, bananas, pineapples, and oranges; on the more elevated fields vines, chestnuts, and wheat are cultivated, and the table-land is covered with fine forests and extensive pastures. The inhabitants, numbering 135,000, are a mixture of Portuguese, Moors, and Negroes, and described as a vigorous, healthy, and industrious race. Since the grape disease in 1852 the vine cultivation, which formerly made the island celebrated, has declined very much, but the coffee-tree has taken the place of the vine, and succeeds very well. There is, however, still produced excellent wine in the vineyards of Madeira (Bual, Sercial, and Malmsey, strong in body and with a fine bouquet); about 300,000 gal. are annually exported. Sugar is also cultivated with success. The capital is FUNCHAL (*q. v.*). Madeira was discovered in 1416, and soon after colonized by the Portuguese. The conjecture that the Phœnicians discovered Madeira at a very early date has been formed on insufficient evidence, though the position in which Pliny places the Mauritanian islands with reference to the Canaries seems to indicate the Madeiras. The romantic story of the two lovers cast on the shores of the island in 1346 is hardly more than fiction; but it seems probable that Genoese captains had visited Madeira before the Portuguese came. Revised by M. W. HARRINGTON.

Madeira-nut: See WALNUT.

Maderno, CARLO: architect; b. at Bissone, in the Correo district in 1556. He studied painting at first, but being called to Rome by his uncle Domenico Fontana, he practiced architecture and acquired great but undeserved fame. He succeeded Giacomo della Porta as architect to St. Peter's, and altered the designs of Bramante, Peruzzi, and Michaelangelo. He preferred the Latin cross to the Greek, which entirely destroyed the proportion and harmony of the project of Michaelangelo. Nothing was done in Rome without his advice or co-operation. The choir and cupola of St. Giovanni dei Fiorentini, the façade of Santa Susanna, the Church of La Vittoria, and that of Sta. Chiara are his works. He finished the Quirinal Palace, the Borghese Palace, the tribune of Sta. Maria della Pace, and numerous others, besides making designs which were carried out in other cities of Italy, France, and Spain. D. in Rome, 1629.

W. J. STILLMAN.

Madison: city; capital of Morgan co., Ga. (for location of county, see map of Georgia, ref. 3–H); on the Georgia and the Macon and N. railways; 63 miles E. by S. of Atlanta, 104 miles W. of Augusta. It is an important shipping-point for cotton; has steam cotton-gins, steam sawmill, and a cotton-compress, and contains the Madison Male and Female Institute (non-sectarian, opened in 1875), a State bank with capital of $75,000, a private bank, and two weekly newspapers. Pop. (1890) 2,131; (1900) 1,992.

Madison: city; capital of Jefferson co., Ind. (for location of county, see map of Indiana, ref. 9–G); on the Ohio river, and the Pitts., Cin., Chi. and St. L. Railway; 90 miles S. W. of Cincinnati. It has daily steamboat communication with Cincinnati and Louisville; is engaged in ship-building and the manufacture of cotton and woolen goods, tanned leather, starch, machinery, foundry products, and brewery products, and has a large trade in provisions. There are 2 national banks with combined capital of $250,000, and 3 daily and 3 weekly newspapers. Pop. (1880) 8,945; (1890) 8,936; (1900) 7,835.

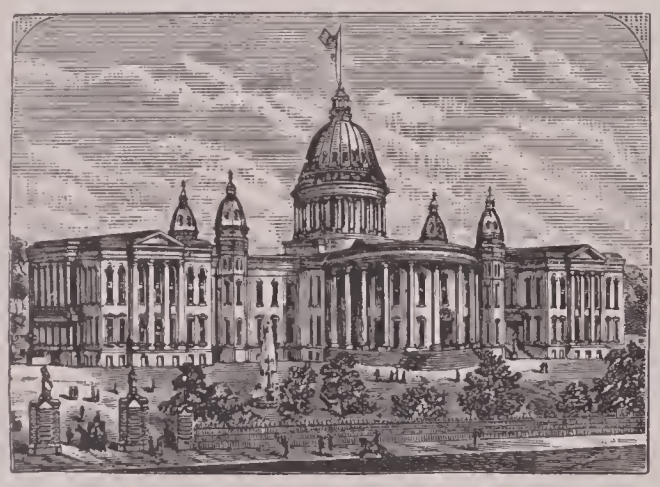
EDITOR OF "COURIER."

Madison: borough; Morris co., N. J. (for location of county, see map of New Jersey, ref. 2–D); on the Del.,

Lack. and W. Railroad: 26 miles W. of New York city. It is in a noted peach and rose growing region; is the seat of Drew Theological Seminary (*q. v.*); and contains the permanent and summer residences of many New York and Newark business men. The principal industry is rose-growing for New York flower-dealers. There are some minor manufactures and two newspapers. Pop. (1880) 1,756; (1890) 2,469; (1900) 3,754. Editor of "Eagle."

Madison: city; capital of Lake co., S. D. (for location of county, see map of South Dakota, ref. 7–G); on the Chi., Mil. and St. P. Railway; 40 miles N. W. of Sioux Falls, 60 miles S. of Watertown. It is in an agricultural region, is the seat of the State normal school (founded in 1883), and has a daily, a semi-weekly, 3 weekly, and 2 monthly periodicals. Pop. (1880) 96; (1890) 1,736; (1900) 2,550.

Madison: city; capital of Wisconsin and of Dane co. (for location of county, see map of Wisconsin, ref. 7–D); on the Chi. and N. W., the Chi., Mil. and St. P., and the Ill. Cent. railways; 82 miles W. of Milwaukee. It is built on an undulating isthmus between Lakes Mendota and Monona, 788 feet above sea-level and 210 feet above Lake Michigan, and has Lakes Waubesa and Kegonsa in its immediate vicinity. The city is the seat of the University of Wisconsin (*q. v.*), and contains 2 commercial colleges, 10 public schools, a high school, several select schools, 21 churches, 4 State banks, a national bank, and a savings, loan, and trust company with an aggregate capital, surplus, and undivided profits of $775,000 and deposits of $4,280,000, and 3 daily, 10 weekly, 5 monthly, and 3 other periodicals. It has improved water-works, gas and electric light plants, electric street-railways, 25 hotels, and State Supreme Court, State Historical Society, university, high school, public, and law libraries. The industries comprise the manufacture of agricultural implements, machinery, printing-presses, bicycles, flour, beer, carriages and wagons, and foundry and machine-shop products. The State Capitol is in an attractive park of 13 acres, and the State Hospital for the Insane is in the suburbs. Madison has wide repute as a charming summer resort. Pop. (1880) 10,324; (1890) 13,426; (1900) 19,164.
Editor of "State Journal."



State Capitol, Madison, Wis.

Madison, James, D. D.: bishop and collegiate professor; b. near Port Republic, Va., Aug. 27, 1749; was a second cousin of President Madison; graduated at William and Mary College 1768; studied law and was admitted to the bar, but abandoned that profession for the ministry of the Protestant Episcopal Church. In 1773 he was chosen Professor of Mathematics in William and Mary College, and became president of that institution in 1777. He visited England in 1775 and again in 1777, where he pursued a course of study at London in several advanced branches of science, kept the college open during the war of the Revolution, became Professor of Natural and Moral Philosophy 1784, was consecrated first Bishop of Virginia by the Archbishop of Canterbury in Lambeth Palace Sept. 19, 1790, and continued to discharge his duties as collegiate president and professor until his death Mar. 6, 1812. He published several addresses, a *Eulogy on Washington* (1800), a large map of Virginia, and some papers in Barton's *Journal* and in the *Transactions* of the American Society, vols. ii., iii., and iv.

Madison, James: fourth President of the U. S.; b. at Port Conway, Prince George co., Va., the residence of his maternal grandparents, Mar. 16, 1751; was the eldest of the seven children of a prosperous planter, Col. James Madison, of Montpellier, Orange County, by his wife Eleanor Conway; studied Latin, Greek, French, and Italian under the tutorship of the parish minister, Rev. Thomas Martin; entered the college of New Jersey at Princeton in 1769, and graduated in 1771, but remained for several months pursuing a course of reading under the guidance of President Witherspoon. At this time he seriously and permanently injured his health by allowing himself but three or four hours of sleep; returned to Virginia in 1772, and continued for two years in incessant study, nominally directed to the law, but really including extended researches in theology, philosophy, and general literature. His attention was then absorbed by the impending struggle for independence, with which was closely connected in Virginia a local controversy on the subject of religious toleration. The Church of England was the established State religion in the Old Dominion, and other denominations labored under serious disabilities, the enforcement of which was characterized by them as persecution. Madison took a prominent stand in behalf of the removal of all disabilities, repeatedly appeared in the court of his own county to defend the Baptist Nonconformists, was elected from Orange County to the Virginia convention in the spring of 1776, and signalized the beginning of his public career by procuring the passage of an amendment to the Declaration of Rights as prepared by George Mason, substituting for the word "toleration" a more emphatic assertion of religious liberty. In the same year he was elected to the Virginia Assembly; was chosen in Nov., 1777, a member of the council of State, and in Mar., 1780, took his seat in the Continental Congress, where he first gained prominence through his energetic opposition to the issue of paper money by the States. He was made chairman of the committee on foreign relations, and as such wrote an able memorandum for the use of the American ministers in France and Spain, establishing the claims of the young republic to the territories between the Alleghany Mountains and the Mississippi, and to the free navigation of that river. In 1783 he was chairman of the committee on ways and means, was the principal author of the system of revenue then adopted, and wrote on that subject the address to the States adopted by Congress. As a member of the Virginia Legislature 1784–86, Madison rendered important service by promoting and participating in that revision of the statutes which effectually abolished the remnants of the feudal system subsistent up to that time in the form of entails, primogeniture, and state support given to the Anglican Church; and his *Memorial and Remonstrance* on the latter subject was one of his ablest State papers. In Jan., 1785, he took the initiative in proposing a meeting of State commissioners to devise measures for more satisfactory commercial relations between the States; represented Virginia at the Annapolis meeting which issued the call for the national constitutional convention (Sept., 1786); was a delegate to that convention, which met at Philadelphia May, 1787; was one of the chief framers of the Constitution of the U. S., and perhaps its ablest advocate in the pages of The Federalist (*q. v.*). He was a member of the first four Congresses, 1789–97, in which he maintained a moderate opposition to Hamilton's financial policy; declined the mission to France and the secretaryship of State, and, gradually identifying himself with the Republican party, became from 1792 its avowed leader, and in 1796 was its choice for the presidency as successor to Washington, but declined to be a candidate. During the stormy administration of John Adams, Madison remained in private life, but was the author of the celebrated "Resolutions of 1798" adopted by the Virginia legislature, in condemnation of the Alien and Sedition Laws, as well as of the *Report* (1800) in which he defended those resolutions, which is by many considered his ablest State paper. The great reaction in public sentiment which seated Jefferson in the presidential chair was largely owing to the writings of Madison, who was consequently well entitled to the post of Secretary of State, which he filled during the whole administration of his friend with such ability as to make him the natural successor in the chief magistracy. Chosen President by an electoral vote of 122 to 53, Madison was inaugurated Mar. 4, 1809, at a critical period, when the relations of the U. S. with Great Britain were becoming embittered, and his first term was passed in diplomatic quarrels, aggravated by the act of non-intercourse of May, 1810, and finally resulting in a declaration of war on June 18, 1812. In the autumn Madison was re-elected to the presidency by 128 electoral votes to 89 in favor of George Clinton. The war

was prosecuted three years, marked by alternate success and defeat in Canada, by glorious victories at sea, by the burning of the national Capitol at Washington, Aug., 1814, by the opposition movement in New England, which culminated in the HARTFORD CONVENTION (*q. v.*) in 1814, and by the celebrated battle won at New Orleans (Jan. 8, 1815) after a peace had been signed at Ghent (Dec. 24, 1814) which left the original cause of dispute in abeyance. The conflict of 1812–15 was indecisive, and the check received by the Western States in their openly declared intention of annexing Canada by right of conquest might furnish a motive of humiliation, as well as a valuable lesson, had not the popular historians of the war conveniently forgotten to chronicle that original intention. In 1815 a commercial treaty was negotiated with Great Britain, and in Apr., 1816, a national bank was incorporated by Congress, the germ of a financial conflict not yet decided. Madison yielded the presidency Mar. 4, 1817, to his Secretary of State and intimate friend, James Monroe, and retired to his ancestral estate at Montpellier, where he passed the evening of his days surrounded by attached friends and enjoying the merited respect of the whole nation. He took pleasure in promoting agriculture as president of the county society, and in watching the development of the University of Virginia, of which he was long rector and visitor. In extreme old age he sat in 1829 as a member of the convention called to reform the Virginia constitution, where his appearance was hailed with the most genuine interest and satisfaction, though he was too infirm to participate in the active labor of revision. He died at Montpellier, June 28, 1836. James Madison was pre-eminently a statesman of a well-balanced mind. His attainments were solid, his knowledge copious, his judgment generally sound, his powers of analysis and logical statement rarely surpassed, his language and literary style correct and polished, his conversation witty, his temperament sanguine and trustful, his integrity unquestioned, his manners simple, courteous, and winning. By these rare qualities he conciliated the esteem not only of friends but of political opponents, in a most unusual degree.—He had a worthy helpmate in his wife, DOROTHY PAYNE (b. in Virginia, 1767), whom he married in Philadelphia in 1794, she being then Mrs. Todd, a widow celebrated in society for beauty and accomplishments. During her long residence in Washington, Mrs. Madison was a conspicuous ornament of the "republican court" over which she ultimately presided; she returned to Washington after her husband's death, survived until July 12, 1849, and was long admiringly remembered in Washington as "Dolly Madison." (See *Memoirs and Letters of Dolly Madison*, 1886.) A valuable diary kept by Madison at the time of the formation of the Federal Constitution was purchased from his heirs for $30,000, and printed by order of Congress as *Reports of the Debates in the National Convention of 1787* (3 vols., 1840); a second edition of this journal of the convention of 1787 was published in one volume, Chicago, 1893; his *Complete Works* have been published in 6 vols. See his *Life and Times*, by W. C. Rives (3 vols., 1859–69, unfinished); the *Letters and other Writings of James Madison* (4 vols., 1865); and Gay's *Life* in the American Statesmen Series.

Revised by F. M. COLBY.

Madison University: See COLGATE UNIVERSITY.

Madisonville: town; capital of Hopkins co., Ky. (for location of county, see map of Kentucky, ref. 4–D): on the Louis. and Nash. Railroad; 36 miles N. of Hopkinsonville, 38 miles S. of Henderson. It is in the heart of the tobacco-growing region, and also in a valuable coal-mining district, and has flour and planing mills, cotton-gin, tobacco-stemmeries, and several manufactories. Pop. (1880) 1,544; (1890) 2,212; (1900) 3,628.

Madisonville: village; Hamilton co., O. (for location of county, see map of Ohio, ref. 7–C): on the Pitts., Cin., Chi. and St. L., and the Balt. and O. S. W. railways; 13 miles N. E. of Cincinnati. It has several manufactories, considerable trade with the surrounding country, and a weekly newspaper. Pop. (1880) 1,274; (1890) 2,214; (1900) 3,140.

Mäd'ler, JOHANN HEINRICH: astronomer; b. in Berlin, Prussia, May 29, 1794. While holding a position in the normal school of his native city he made astronomical observations together with Wilhelm Beer, and they published in 1829–36 the celebrated chart of the moon, in four leaves, and in 1837 the explanation of the chart (*Allgemeine vergleichende Selenographie*, 2 vols.). In 1836 he obtained an appointment at the observatory of Berlin, and in 1840 he was made director of the observatory of Dorpat, in Russia. While there he published a long series of *Untersuchungen über die Fixsternsysteme*, setting forth his hypothesis of the existence of a great central celestial body. An eye disease compelled him to resign in 1865. He returned to Germany, and died at Hanover, Mar. 14, 1874. Among his other works are *Leitfaden zur mathematische und allgemeinen physischen Geographie* (Stuttgart, 1844); *Die Zentralsonne* (1846); *Der Fixsternhimmel* (1858); *Geschichte der Himmelskunde* (1872–73).

Madoc: a Welsh prince; son of Owen Gwynedd; flourished in the twelfth century. According to some annalists he sailed westward with a fleet A. D. 1170, discovered a vast and fertile continent, returned to Wales, sailed again with ten vessels, and was never after heard of. Many passages in Welsh bardic and historical writings have been cited in support of the story, but these passages are, for the most part, extremely vague, and their reference to Madoc's alleged discovery is a matter of mere conjecture. The earliest extant narrative of Madoc's voyage is in the work of one Humfrey Llwyd, or Lloyd, who wrote in 1559. The new land was supposed to be Nova Hispania or some part of Florida, since the Spaniards are said to have found there the traditions of a previous settlement by a strange race which had honored the cross. Substantially the same account of the discovery was given in the writings of Powel, Herbert, Howell, Hakluyt, Raleigh, Purchas, and many others, and to this evidence was added the testimony of travelers who professed not only to have found traces of the Welsh settlement in Mexico, but to have learned of a certain tribe of Indians that spoke the Welsh tongue. All these claims, which created among patriotic Welshmen a widespread belief in the story of Madoc's voyage, have been subjected to a careful and critical analysis by Thomas Stephens in *Madoc, an Essay on the Discovery of America by Madoc ap Owen Gwynedd in the Twelfth Century* (1893). After a thorough presentation of the evidence relating to the subject, the author decides against the theory of Welsh discovery. For arguments in favor of the theory, see the publications of the Llangollen Eisteddfod, held in September, 1858, and for a bibliography of the subject, see R. B. Anderson's *America not Discovered by Columbus* (1874).

F. M. COLBY.

Madon'na [Ital., originally equivalent to *madame*]: a title of the Virgin Mary, and given especially to artistic representations of her. In mediæval times the Madonna was the symbol of glorified womanhood and maternity, and feelings of chivalric devotion, blended with religious reverence, made her a prominent subject of Christian art. See Mrs. Jameson, *Legends of the Madonna* (1852).

Madoz', PASCUAL: statesman and author; b. at Pamplona, Spain, May 17, 1806; studied at the University of Saragossa; volunteered for the defense of the castle of Mouzon against the French in 1823; was taken prisoner and held for seventeen months, after which he resumed the study of law at the university, but was expelled soon after for liberal opinions; resided several years in Tours, France; was pardoned by the regent Christina and returned to Spain. Taking up his residence at Barcelona he edited a *Diccionario Geografico Universal* in 10 vols. (1829–34), a *Colección de Causas Celebres* (20 vols.), and a liberal newspaper, *El Catalano*; became a lawyer and a judge; and fought against the Carlists as colonel of a battalion of volunteers. In 1836 he was elected to the Cortes, in which he sided with the progressive party, refusing to accept office from the Government. During this time he was at work on his *Diccionario Geografico, Estatistico y Historico de España* (Madrid, 16 vols., 1848–50). He became governor of Barcelona 1854; was leader of the Progressists in the Cortes, and as Minister of Finance in 1855 he showed most radical tendencies. In the following year, after a vain resistance to the Government, he was forced to leave Spain, but soon returned, and was re-elected to the Cortes. Took part in the revolution of 1868, became governor of the province of Madrid, and deputy to the Constituent Cortes, and died in 1870 on the journey to offer the crown of Spain to Amadeo.

F. M. COLBY.

Madras' Province: the southernmost province of the Hindustan peninsula; extends from Cape Comorin, lat. 8° 4′ N., to Nagpur, lat. 21° 10′ N., and is bounded N. by the presidency of Bombay, Curg, Haidarabad, the Central Provinces, and Bengal, E. and S. E. by the Bay of Bengal, S. by the Indian Ocean, and W. by the Arabian Sea. Area,

140,172 sq. miles. Pop. (1901) 38,208,609. The surface forms a plateau sloping down from the center on both sides, inclosed E. and W. by the Ghats and S. by the Nilgiri Hills, and traversed by three large rivers, the Godavari, Kistna, and Cauvery, besides several minor ones. The rivers, which flow westward to the Arabian Sea, expand at their mouths, become shallow, and form lakes. The soil is sandy along the coast, and much mixed with salt in the interior; there are, nevertheless, many very fertile districts; for instance, Tanjor, which is rich in grain. The great forests, which since 1859 have been under regular cultivation, yield teak and many other valuable kinds of wood. Sugar, cocoanuts, tobacco, indigo, and cotton are produced. Considerable quantities of iron, copper, lead, manganese, silver, and coal are found. Revised by M. W. Harrington.

Madras (derivation unknown; native name *Chennapatnam*, "Chenappa's City"; official name *Fort St. George*): the third city of India; capital of the presidency or "administration" of the same name; situated on the Bay of Bengal, along the shores of which it extends for 10 miles; lat. 13° 4′ N., lon. 80° 15′ E. (see map of S. India, ref. 6–F). The city, which has an area of 27 sq. miles and extends inland for about 4 miles, is built on a sandy plain only a few feet above sea-level, and the drainage is consequently bad. It consists of Fort St. George (the first British possession in India) and of twenty-three villages, which have grown together into one municipality. The streets are macadamized, but the street-lighting, sewerage, means of transit, etc., are so poor that the city is often nicknamed "The Benighted." The water-supply is obtained from wells and the Red Hill Tanks or reservoirs. The Cooum river, which traverses the center of the city, is little better than an open sewer, the mouth of which is silted up from the sea for a large part of the year. A similarly sluggish stream, the Adyar, flows across the city on the S. In the center of the town, but immediately on the sea, stands Fort St. George, which, besides the barracks for the British troops and other military institutions, contains the council-house, in front of which stands the marble statue of Lord Cornwallis, the arsenal, St. Mary's church (more than 100 years old), and other public buildings. To the N. of the fort, but separated from it by a large esplanade, is Blacktown, the native town, poorly built, but densely populated. To the E. along the shore it is lined with handsome public buildings and business offices. On the south side of the fort, but separated from it by the Cooum river, is the Mohammedan quarter, with the Chepak Gardens and the palace of the former nabobs of the Carnatic. W. of the palace stands the government-house. Other noteworthy buildings are the new High Court; the lighthouse, 128 feet high and visible 20 miles; the Church of St. Andrew (founded in 1818); St. George's Cathedral; the mint (in Blacktown); the Madras Club; the observatory; the Military Orphan Asylum; the hospital, etc. The numerous residences of the European officials, civil and military, are generally palatial structures, the polished chunam used in their construction giving them the appearance of marble. Parks and gardens usually surround the houses and contribute much to the beauty of the city. Madras is progressing industrially and has several large cotton-mills, tanneries, etc., and an ice-factory. It has several canals, the most important of which is the Buckingham, extending northward for 196 miles, and is an important railway center. Though destitute of any natural harbor, and thus unfavorably situated for commerce, Madras is in direct steam communication with Europe and the principal ports of the East. It exports hides, spices, tea, coffee, indigo, cotton, and saltpeter, and imports cotton goods, canned goods, liquors, metals, horses, etc. Recently a commodious artificial harbor has been constructed at great expense, and vessels are now comparatively well sheltered from the terrible hurricanes to which they were formerly exposed in the open roadstead, and passengers are no longer landed through the surf on catamarans and the native *massulah* boats, consisting of planks bound together with string. In calm weather the surf breaks about 300 feet from the shore, with waves 3 feet high, while in stormy weather the break is 1,000 feet from the shore and the height of the waves is 15 feet. The heat is great but comparatively dry, and an invigorating seabreeze called "the doctor" blows the greater part of the year from about noon to sunset. Madras was founded in 1639 by Francis Day, of the East India Company, who obtained a grant of land from the Rajah of Chandragiri in that year, and was made a presidency in 1653. The fort has often been attacked—in 1702 and 1741 by the natives. In 1746 it was captured by the French, but restored two years later, and in 1758–59 it was unsuccessfully besieged by them. In 1803 it was swept by a great fire which consumed 1,000 houses, and it suffered greatly in the great hurricane of 1872. Pop. (1891) 452,518.

Madrazo, mäă-draa′thō, Don Raimundo, dc: portrait and genre painter; b. in Rome, Italy, July 24, 1841; pupil of his father, Don Federico de Madrazo, and of Léon Cogniet, in Paris; was awarded first-class medals, Paris Exposition, 1878–89; decoration of the Legion of Honor 1878. D. in Madrid, June 11, 1894. He was a brilliant technician, and his portraits in oil and in pastel are most cleverly painted. His *Fête during the Carnival* is in the collection of Mrs. W. H. Vanderbilt, New York, and is a representative work.

William A. Coffin.

Madre de Dios: river of Bolivia. See Madeira.

Madre de Dios: archipelago. See Magallanes.

Madrepore: a group of coral-forming polyps (see Scyphozoa) belonging to the order of *Hexactinia*. The term is usually restricted to the tree-corals of tropical seas, but in the broader sense it includes the greater portion of the reef-building forms.

Madrid′: the capital of Spain and of the province of Madrid, a part of New Castile; situated nearly in the center of the country, in lat. 40° 25′ N., lon. 3° 42′ W., on the left bank of the Manzanares, a small stream which joins the Jamara and flows to the Tagus (see map of Spain, ref. 15–F). The site offers no commercial or industrial advantages, nor has it any special military importance; and the surrounding plateau—2,200 feet high, and once covered with forests, but now, with the exception of the immediate neighborhood of the city, naked and arid—suffers from a very harsh climate. In the streets of the city the thermometer sometimes falls in the winter to 18°, and rises in the summer to 105° in the shade. Changes are frequent, sudden, and violent, and the difference in temperature between the sunny and shady sides of the street often amounts to 20°. The city is first mentioned in history as a Moorish outpost, called *Majerit*, but was captured in 1083 by Alfonso VI. of Castile. Henry III. of Castile resided there often for the pleasure of hunting; Charles V. went there occasionally, and in 1560 Philip II. made the place his capital. From this time it grew rapidly into a magnificent city, and became the center of the Spanish people, political and literary. Pop. (1892) 480,000.

The city is surrounded by a brick wall 20 feet high and pierced by fifteen gates, of which the most remarkable is Puerta de Alcalá, 72 feet high, built in the form of a triumphal arch with five openings, and standing at the foot of the street of Alcalá, which, three-fourths of a mile long, traverses the city from N. E. to S. W., and forms one of the most magnificent streets in Europe. The southwestern (or old) part of the city contains many narrow, crooked, and ill-kept streets, but the central and eastern parts consist of straight, broad, well-kept thoroughfares, lined with handsome houses, magnificent palaces, and elegant public buildings. Notable among the public squares, of which Madrid numbers seventy-two, is Puerta del Sol, once forming the eastern entrance of the city, but now occupying nearly its center. The government palace, the post-office, and other public buildings are situated here; also the best hotels, clubs, and reading-rooms; and thus the place has become a general rendezvous both for business and pleasure. Plaza Oriente, situated between the royal palace and the royal theater, contains an equestrian statue in bronze of Philip IV., 19 feet high, designed by Montañes; in the promenade skirting the plaza stand forty-four colossal statues of kings and queens. Plaza Mayor, 398 feet long by 306 feet wide, contains an equestrian statue in bronze of Philip III.; here the so-called *autos-de-fe* were formerly celebrated, and from the Real Casa de la Panaderia the king and the court used to witness the burning of heretics. The bull-fights take place in Plaza de Toros, just outside Puerta de Alcalá, erected by Philip V., and accommodating 14,000 persons. In Plaza de las Cortes stands a fine bronze statue of Cervantes. Among the numerous promenades and gardens, the Prado is the most remarkable; 2½ miles long, divided into parts—the Prado proper, the Salon, the Fuente Castellana, formerly the Delicias de Isabel—finely laid out, planted with beautiful trees, and in part adorned with magnificent fountains and statues. The view which these

grounds present on a fine evening, when thronged with people, is very brilliant and characteristic.

Although Madrid is one of the handsomest modern cities, it contains, properly speaking, only one striking building, the royal palace. Its cathedral was begun in 1885. It forms only a suffragan bishopric of Toledo. Many of its churches, of which it numbers ninety, are beautifully decorated with paintings of the old masters, but none of them has any architectural merit. The same is the case with the convents and monasteries, which formerly were so numerous in Madrid, but which now mostly are used for other purposes; forty-four monasteries were suppressed in 1836. The royal palace was built between 1737 and 1750, of granite and white marble, forming a square 470 feet long, 100 feet high, inclosing a court 240 feet square, occupying an area of 220,900 sq. feet, and surrounded with magnificent gardens. It contains a library of 100,000 volumes, an interesting collection of arms, consisting of 2,533 specimens, among which are the armor of Columbus, Gonsalvo de Cordova, and Don John, and a numismatic collection of 150,000 pieces. The collection of pictures in the royal museum in the Prado is one of the largest and richest in Europe, and contains 65 pictures by Velasquez, 58 by Ribera, and 46 by Murillo, besides numerous and excellent works of the Italian and Dutch schools. The educational institutions of the city are good, from the elementary schools, among which the Protestant Sunday-schools begin to play a conspicuous part, to the university and the learned societies. There are, besides the national library, containing over 300,000 volumes, several minor libraries accessible to the public, an observatory, a botanical garden, a medical school, military and engineering schools, a theological seminary, normal schools, and schools of art, law, etc. Its hospitals and other charitable and benevolent institutions are also good.

The industry of the city is not considerable. Of its manufactures only those of plated ware, coaches, tobacco, furniture, carriages, tapestry, earthenware, gloves, and fans have acquired any prominence; but the commerce is important. The retail business is mostly in the hands of foreigners, especially Frenchmen; but wholesale transactions are carried on by native houses, and are very large, the city forming the entrepôt for all the interior provinces.

Revised by C. K. Adams.

Madrid, José Fernandez: See Fernandez Madrid.

Mad'rigal [Fr. *madrigal*, from Ital. *madrigale* < O. Ital. *madriale*, *mandriale*, pastoral poem, madrigal; cf. Ital. *mandra*, flock < Lat. *man'dra*, stall, herd, from Gr. μάνδρα, fold, stable]: in music, the name of a certain species of composition, originally of a light, airy, joyous, and pastoral character. Madrigals are often of complex and elaborate structure, usually for voices alone, and consist of four, five, or more parts, in which the skill of the composer exhibits itself in fugues, canons, imitations, and other highly labored styles of writing. Compositions of this kind abounded in the sixteenth and seventeenth centuries, and in their production the best masters appear to have found a congenial field for the exercise of their ability. It is supposed by some writers that the madrigal originated in Flanders, was subsequently taken up with success by the Italians, and finally became popular in England about the middle of the sixteenth century. Numerous collections of these compositions were published in that century and the following, and these give evidence not only of the popularity of the madrigal in England, but also of the high rank attained by the English masters in this style of composition. In 1741 the well-known Madrigal Society was founded in London—an institution which has had a wide influence in the cultivation of a taste for madrigal music, and for glees, canons, rounds, catches, and national airs. The derivation of the name "madrigal" is merely conjectural. By some it has been traced to *mandra*, a sheepfold, as the early madrigal was of a pastoral character; Dr. Burney derives it from *Alla madre*, "the first words of certain hymns addressed to the Virgin"; Sir John Hawkins connects it with the name of a town in Spain; but no satisfactory etymology has yet been reached. Revised by Dudley Buck.

Madu'ra: an island of the Malay Archipelago, N. E. of Java, comprising an area of 1,700 sq. miles, and belonging to the Netherlands. The inhabitants, numbering 800,000, are Mohammedans, and live in three kingdoms governed by native princes under Dutch superintendence. They are brave and honest; but, although they cultivate sugar, indigo, rice, and tobacco to some extent, they have no disposition for agriculture, and the island is a possession of inferior importance. Its chief product is salt, the manufacture of which is a government monopoly. Petroleum is found in small quantities in all the departments. The principal industry is cattle-rearing. The breed of oxen is small, but very highly esteemed in Java, and exported in considerable numbers. The island contains some hot springs and a mud-volcano called Banju Ening. Among the most important towns of Madura are Kamul, Bangkalang (the flourishing chief town of Madura proper), Arisbaya, Ajermata (named from its salt springs), Pamakasan (containing the residence of the regent), Sampang (an important market-town), Sumenep, and the European town of Maringan.

Madura: a city of British India; in the province of Madras; capital of the district of Madura, which, comprising an area of 8,401 sq. miles, with a population of 2,175,000, occupies the southeastern part of Hindustan (see map of S. India, ref. 7–E). The city is fortified, carries on a considerable trade in cotton and tobacco, and contains some of the most remarkable Hindu buildings, among which are the magnificent Pandiyan palace, the great temple of Mahadeva, and a celebrated choultry or inn for pilgrims, 312 feet long and 125 feet broad, resting on six rows of columns of gray granite, and 25 feet high. A Roman Catholic mission was started here in 1606 by the Portuguese Jesuit Roberto de Nobili, and continued with great success till the middle of the eighteenth century, when the wars between France and Great Britain stopped and nearly annihilated the work. It was resumed in 1837. In 1834 a Protestant mission was established by the American Board of Commissioners for Foreign Missions, which has under its charge numerous churches and schools, besides several dispensaries. Pop. (1891) 87,420.

Mad'vig, Johan Nikolai: statesman and scholar; b. at Svaneke, Denmark, Aug. 7, 1804; studied from 1820–25 in Copenhagen; became privat docent in 1826; Professor of the Latin Language and Literature in 1829; was elected to the Rigsdag in 1848; was Minister of Education till 1851; since 1855 frequently elected president of the Rigsdag. Madvig was one of the greatest text-critics of modern times. D. Dec. 13, 1886, having lost his eyesight some years previously. His most famous works, characterized no less by a brilliant Latin style than by critical learning, are *Emendationes Livianæ* (1876, 2d ed.); *Adversaria critica ad scriptores Græcos et Latinos* (3 vols.); *Opuscula Academica* (1887, 2d ed.); *Kleine Schriften* (1875); *Latin Grammar* (1843) and *Greek Syntax* (1847), both frequently re-edited; *Verfassung und Verwaltung des römischen Staats* (2 vols., 1882); and his masterpiece, the critical commentary to Cicero's *De Finibus* (1839; 1876, 3d ed.). Together with his pupil Ussing, he also published a complete text edition of Livy (4 vols., 1879, 3d ed.). See Heiberg, *Biogr. Jahrbücher* (ix., 1886, pp. 202–221), and, for a complete list of his writings, *Wochenschrift für classische Philologie* (iv., 1887, p. 285). Alfred Gudeman.

Mæan'der (in Gr. Μαίανδρος): a celebrated river in Asia Minor; rises in Phrygia at Celænæ (later Apamea-Cibotus, now Dineir). Numerous large springs burst forth from the mountain-side at Celænæ, and when united form a large river at once. The water comes through the mountain that separates Celænæ from Aulocrene (now Bunarbashü), celebrated both in myth and history. After leaving the Baklan Ovasü at Demirdjikieui, it falls rapidly and cuts its way in a deep cañon through the mountains, emerging at Tripolis into the great fertile valley of the Mæander, whose soil is from 30 to 60 feet deep. Besides the so-called Smyrna figs, this valley furnishes most of the licorice used in Christendom, and has been wealthy and populous at every period of history. The river is noted for its winding and tortuous course through this valley, and because of this peculiarity it has given its name to one of the most beautiful patterns of Greek ornamentation. It has numerous tributaries. It is narrow and deep, and carries with it a large quantity of mud, which, being deposited at the mouth, has extended the coast many stadia farther into the sea, and connected it with some adjacent islands. It is navigable only for small craft. For a discussion of the rivers that rise at or near Celænæ, the Marsyas and the Mæander, see the literature cited under Marsyas. J. R. S. Sterrett.

Mæce'nas, Gaius Cilnius: was born between the years 74 and 64 B. C. of a noble family of Etruscan origin, and died in 8 B. C. His historical significance is twofold, as a statesman and as a patron of literature. He was a friend of the young Octavian, and became his most trusted adviser. His services were employed especially for diplomatic negotia-

tions, in which he displayed rare tact and discretion. We first hear of him as mediating between Sextus Pompeius and Octavian, in the year 40 B. C., bringing about the marriage of Scribonia, a connection of Pompeius, with Octavian. A diplomatic mission of reconciliation was the purpose of a trip to Brundisium a few years later, which Horace has so drolly described in one of his satires (i., 5). During the absence of Octavian in 36 B. C. he was his official representative at Rome, and again in 31 B. C. he shared this responsibility with Agrippa; but all of his influence in the establishment and organization of the new *régime* was exercised as a private citizen, and it almost seems to have been a matter of family pride and tradition to keep aloof from public life as a magistrate. His private life was sensual and inert, and ancient authors repeat much gossip concerning his table extravagances, his passion for pantomimes, and his association with actors. He is well characterized by Velleius as one who "in emergencies was tireless, far-sceing, and never at a loss what to do, but who, when the pressure of business or duty had relaxed, was more effeminate and luxurious than a woman"; but it is as the creator and center of a literary circle at Rome, of a brilliancy unparalleled perhaps in the world's history, that he is best known—a circle composed of such men as the tragic poet Varius, Vergil, Horace, and Propertius. His patronage did not merely consist in the alleviation of their wants and the granting of means for the enjoyment of a literary leisure, but it had a direct influence on many of their compositions, and we learn that the *Georgics* of Vergil and portions of the works of Propertius were due to his suggestion. As a patron of literature his name became proverbial, and a century after his death Martial wrote, *sint Mæcenates non deerunt, Flacce, Marones* (let there but be Mæcenases, and Vergils shall not be lacking). His own literary efforts were inconsiderable and unimportant, arousing a temporary interest chiefly because of their authorship and the strained and unnatural style in which they were written. A striking and characteristic fragment is preserved by Seneca, which reveals with painful vividness his almost hysterical fear of death: "Maim me in hand and foot and hip, make me hunchbacked, shake the teeth from my mouth—while life but lasts, it is well; hang me on the cruel cross, but only preserve my life." G. L. HENDRICKSON.

Maelström, māl'strŭm, or **Malström** [from Norweg. *malstraum*, a whirlpool; *mala*, grind + *straum*, stream]: according to legend, a tremendous whirlpool on the western coast of Norway, immediately S. of Mosköe, the southernmost island of the Lofoden group, in lat. 67° 48′ N. The legend tells us that whales, men-of-war, etc., when caught by the vortex, are ground to pieces as fine as dust. There is, however, no whirlpool at all; but the currents, which run here for six hours from N. to S., and then for six hours from S. to N., are very strong: and when, as often happens, the wind blows from just the opposite direction to that of the current, the agitation of the sea may become very heavy, and even dangerous to small vessels. The origin of the legend is unknown.

Maerlant, maar'lăant, JACOB, van: mediæval writer; b. about 1235 in the district of Bruges, a city of the Netherlands. When still young he removed to the village of Maerlant, on the island of Voorn, in the North Sea. Hence came the name he is known by, and here he was for a time a sacristan, or parish clerk. Here also several of his earlier works seem to have been written. In 1266 he settled in Damme, the haven of Bruges, where he is said to have been clerk of the city chancery. His later years seem to have been passed mainly here, and here he was buried under the belfry of the parish church. Maerlant was called by his own pupil and imitator, Boendale, "Vader der dietscher dichtren algader," and by this name he continues to be known in the history of Dutch literature. In him first appear on a large scale those qualities which have ever since been characteristic of the Dutch genius—moral energy, didactic fervor, erudition, and middle-class rather than aristocratic ideals of life. When he appeared his countrymen were completely under the influence of the literary works of France. Romances of chivalry such as were rife at Paris and at Troyes had been eagerly translated into Dutch, and the vogue of them seemed complete. Maerlant himself began his career as a writer by treating precisely such matters. His first works were a version of the *Alexandreis* of Gauthier de Chastillon (written between 1257 and 1260; ed. by Snellaert 1860–61, and J. Franck 1882); a *Historie van Troyen*, based upon the *Roman de Troïe* of Benoît de Sainte-More (about 1264, ed. in part by J. Verdam 1874; a complete ed. has been undertaken by Nap. de Pauw and E. Gaillard, vol. i., Ghent, 1889); a rendering of the double Arthurian romance of Robert de Borron, *Historie van den Grale* and *Merlijns Boeck* (ed. by J. van Vloten, Leyden, 1880–82); a translation of a lost French romance, *Torec* (ed. J. te Winkel, Leyden, 1875). In all these works Maerlant permits himself great freedom with his originals, abbreviating and adding wherever it seems good to him. Here and there also passages show the tendencies of his mind; but, on the whole, he accepts the romantic and chivalric theories of France as he finds them. A change, however, gradually came over his spirit, and he began to find these same theories exceedingly pernicious. This appears first in a strophic poem known as the *Eerste Martijn* (or *Wapene Martijn*, from its opening words), in which he discusses bitterly with his friend Martijn the corruptions of the world in which they live. This was followed by the similar *Dander* (The Second) *Martijn*, and the *Derden Martijn*, of much the same character (all three ed. by E. Verwijs, 1880). About the same time with the last two of these Maerlant wrote the first of his didactic works, the *Heimelijkheid der Heimelijkheden* (ed. by J. Clarisse, 1838; and by E. Kansler in his *Denkmäler altnied. Sprache u. Lit.*, 1844–66), as it is conjectured, for the benefit of Floris V. when he became Count of Holland (1266). This is a treatise on the art of governing, based upon the work attributed wrongly by Maerlant to Aristotle, the *Secreta Secretorum*. Soon after this he prepared his version of the *De Rerum Natura* of Thomas of Cantimpré, known as *Der Naturen Bloeme* (ed. by E. Verwijs, 1878). This was followed by the most famous of his works, the *Rijmbibel*, based on the *Scolastica* of Petrus Comestor, but amplified by an account of the fall of Jerusalem (*Die Wrake van Jherusalem*), taken from Flavius Josephus (ed. by J. David, 1858–69). This was completed in 1271, and at once brought upon the poet the charge of having made the Bible accessible to the laity. He had to defend himself from the charge, probably before the Bishop of Utrecht. Soon after, at the request of a Franciscan of Utrecht, he translated into Dutch St. Bonaventura's life of St. Francis, *Leven van St. Franciscus* (ed. by J. Tideman, 1848). In 1283 Maerlant set his hand to his chief work, the *Spiegel Historiael*, based upon the *Speculum Historiale* of Vincent of Beauvais (ed. by de Vries and E. Verwijs, Leyden, 1857–63). This enormous task he did not live to finish. In his last years he wrote a number of shorter pieces of a devotional character, among them a beautiful crusade song, *Van den Lande van Oversee*. Though a list of his works makes Maerlant appear chiefly as a translator, yet in reality his originals were to him little more than general guides. He seldom followed literally, and he showed everywhere the ideals that were his and those of the serious part of the Dutch people. Hence his great vogue and influence. See C. A. Serrure, *Jacob van Maerlant en zijne werken* (2d ed. 1867); Karel Versnaeven, *Jacob van Maerlant en zijne werken* (1861); J. te Winkel, *Maerlants Werken beschouwd als Spieghel van de 13ten eeuw* (1877); *id.*, *Geschiedenis der nederlandsche letterkunde* (Deel i., 1887).
A. R. MARSH.

Mæ'sa, JULIA: sister-in-law of the Emperor Septimius Severus and grandmother of the Roman Emperors Elagabalus and Alexander Sĕverus; b. at Emesa, a city of Syria, about 150 A. D., and died about 225 A. D. She has a place in history as having brought about the elevation to the imperial dignity of her grandsons Elagabalus (emperor 218–222) and Alexander Severus (emperor 222–235). G. L. H.

Maestricht, maas'tricht [Dutch, *Maastricht*; anc. *Trajectum ad Mosam*]: city of the Netherlands; capital of the province of Limburg, on the Meuse; 19 miles by rail N. N. E. of Liège (see map of Holland and Belgium, ref. 10–G). It was founded in the fifth century, is regularly and well built, and contains several fine buildings. It was formerly considered one of the strongest fortresses in Europe and the principal defense of Holland, as parts of the surrounding ground can easily be put under water, but during the years 1871–78 the fortifications were razed. In the wars between the United Provinces and Spain and France it often formed the center of the contest, and suffered much. It has an extensive transit trade, manufactures of carpets and earthenware, and immense subterrancan quarries of sandstone in the Pietersberg. These have been worked since the ninth century, and the excavated passages cover an area of 12 by 7 miles. Pop. (1896) 33,834.

Maeterlinck, maa'ter-link, Maurice, or (in Flemish) Mooris: poet; b. in 1864. He is the most remarkable representative of the school of poets calling itself *La Jeune Belge* and working under the device *Pro Arte*. The distinctive character of his work dates from a nine months' residence in Paris in 1886, where he came much under the influence of Villiers de l'Isle-Adam. He owes something also to his study of English literature, particularly Shakspeare and the Elizabethan dramatists on the one hand, and De Quincey, Poe, and Rossetti on the other. He has produced a series of *soi-disant* dramas that have created a veritable sensation by reason of the strangeness of their manner and a certain indubitable power they show. These are *Les Aveugles*, *L'Intruse*, *La Princesse Maleine* (5th ed. 1891), *Les Sept Princesses* (1891), *Pelléas et Mélisande* (1892), *La Quenouille et la Besace* (announced Sept., 1893). Besides these dramas he has also published a volume of poems, *Serres chaudes*, and *L'Ornement des noces spirituelles, de Ruysbroeck l'Admirable, traduit du Flamand et accompagné d'une introduction.* See the London *Academy* for Mar. 19, 1892, and *The Nineteenth Century* for Sept., 1893.

A. R. Marsh.

Maffei, maă-fā'ĕe, Andrea, Cavaliere: poet; b. at Riva di Trento, Italy, in 1802; studied literature under Paolo Costa, and then went to Munich for the study of German. At the age of sixteen, encouraged by Monti, he began to publish his finished metrical translation of the *Idyls of Gessner* (Milan, 1818). This was followed by a translation of Schiller's *Bride of Messina* (1827) and *Mary Stuart* (1829), and later by that of all the dramatic works of this great German (Milan, 1844), on whose manner Maffei formed his own poetic style. After this he made admirable translations of numerous poems of Moore; the *Childe Harold*, *Sardanapalus*, *Bride of Abydos*, and other poems of Byron; Milton's *Paradise Lost* (Turin, 1857); and three plays of Shakspeare. He also rendered into Italian Goethe's *Faust*, *Iphigenia*, and *Hermann und Dorothea*, several German romances, and the *Odes* of Anacreon. In 1854 he published a small collection of original verses, entitled *Dal Benaco*. Four years later he began to print a larger collection of the same kind, *Versi editi e inediti* (3 vols., Florence, 1858–60). Among these are poems of rare lyrical beauty. He led a retired and uneventful life in his native place, and died in Milan, Nov. 27, 1885.

Revised by A. R. Marsh.

Maffei, Francisco Scipione, Marquis: scholar and poet; b. at Verona, Italy, June 1, 1675; educated by the Jesuits at Parma, he joined his brother, a general in the Bavarian service, in the war of the Spanish Succession. Returning to Italy, he published in 1710 a treatise, *Della scienza cavalleresca*, directed against the duel. The same year he helped to found the *Giornale dei letterati*, the first Italian literary journal, to which he made many contributions. Becoming interested in the revival of the Italian drama, he published a collection of the best examples of it, with a prefatory dissertation (3 vols., 1723–25). He had already, however, rendered a better service by his tragedy *Merope* (first represented June 12, 1713); his comedy, *Le cerimonie*, and several melodramas were worth far less. Turning now entirely to scholarship, he published, after several lesser works, his *Verona illustrata* (1732), a splendid monument of erudition and civic pride. Traveling soon after through Southern France, he interested himself greatly in Provençal matters, and published in Paris in 1733 a series of letters on the subject, entitled *Galliae antiquitates*. For three years he resided in Paris, and becoming engaged in the Jansenist controversy he wrote his *Istoria teologica delle dottrine . . . della divina grazia, del libero arbitrio e della predestinazione* (published in Trent, 1742), which, with other theological treatises, brought upon him many savage attacks. After journeying in England, Holland, and Germany, he returned to Italy, where he wrote his *Trattato de' teatri antichi e moderni*, in reply to the attack of the priest Concina on all forms of theatrical representation. Interested also in science, he published a *Lettera sopra i fulmini* (1747), and treatises on electricity, etc. He died Feb. 11, 1755. His works were published in twenty-one volumes in Venice (1790). See G. B. C. Giulari, *Bibliografia maffeiana* (in *Propugnatore*, 1885).

A. R. Marsh.

Maffei, Giovanni Pietro: historian; b. at Bergamo, Italy, in 1535; became Professor of Rhetoric at Genoa 1563; secretary of the republic 1564; entered the order of Jesuits 1565; taught rhetoric several years at Rome; visited Spain and Portugal in quest of materials for his Latin *History of the Indies* (1588), a work of great value upon which he bestowed twelve years' labor. He had previously published a *Commentary on the Achievements of the Society of Jesus in the East up to 1568* (1571) and a *Life of Ignatius Loyola* (1585). He edited a collection of missionary *Letters from the East* (1588), wrote the history of the pontificate of Gregory XIII. (not published till 1742), and had commenced those of later popes, but had brought the story down only to the death of Sixtus V. (1590) at the time of his own death, at Tivoli, Oct. 20, 1603. His complete works in Latin were published at Bergamo (1747) with a *Life*.

Maffia: a Sicilian secret society having for its aim the substitution of its own authority for that of the law. Though depending upon community of sentiment among its members rather than upon effective organization, it has nevertheless proved a powerful influence in the social and political affairs of the island, often controlling elections, affording protection against the officers of justice, and forcing landlords to employ none but members on their farms. Boycotting is the usual weapon, but violence has been resorted to in many instances. Italian emigrants have founded branches in New York, New Orleans, and other cities of the U. S., where their members are thought to foster and protect crime. In New Orleans the suspicion felt for the Maffia broke out into open and violent hostility on the occasion of the murder of the chief of police by members of the society in 1890. Enraged at the acquittal of some of the accused, a mob broke into the jail and murdered eleven of the prisoners, including those who had been acquitted. In consequence of the delay in bringing to justice the authors of the disturbance, the Italian Government protested against this violation of the rights of Italian residents, but the matter was amicably arranged, the U. S. agreeing to indemnify the relatives of the victims.

F. M. Colby.

Mafra, maa'fraă: small town of Portugal, 20 miles N. W. of Lisbon (see map of Spain, ref. 17–A); famous for the immense building which John V. erected here in 1717–31, which comprises a royal palace with 866 rooms, a cathedral 186 feet long and 135 feet broad, surmounted with a magnificent dome, and a monastery with 300 vaulted cells, the whole of white marble from Carrara, and surrounded with magnificent gardens.

Magalhães, maă-gaăl-yĭns', Benjamin Constant Botelho, de, commonly known as Benjamin Constant: statesman; b. in Brazil in 1838. He was director of the military academy at Rio de Janeiro, and early adopted republican principles, upholding them in the press and in congress. As one of the leaders of the revolution by which the emperor was deposed (Nov. 15, 1889), he took part in the formation of the provisional government in which he was Minister of War and, for a time, of the Post-office. Two days after the constituent assembly had met, he died at Rio de Janeiro, Jan. 22, 1891. The Brazilian constitution, adopted soon after, provided that his house should be purchased and preserved by the Government as a memorial of his services.

Herbert H. Smith.

Magalhães, Domingas José Goncalves, de, Visconde de Araguaya: poet and publicist; b. at Rio de Janeiro, Brazil, Aug. 13, 1811. He studied law and was admitted to the bar, but in 1836 became attached to the diplomatic service, and in later life was successively *chargé d'affaires* at Naples and Turin, and minister at Vienna (1859–62), Washington (1868–72), and Rome; he was several times elected to congress. In literature Magalhães stands at the head of the Brazilian romantic poets. Among his earlier works are *Suspiros poeticos e saudades*, and several tragedies which were acted with success. His *Confederação dos Tamoyos*, a heroic poem founded on episodes connected with early Brazilian history, appeared in 1857, and is his best-known work. It was followed by *Mysterios* (1858); *Urania*, a collection of shorter poems (1862); and several prose works on philosophical questions. A collected edition of his writings, in eight volumes, appeared in 1876. D. in Rome, July 10, 1882. See F. Wolf, *Ueber D. J. G. de Magalhães: ein Beitrag zur Geschichte des brasil. Literatur* (Vienna, 1862).

Herbert H. Smith.

Magalhães, Fernão, de (Span. Fernando de Magallanes; by English and French authors commonly called Ferdinand Magellan): discoverer; b. in the village of Saborosa, Traz-os-Montes, Portugal, about 1480. From 1505 to 1512 he served in the East Indies (returning once to Portugal in 1508), and accompanied expeditions to Malacca,

the Moluccas, Sumatra, Amboyna, the Malabar coast, etc., acquiring much knowledge of those regions and of navigation. In 1514 he fought with the Portuguese in Morocco. About this time he conceived the plan of finding a western route to the East Indies. America was then a barrier on the western route to Asia, and so far all attempts to find a passage through or around it had failed, although Balboa's discovery had shown that there was an ocean beyond it. A cosmographer named Ruy Faleiro offered to join him in the enterprise; but to carry it out it was necessary to have the sanction of some government, and at this time Magalhães was on bad terms with the Portuguese court, which, as he claimed, had not properly rewarded his services. He therefore determined to apply to Spain, and before doing so, according to a custom of the nobility, formally renounced his allegiance to Portugal. He reached Seville in Oct., 1517, living there in the house of an exiled Portuguese, Diego Barboza, a man of position and influence, whose daughter he married shortly after. The *Casa de Contratación* at Seville had the superintendence of colonial affairs, and to it Magalhães first applied, but obtained little encouragement. Later he and Faleiro were admitted to an audience at Valladolid with Charles V., then a young man just taking possession of the Spanish throne; Charles was greatly interested in the scheme, and by good fortune Bishop Fonseca, who had so persistently opposed Columbus, Balboa, and Cortés, warmly seconded this enterprise. Without definitely fixing on a route, Magalhães offered to take a Spanish flotilla to the Moluccas by a route different from that used by the Portuguese. The partners, having been joined by a rich merchant, offered to make the expedition at their private expense, as was the general custom; but Charles finally agreed to fit out a Government squadron, under the joint command of Magalhães and Faleiro, who were to receive important honors and privileges in case of success. There was the usual opposition and delay in preparing the ships, but all obstacles were overcome by the steady support of the king. The Portuguese court protested vigorously against the proposed expedition, as likely to infringe on its rights; and its envoys endeavored by every means to ruin the enterprise, even offering brilliant inducements to Magalhães and Faleiro to return to Portugal, which they very properly refused. The two partners frequently quarreled; and at length Charles, seeing the inconvenience of a divided command, ordered that Faleiro should remain at Seville to fit out a second expedition. This and the spiteful report of one of the Portuguese envoys originated the frequently repeated statement that Faleiro went crazy at this time. The five ships and 265 men were placed under the full command of Magalhães; but the usual policy of curtailing authority was shown in giving extraordinary powers to Juan de Cartagena, one of the captains, with the title of *veedor*, or inspector. The squadron left San Lucar Sept. 20, 1519, touched at Madeira, thence sailed to the Brazilian coast, and on Dec. 13 entered the bay of Rio de Janeiro, where the Spaniards remained trading with the Indians until the 26th. From Jan. 10 to Feb. 7, 1520, they explored the Rio de la Plata, already made known by the expedition of Solis. Thence following the unknown coast of Patagonia, they reached (Mar. 31) the port of San Julian, where Magalhães decided to winter. Soon after leaving Madeira, Juan de Cartagena had attempted to assert his position by refusing to obey Magalhães, and had been promptly arrested by the latter, and placed in the custody of one of the ships' captains. The prospect of wintering on this bleak coast caused much discontent, and at length the captains and crews of three ships mutinied, releasing Cartagena, and announcing their intention of returning to Spain. By a prompt and unexpected attack Magalhães subdued the mutineers; one of their leaders was killed in the fight, another was executed, and Cartagena and a priest who had joined the revolt were condemned to be abandoned on the coast; thereafter the authority of Magalhães was never questioned openly. Soon after this one of the ships was lost in an attempted reconnoissance toward the south. The Spaniards had some slight encounters with the Indians, whom they described as a race of giants, perhaps from having seen an individual of unusual size. Leaving San Julian Aug. 24, they spent two months more at the Rio de Santa Cruz; and on Oct. 21 discovered the entrance to the strait which Magalhães called Todos los Santos, but which has since borne his name. Two ships sent to explore the inlet could find no end to it; and at length Magalhães, convinced that he had found the desired passage, ordered the whole squadron to sail through. As they often stopped for fishing or exploration, a month was occupied in the passage. During this time one of the ships became separated, the crew mutinied, and returned to Spain. With the remaining three vessels Magalhães reached the western end of the strait Nov. 28, and sailed out on the ocean, which he called the Pacific, on account of the pleasant weather prevailing there. From this point he kept at first well to the N., and later to the N. W. and W., the crew suffering greatly from insufficient and bad food and water, and from scurvy. A few islands were seen, among others those which Magalhães called the Ladrones or Robber islands, because the natives stole one of the ship's boats—a name still retained for the group. Seeking the Moluccas, but misinformed of their position, the Spaniards kept too far N., and on Mar. 16, 1521, discovered Samar, one of the Philippines. The King of Zebu, on a neighboring island, received them with great hospitality, even making an act of formal allegiance to Spain. The natives of the island of Mactan were hostile; Magalhães attacked them, and was defeated and killed, with eight of his men, Apr. 27, 1521. It was long before the Strait of Magellan became a practical highway; but this expedition gave to the world the first distinct knowledge of the Pacific, and the Spanish discovery of the Philippines led to their colonization soon after, and the development of the rich commerce, through Mexico, with the Asiatic islands.

AUTHORITIES.—The writings of Antonio Pigafetta, an Italian who accompanied the expedition; the one best known is *Primo viaggio intorno al globo terracqueo* (Milan, 1800); Navarrete, *Colección de Documentos*, vol. iv.; Stanley, *First Voyage round the World by Magellan* (Hakluyt Soc., 1874); Barros Arana, *Vida y Viages de Hernando de Magallanes* (1879); Kohl, *Geschichte der Entdeckungsreisen und Schifffahrten zur Magellans-strasse* (1877); Rev. E. E. Hale, *Magellan's Discovery* (in *Narrative and Critical History of America*, vol. ii., 1886); Guillemard, *The Life of Ferdinand Magellan* (1891). HERBERT H. SMITH.

Magallanes, mă̆a-gă̆al-yaa′nāz: a territory of Chili, including all the mainland and islands of the republic S. of lat. 47° to Cape Horn; bounded W. by the Pacific and E. by the main ridge of the Andes as far as lat. 52° S., beyond which the Chilian territory extends to the Atlantic, thus embracing the whole of the Strait of Magellan and most of the Fuegian archipelago. The area, as officially estimated, is 75,292 sq. miles, but as the eastern boundary-line is very imperfectly known, this is to some extent a matter of conjecture. The whole region is mountainous, and the coast is broken by a multitude of inlets, channels, and fiords, resembling those of Norway. The almost numberless islands and peninsulas are fragments of greater or less size cut off by these channels, and partaking of the high and rocky character of the mainland; explorations are continually revealing new passages in this labyrinth, and it is often found that what was supposed to be a single island is in fact a conglomeration of several, while the supposed peninsulas may be really islands cut off by some undiscovered passage. The fiords penetrate far inland, with numerous ramifications. Nearly all these channels are very deep, and this adds to the danger of navigating them, owing to the difficulty of finding anchorage. The scenery of this region is extremely grand and varied, the rocks often rising perpendicularly to great heights, while in other places the mountains are clothed with dense pine-forests. Glaciers are numerous, some of them attaining the sea-level. The islands on the Magallanes coast were nearly all named by English explorers. The line begins at the N. with the Wellington group, in which the principal mass is Wellington island, 140 miles long from N. to S., and separated from the mainland by a channel which in parts is hardly 300 feet wide; it is surrounded by a multitude of smaller islands and rocks. South of this is the Madre de Dios archipelago, then Queen Adelaide island, separated by a channel which leads to the Strait of MAGELLAN (*q. v.*), the latter cutting off the group known as TIERRA DEL FUEGO (*q. v.*). Small islands to the S. of Tierra del Fuego are the most southerly outlying fragments of South America, Horn island, the extreme southerly rock, being the so-called Cape Horn. The southernmost point of the continent is Cape Froward on the Magellan Strait. The interior of Magallanes, so far as known, has little land fitted for agriculture, but portions can be used for pasturage; small lakes and peat-marshes are numerous. The climate is damp and stormy, snow-storms being frequent in winter. Three or four thousand colonists are gathered in a few set-

tlements on the coasts, the most important being Punta Arenas on the Strait of Magellan. A coal mine and gold-washings are worked in the vicinity, and considerable herds of cattle are kept; pop. (1894) 1,500. For bibliography, see MAGELLAN, STRAIT OF. HERBERT H. SMITH.

Magallanes, FERNANDO, de: See MAGALHÃES, FERNÃO, de.

Magallanes Strait: See MAGELLAN, STRAIT OF.

Magazine-guns: small-arms which deliver projectiles in rapid succession, the cartridges being delivered automatically from a magazine or hopper.

The earliest magazine-guns had tubular magazines in which the cartridges were placed end to end, the magazine being situated in the butt-stock, as in the Spencer (Fig. 1), or

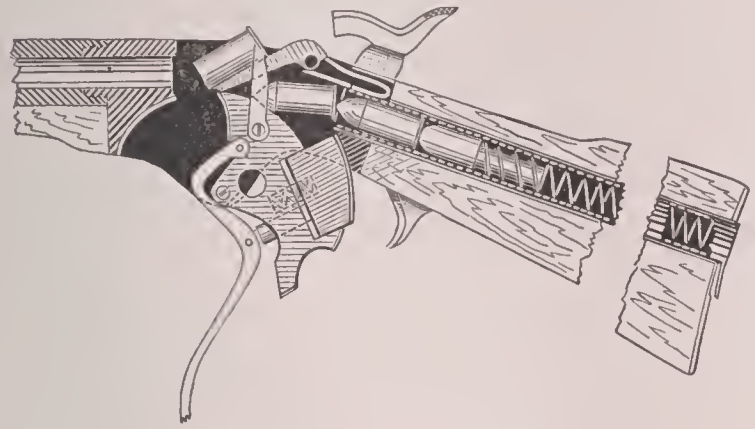


FIG. 1.—Spencer magazine-gun.

under the barrel, as in the Henry. These two guns were invented in the U. S., and were the earliest adopted for actual use in war. They were used during the civil war in the U. S.

From the Henry magazine-gun was developed the Winchester (Fig. 2), still in use for sporting purposes, and a magazine-gun of this nature, the Vetterlin, was soon after used in Switzerland.

Though the tubular magazine is still used in one or two countries, the approved modern military magazine is of entirely different type. It is a "box magazine," so called, in which the cartridges are placed side by side instead of end to end, thus making a magazine of compact and convenient form which can be rapidly refilled when empty, or which can be readily detached from the gun and replaced.

Out of nearly forty guns presented for trial in 1882 before the U. S. Magazine-gun Board there were only two systems of box magazine, the Lee and the Livermore-Russell, while in 1892, out of about fifty guns presented, all but two or three were of the box magazine type. These and all later box magazines are more or less modifications of the Lee or of the Livermore-Russell system.

FIG. 2.—Sectional cut of Winchester rifle.

With the tubular magazines the operation of filling was generally slow and tedious, as the cartridges had to be pushed in one at a time, endwise; so that magazines of such form were practically useful only as a reserve, for being once emptied they were no better than single-loaders, unless

FIG. 3.—Lee magazine-gun.

time was allowed for refilling. With box magazines, however, the operation of refilling or replacing the magazine is so rapid that it is not necessary to keep a large reserve of cartridges in the magazine. The accepted form of breech mechanism for military magazine-guns is the bolt system, the box magazine being so placed as to feed through the breech-housing into the "receiver"—the space just in rear of the barrel and in front of the bolt, when the bolt is drawn back.

The Lee gun (Figs. 3 and 4) had a detachable magazine holding five cartridges, arranged side by side like the fingers of the hand. The magazine consisted of a box, which was pushed up from below through a slot under the bolt and just in rear of the barrel, feeding the cartridges up from below by means of a spring, so that they were caught successively by the bolt and pushed forward into the cartridge-chamber. A number of these magazines, already filled, were carried on the waist-belt, so that when the magazine on the gun was emptied it could be replaced by a full one. Each magazine was provided with a spring and a cartridge-pusher or "follower."

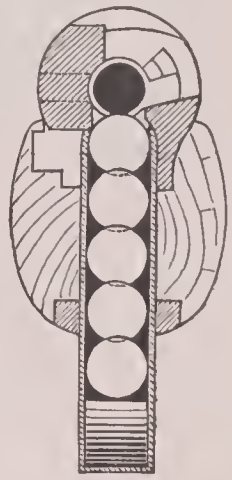


FIG. 4.—Section of Lee gun and magazine.

The Livermore-Russell gun had a fixed magazine extending downward just in rear of the barrel, as in the Lee, but placed at the side instead of underneath; and it was arranged to be rapidly refilled, when emptied, without removing it from the gun. A "follower," moved by a spring below, forced up the cartridges to the receiver. An outside mouth at the top of the magazine allowed cartridges to be pushed in from above; a spring gate at this filling-mouth admitting cartridges, but preventing their exit through this mouth, and guiding them sidewise to the "receiver." This magazine could be filled by inserting cartridges one at a time, but the special method adopted for rapidly refilling the magazine was the use of a cartridge-holder or magazine-filler, from which, when placed

FIG. 5.—Gun used in British service.

over the mouth of the magazine, all the cartridges could be pushed together into the magazine.

In the gun adopted for the British service (Fig. 5) a Lee detachable magazine holding ten cartridges is used.

The Schulhoff magazine (Fig. 6) consists of a drum placed under the receiver, the cartridges being inserted through a mouth at the side and forced round by a revolving plate

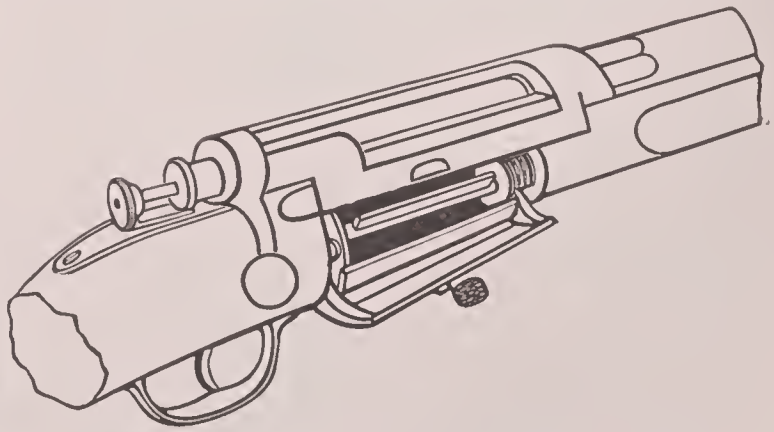


FIG. 6.—Schulhoff magazine-gun (Austrian invention).

until presented at the bottom of the receiver. This magazine, holding nine cartridges, could be filled by dropping in loose cartridges, or by using the original form of magazine-filler described above. Opening the lid of the filling-mouth turns back the revolving plate or "follower," compressing the follower-spring and leaving the way clear for the cartridges.

In the Mauser system (Fig. 7) the cartridge-holder, or clip, consists merely of a strip of metal curved at its edges to enfold the flanged or cannelured heads of the cartridges. The magazine is placed centrally under the receiver, and

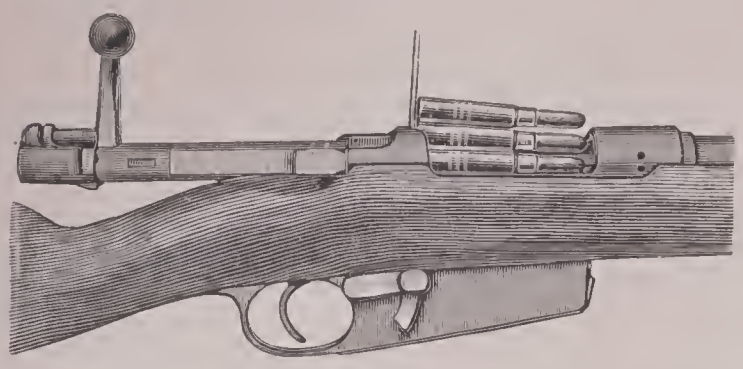


Fig. 7.—Mauser gun.

the cartridges are forced from the clip into the magazine from above. This system has been adopted by Belgium, Spain, Sweden, Turkey, and the Argentine Republic; and Switzerland has adopted the Schmidt system, which uses a magazine-filler resembling the old form.

Another fixed magazine, intended to be filled by pushing in cartridges from a clip or magazine-filler, is the Krag-Jorgensen. This feeds into the side of the receiver, but the

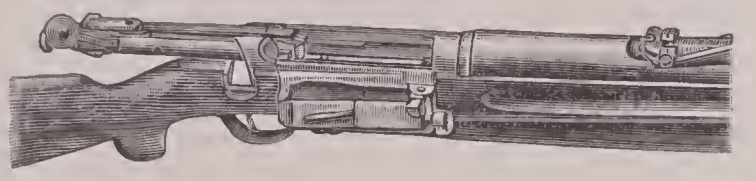


Fig. 8.—Krag-Jorgensen gun (Norway and U. S. services).

magazine, instead of projecting downward, is bent to extend under the bottom of the receiver to the opposite side, where there is a mouth for the insertion of cartridges. This mouth is closed by a lid which in opening withdraws the

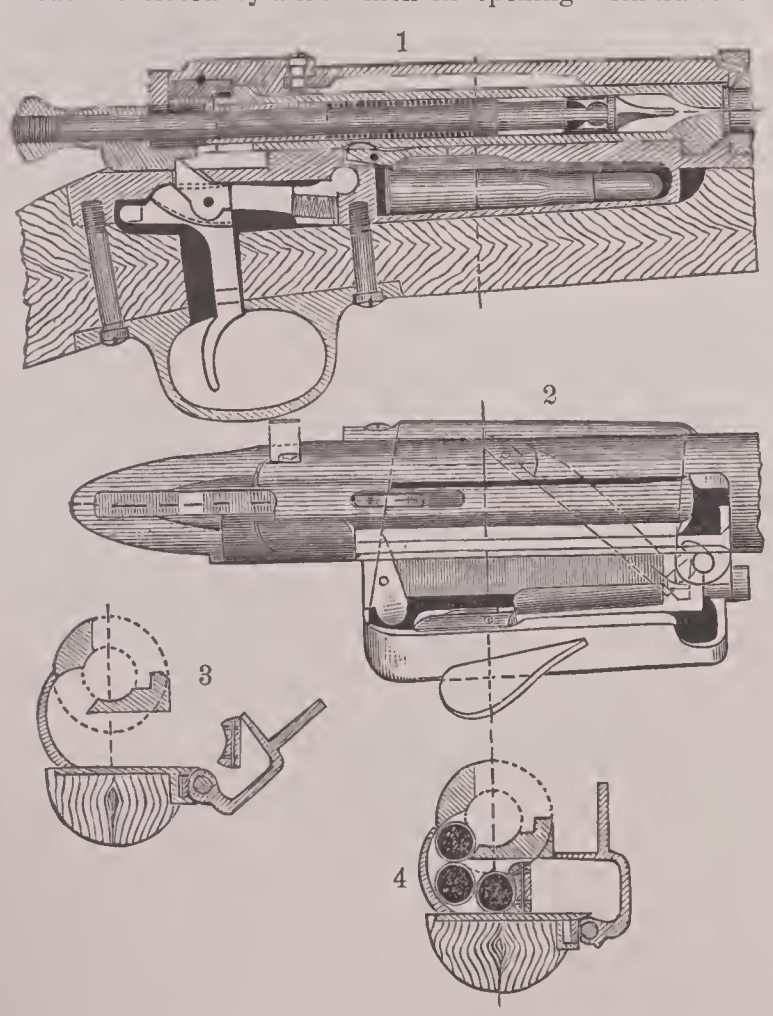


Fig. 9.—U. S. magazine-rifle (Krag-Jorgensen): 1, longitudinal section of breech and magazine mechanism in firing position; 2, plan view, with bolt removed, of receiver and magazine—gate open, ready for insertion of cartridges; 3, cross-section, corresponding to 2; 4, cross-section of receiver and magazine, with latter partly full.

magazine-spring and cartridge-follower, allowing the cartridges to be dropped in without obstruction. In the Danish form of this gun the lid is hinged at the front, so that in opening it swings out and forward; but in the forms adopted by Norway and the U. S. this lid is hinged at the bottom, so that in opening it swings out and downward. Fig. 8 gives the general view of this gun, and Fig. 9 plan and sections.

A special peculiarity of the Mannlicher magazine (Fig. 10) is that the clips in which cartridges are packed, are inserted

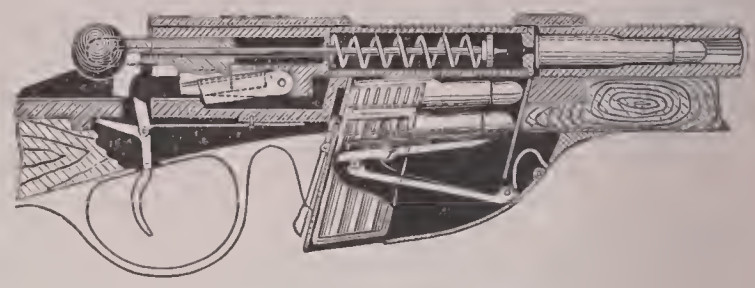


Fig. 10.—Mannlicher gun (Austrian).

with the cartridges into the magazine cavity, so that the clip forms one of the working parts of the magazine. Unlike the detachable magazine proper, the Mannlicher clip (Fig. 11) does not contain in itself the spring and cartridge-follower, these being fixed in the magazine cavity on the gun, and made to push the cartridges up through the clip and feed them into the receiver. When the cartridges are all fed out of the magazine, the clip falls from the bottom and a new full clip is inserted. Fig. 12 shows the form of Mannlicher magazine adopted in Germany. Magazines of the Mannlicher type have been adopted in Austria, Bulgaria, Chili, France, Holland, Mexico, and Roumania.

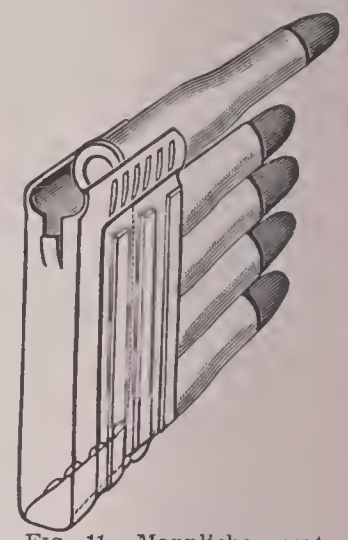


Fig. 11.—Mannlicher cartridge-clip.

The use of box magazines has been greatly facilitated by the introduction of cartridges having shells with grooves or cannelured heads in place of the flanged heads of the older cartridges, which had to overlap in the magazine to prevent their catching. The new form, illustrated in the German Mannlicher,

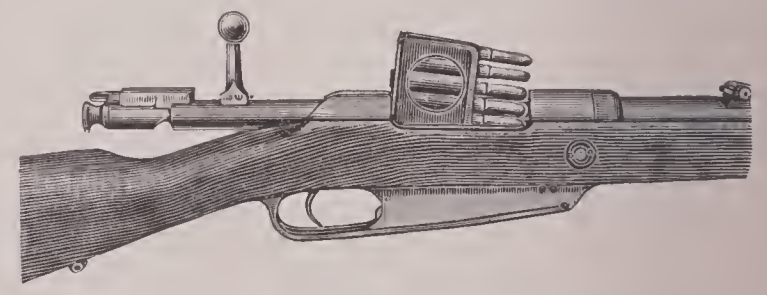


Fig. 12.—Mannlicher gun (German form).

allows the cartridges to be arranged symmetrically in the clip, so that it can be placed either way up in the magazine. The clip of the old form used in the Austrian Mannlicher is shown in Fig. 11.

Most of the bolts used in the breech mechanism of magazine-arms have been the ordinary sliding and turning bolts —of the general type of the German needle-gun as improved in the Mauser single-fire gun and other well-known bolts— but the Austrian Mannlicher rifle illustrates a form in which the bolt is moved by the direct forward and back action of the hand, the object of this system being to increase the rapidity of manipulation of the arm. The Swiss and Mexican guns also illustrate this system of bolt action, and they have adjustments for firing the gun automatically on closing the bolt.

The Freddi recoil rifle is an automatic magazine-gun in which the barrel is made to slip to the rear in the stock, under the action of the discharge, and actuate mechanism for withdrawing the bolt and closing it again, at the same time forcing in a new cartridge in place of the empty shell ejected. With the Freddi gun continuous fire can be maintained by keeping the finger on the trigger until the magazine is exhausted.

For sporting purposes tubular magazines are still much used, especially those which are operated by slides in place of the levers of older types. Two forms of this class are

popular on shotguns and even on rifles. The first, illustrated by the Spencer repeating shotgun, the earliest gun acting on this principle, has a handle operated by the left hand, sliding along the barrel underneath, and this method has been adopted by the Winchester and Colt arms companies. In the second form, the Burgess, the handle, which carries with it the trigger, slides along the small of the stock, being operated by the right hand, leaving the left hand in place to steady the barrel. A. H. Russell.

Magdala: a mountain-fortress of Abyssinia, situated on one of the three peaks of the spur which King Theodore defended against the British. (See Abyssinia.) The three peaks are called Fâla, Selassye, and Magdala. They rise about 9,000 feet, and are separated from each other by saddle-like depressions. On Apr. 13, 1868, the British took the fortress standing on the top of the steep peak, and Theodore committed suicide. Gen. Napier, commander-in-chief of the British expedition, was created Baron of Magdala.

Magdalena: the northernmost department of Colombia; bounded N. by the Caribbean Sea, E. by Venezuela, S. by Santander, and W. by the Magdalena river, separating it from Bolivia; area, including the Goajira Peninsula (see Goajira), 26,900 sq. miles. It was formed from the old provinces of Rio Hacha, Santa Marta Valle-Dupar, and part of Ocaña; Goajira was attached to it for administrative purposes in 1871, but is still claimed by Venezuela. A branch of the Eastern Cordillera stretches northward along the eastern frontier, with the local names of Sierra de Motilones and Sierra de Valle-Dupar; and in the northern part near the sea there is an entirely isolated group of mountains, including the Sierra Nevada de Santa Marta, 17,018 feet high. Surrounding this group and occupying all the central and western portions of the department are low plains partly covered with forest and partly with extensive grassy stretches or llanos; large portions of them are swampy, and those properly belonging to the Magdalena delta are subject to annual floods; they contain numerous lakes and several large rivers which flow to the Magdalena. Agriculture (cacao, coffee, sugar, maize, etc.) and grazing are the only important industries, though the department is said to be rich in minerals. The population is in a backward state, and hardly a third of the territory is inhabited. Pop. (estimated 1890) 125,000. Capital, Santa Marta.

Herbert H. Smith.

Magdalena: the most important river of Colombia, forming, with its branches, the principal fluvial system of Northwestern South America. The main river is about 1,050 miles long, and lies between the Central and Eastern Cordilleras of the Colombian Andes. It rises where these chains join, near lat. 2° S., in a high *paramo*, close to streams which flow to the Pacific, to the Cauca, and to the Caqueta, a branch of the Amazon. The general course is from S. to N. The upper portion is a series of falls, rapids, and narrow defiles, continued, with short interruption, to Neiva, about 300 miles; and far below that the Magdalena has the character of a highland river, flowing between steep banks and often in narrow passes; just below the junction of the Bogotá (700 miles from the sea) the whole flood is crowded into a defile 400 feet broad, which has been bridged; and the *Angostura*, or Narrows of Carare, below Honda, is less than 600 feet broad, though the river here attains a depth of 150 feet during the floods. The last 500 miles lies in an alluvial plain, an unhealthful region, cut up by numerous channels, lakes, and swamps, and very thinly inhabited. The current of the river in this lower region is still very swift, and the navigation is difficult, owing to numerous shifting sandbars and islands. It finally discharges into the Caribbean Sea by two principal mouths. Seagoing vessels ascend to Barranquilla, at the parting of these mouths. Light-draught steamboats ascend to Honda, about 600 miles, in from ten to fifteen days. For a distance above Honda there is a dangerous series of rapids; beyond them small steamers have ascended with much trouble to Neiva, 200 miles farther, this stretch being known as the upper Magdalena. Notwithstanding its difficult navigation, the Magdalena is the main highway to the populous plateaus of Central Colombia, and must remain so until railways are built. Of the many affluents, the most important is the Cauca (*q. v.*). The whole area drained by the Magdalena river system is estimated at 96,000 sq. miles. See Crevaux, *Voyages dans l'Amérique du Sud* (1883); von Schenk, *Reisen in Antioquia* (in Petermann's *Mittheilungen*, 1883); Vergara y Velasco, *Geografía de Colombia*.

Herbert H. Smith.

Magdalene, or **Mary Magdalene**: a woman who stood by Jesus at the cross; was present when Joseph of Arimathea laid him in the sepulcher; came early on the first day of the week to the tomb and found it open; went to Peter and John, and saw the two angels sitting in the sepulcher when she returned with the apostles. Jesus himself appeared to her shortly after, and announced his approaching ascension. The derivation of her surname probably is from "Magdala," the name of a town of Galilee. She is gratuitously identified with the "woman who was a sinner" (Luke vii. 37). She is the "Mary called Magdalene, out of whom went seven devils" (Luke viii. 2).

Magdalene Islands: a group of islands in the Gulf of St. Lawrence, nine in number, formerly, with one exception, united into one and called Magdalene island. The group is 57 miles long by 14 broad, and is about 50 miles from Prince Edward Island and 60 from Newfoundland. They consist of steep cliffs of freestone rising 200 or 300 feet above the sea. Area, 156 sq. miles. Pop. about 5,000, mostly of French origin. Fishing is the chief occupation. The soil is good, but few crops are raised, and the domestic animals are poor. The climate is relatively cool in summer and mild in winter. In winter the islands are connected by ice so firm that ponies can be ridden over it. For about five months there is no communication with the outer world except by telegraph.

Mark W. Harrington.

Magdalla Red: See Naphthalene Colors.

Mag'deburg, Germ. pron. *măăkh'de-boorch*: city of Prussia, capital of the province of Saxony; on the Elbe; 72 miles by rail N. of Leipzig (see map of German Empire, ref. 3–F). It was founded in the tenth century by Otto the Great, and consists, besides its two suburbs, Neustadt and Sudenburg, of four parts—Altstadt and the Sternschantze on the left branch of the Elbe, the citadel on an island in the river, and Friedrichstadt on the right bank. Each of these parts is strongly fortified, and together they form a fortress of the first rank, making Magdeburg one of the strongest places in Europe. Most of the streets are crooked and narrow, but the houses are generally neat and substantial, and there are several fine buildings, among them a Gothic cathedral of the thirteenth century. There are many beautiful promenades, such as the Fürstenwald and the Friedrich-Wilhelms Garten. The manufactures comprise woolens, cotton, ribbons, leather, soap, and glass; the breweries and distilleries are very extensive. On account of its position on the Elbe and at the junction of four principal railway lines, Magdeburg is one of the commercial centers of Northern Germany. It has many benevolent institutions, and several good military, scientific, industrial, and commercial schools. During the Thirty Years' war it was besieged by Wallenstein (1629), and in 1631 was captured by Tilly, who sacked and burned the city and massacred many thousands of the inhabitants. Pop. (1900) 229,663. Revised by W. B. Shaw.

Magdeburg Centuries: See Centuries of Magdeburg.

Magee, William Connor, D. D.: bishop; b. at Cork, Ireland, in 1821; studied at Trinity College, Dublin; went to Malaga, Spain, for his health, 1846, remaining there two years; obtained the curacy of St. Saviour's, Bath, 1848; became incumbent of the Octagon chapel, Bath, 1850; took a leading part in organizing the Church Defense Society in opposition to the Liberation Society; became minister of Quebec chapel, London, 1860; rector of Inniskillen 1861; dean of Cork 1864, and shortly afterward dean of the Chapel Royal, Dublin; was Donellan lecturer in Dublin University 1865–66, and was appointed Bishop of Peterborough 1868. He was translated to the archiepiscopal see of York in 1887. D. in London, May 5, 1891. He acquired a great reputation for eloquence, preached on public occasions in various parts of Great Britain, and took an active part in the debates of the House of Lords, especially in opposition to the disestablishment of the Irish Church. Many of his sermons have been published, both in Great Britain and in the U. S. Revised by W. S. Perry.

Magellan, Ferdinand: See Magalhães, Fernão, de.

Magellan (Span. Magallanes), Strait of: a channel between the southern end of the South American continent and the islands of Tierra del Fuego, connecting the South Atlantic and Pacific Oceans. From the Atlantic end (lat. 52° 28′ S.) it runs W., then S. W. and S. to lat. 53° 54′ S., and from Cape Froward keeps a nearly straight N. W. course to the Pacific, which it reaches in lat. 52° 36′ S.; the extreme length is about 370 miles, and the width varies from over 20

miles to hardly 2½ miles. There are few obstructions from rocks and islands. It is similar in character to the numerous channels and fiords along the coast of Southern Chili (see MAGALLANES); like them it is bordered by high and often precipitous and imposing lands, and has numerous branches, some of which end in a *cul-de-sac*, while others form channels between the Fuegian islands; some of the latter offer shorter routes to the Pacific, but are obstructed by rocks. The strait lies entirely within Chilian territory, but is a free waterway; its only port of importance is Punta Arenas. The passage was discovered in 1520 by MAGALHÃES (*q. v.*), and has been celebrated from the voyages of Drake, Hawkins, Dumont d'Urville, Darwin, Fitzroy, and many others. At present it is much used by steamers, but its baffling winds, sudden gusts, currents, and high tides render it dangerous to sailing vessels; these generally take the longer passage around Cape Horn, or through the short Strait of Lemaire (discovered in 1615). See Darwin, *Voyage of a Naturalist*, and the reports of Fitzroy and King; *Information Relating to Magellan Straits* (British hydrographic office); and Cunningham, *Natural History of the Straits of Magellan* (1878). HERBERT H. SMITH.

Magellanic Clouds: See NEBULÆ.

Magendie, mă'zhăn'dĕe', FRANÇOIS: physiologist and physician; b. at Bordeaux, France, Oct. 15, 1783; received a medical education in Paris; was admitted to the Academy of Sciences 1819; became Professor of Anatomy in the Collège de France 1831; president of the consulting committee on public health 1848. D. in Paris, Oct. 7, 1855. He practiced vivisection extensively, and in far less humane methods than are now in use; but by this and other means of observation he made numerous and highly important discoveries in physiology, especially in that of the nervous system, and also in other departments of medical science. Among his works are *Formulaire* (1821) for new medicines; *Éléments de Physiologie* (1816–17); *Leçons sur les Phénomènes physiques de la Vie* (1836–42); *Leçons sur les Fonctions et les Maladies du Système nerveux* (1839); and *Leçons sur le Sang* (1839), which have been several times reprinted, and were translated into German. He founded and for ten years edited the *Journal de la Physiologie Expérimentale.*

Magen'ta: town; in the province of Milan, Northern Italy; about 18 miles W. of the city of Milan, in a fertile district watered by the Naviglio Grande (see map of Italy, ref. 3–C). Its topographic position has made it the theater of many battles, the last and most memorable being that known as the battle of Magenta, fought on June 4, 1859, in which the Austrians were defeated by the Italians and French, and thus forced to evacuate Lombardy. Napoleon III. gave the title of Duke of Magenta to Marshal MacMahon, afterward president of the French republic. Pop. 5,570.

Ma'gi [= Lat., plur. of *Ma'gus* = Gr. Μάγος, one of a Median tribe, or perhaps of the priestly class. Cf. MAGIC]: the sacerdotal caste of ancient Media, and priests of Persia in antiquity. Originally the name was a tribal one, designating a single division of the race of the Medes. (Cf. Herodotus 1, 101; Ammianus Marcellinus 23, 6, 32.) The term Magian, *Magu-*, occurs several times in the Old Persian inscriptions, in connection with the usurpation of Bardiya, the false Smerdis. The form of the appellative is found once or twice in the *Avesta* as *Mazu-*. The Greeks called this priestly sect Μάγοι; the English version of the Bible (Matt. ii. 1) renders Μάγοι by "wise men." The origin and meaning of *Mozu-*, *Magu-*, Μάγος, however, are uncertain. The familiar though unfavorable association of the name from earliest times with "magic," black arts, and astrology seems to have arisen from the peculiar tenets and rites of the Magians, and from their dreaded power as priests.

The Magi presumably became priests of Persia proper through the Median supremacy over the country. This religious supremacy continued even though the Median yoke was thrown off at the time of Cyrus the Great. One of the reasons probably for the hatred felt by the Persians at the Magian usurpation of the government by the false Smerdis in the time of Darius Hystaspes was the fear that this move might lead to a restoration of the Median sway. This opposition to the Magians (cf. *Old Persian Inscriptions*, Bh. 1, 63–64; 4, 81) and the resulting "massacre of the Magi," (Μαγοφόνια, Herodotus 3, 79), was presumably political and anti-clerical rather than religious. Regarding the connection of Zoroaster's name in antiquity with the Magi, it may be added that although the scene of his activity was Bactria (see ZOROASTER) there are nevertheless strong grounds for believing that he was originally a Magian from Media. As he was a reformer, however, his religion must have differed somewhat from the older faith. On the question of the relation between the Zoroastrian and the Magian faiths, see ZOROASTER. The name of the Magi, furthermore, is sometimes coupled with the Babylonians and Chaldæans, as in the Bible, Jer. xxxix. 3, 13: Rab-Mag—i. e. chief of the Magi. In this connection their name is commonly associated with Chaldæan magic.

The general religious tenets of the Magi priests may be gathered from Herodotus 1, 140, Plutarch, *Is. et. Os.* 47, from other classical writers, and by inference from the *Avesta* and from passages in the *Old Persian Inscriptions*. The Magian faith was characterized by a belief in the principles of dualism, Ormazd and Ahriman; by a belief in the resurrection and a future life; by certain peculiar rites and practices, such as exposing the dead to be torn by dogs and birds; and by religious scruples against taking animal life, with the exception of destroying noxious animals, which was regarded as a meritorious and sacred duty.

The fame of the Magi for learning and for the power of divination was widespread in antiquity. It was in this sense that the Magi who came to worship at the manger in Bethlehem (Matt. ii. 1–12) are regarded as the wise men from the East. Later tradition represents these Magians as three kings, Gaspar, Melchior, and Balthasar, coming from different places in Persia. The supposed remains of their hallowed bodies, it is claimed, were removed from Constantinople to Milan, and thence in A. D. 1162 to a shrine in the cathedral at Cologne, where they are still preserved as sacred relics. A. V. WILLIAMS JACKSON.

Maggiore, Lago: See LAGO MAGGIORE.

Maggots: See DIPTERA.

Magic [from Lat. *ma'gice* = Gr. μαγική (sc. τέχνη, art), magic, liter., fem. of μαγικός, pertaining to the Magi, hence (since these were thought to possess magical powers) magical]: the pretended art of working wonders by supernatural power. Though popularly derived from the arts of the Magi, or Old Persian priesthood, the belief in magic is inherent in man, and history presents no instance of any race at any time in which pretenders to it have not existed. It is evident that before exact science was founded, yet while students were unwearied in searching into the mysteries of mind and of matter, and of the self-development of a First Cause, and while they were led astray at every step by the wonderful in nature, it was impossible not to believe that there existed some primal clew by which all knowledge, both of the sensible and the spiritual world, could be gained and all power attained. All that they knew indicated the existence of such a science of sciences and power of powers. As all that was positive and intelligible could be represented by numbers or expressed geometrically, it was natural enough to assume that the mysterious and spiritual was subject to the same laws. Hence a belief in the occult power of numerals and proportions, derived from the East, and taught by Pythagoras, Plato, and their followers. The heavenly bodies had certain influences, as of the moon on the tides, the sun in giving light, heat, and health. This was exaggerated as a matter of course, until it was believed that all the planets in their conjunctions had peculiar effects on individuals. The study of astronomy was closely allied to that of mathematics, and in this spirit they mutually became more and more magical. Such methods applied to natural philosophy naturally made chemical investigation reduce matter to a few elements and to a *prima materia* which, once apprehended, could enable man to develop or make any later forms, such as gold or diamonds, an elixir of immortality, and a universal panacea, just as the first principle in astronomy, also divine, was believed to give the illimitable godlike knowledge of all that the stars governed. The next step was to bring chemical principles into harmony with astrology and the lore of God and spirits. So H. Cornelius Agrippa, whose work on occult philosophy (which he afterward declared was nonsense) was the cornerstone of magic in the sixteenth century, declares: "There are four elements without the perfect knowledge whereof we can effect nothing in magick. Now, each of them is threefold, that so the number of 4 may make up the number of 12; and by passing by the number of 7 into the number of 10, there may be a progress to the Supreme Unity upon which all virtue and wonderful operations depend." As spirits were innumerable, they were classified, especially by Paracelsus,

according to this chemico-astrologic theosophic philosophy. At the base of all was the fifth element, "the divine astral spirit," the *intelligentia abscondita* of Vaughan, the transeendental principle or power, "that spirit which God himself breathed into man, and by which man is united again to God." The powers of this spirit, aeeording to Agrippa, "are full of wonders and mysteries, and are operative as in Magick Naturall, so Divine. For from these proceed the bindings, loosings, and transmutations of *all* things, the knowing and foretelling of things to eome, the driving forth of evill and the gaining of good spirits." Objectively, this subtle spirit streamed through all nature as the spirit or very being of stars, mountains, rivers, trees, fountains, flowers, leaves, gems, metals, herbs, establishing between them wonderful affinities or a grand *signatura rerum*, bestowing on them oceult properties, either medieal or magieal, and impressing on them by divine art in their eurves, lines, colors, or spots a seeret alphabet and written language. The stars in the heavens considered as points, when eonnected, made Hebrew letters, "these having," says Agrippa, "the greatest similitude with celestials and the world." This poetic and picturesque prineiple of magic, which made forests, fountains, and gardens, with the stars above, a literal library, was curiously set forth by Jacques Gaffarel in the *Curiositez inouyes* (Rouen, 1632). *Subjectively*, this astral light becomes in man the *intellectus illustratus*, or magic perceptive power, which, united to a transcendent will proceeding from illumination or penance, enabled him to grasp all the mysteries and power hidden in the divine life of nature. As certain gems, metals, etc., were virtually the same with certain planets or certain divine numbers or times (time itself being a form of divinity), all of them consisting of matter (i. e. a lower form of God), impressed by the same astral element, it followed that these gems especially, when marked at fit times with signs of the proper planets, spirits, names of God, etc., became amulets or charms which protected the bearer from disease, evil spirits, or death. Hence the endless charms, talismans, and written spells founded on the theo-magic philosophy. From learning to know, and from conferring with the spirits of nature by means of prayer, will, and communion with God, there was but a step to eommune with the dead and call up their spirits by the art of necromancy, which was professed from the earliest times in the East. Good or harmless spirits were drawn by pleasant charms and ceremonies; the dark and evil powers were won by horrors, by midnight incantations among graves, with such disgusting spells as we read of in *Macbeth*. See ANIMISM.

When the *Tarot*, or infinite Spirit of God, or God in nature, was supposed to be in all things, with a reciprocal appreciative spirit in man, it was soon believed that inspired books eoncealed deep mysteries. This was the secret of the Cabbala, or "the mystical explanation of the Bible, the art of finding sense by the decomposition of words, and that of working miraeles by virtue of these words pronounced in a particular way." This kind of magic probably existed in Egypt and India, and it was known to Pythagoras. The rabbis by means of it deduced universal categories of the spirit-world, which they classified aecording to the elements, the art of governing them by spells, that of making talismans, and all manner of magic, great and small. The names of God properly pronounced were the highest spells; among these *Agla* was greatly revered. The Cabbala was much studied in the fifteenth and sixteenth centuries in Europe. Among its greatest expounders were Akiba, Philo, Avicenna, Raymond Lullius, Mirandola, Paracelsus, Reuehlin, H. More, Robert Fludd, Postel, and Knorr von Rosenroth. The Rosierucians, an imaginary sect of magicians, in whose name many books were written, were an offshoot of the Cabbala, allied to the peculiar views of the alchemists and Christian mystics.

As magic embraeed a mutual harmony of all that exists, it ineluded good and evil. Henee white or holy magic, and also black magic or sorcery, which works by the aid of demons. Soreery was closely conneeted with witchcraft. Celestial magic was founded on prayer and communion with God or mysticism. Natural magic is the art of working wonders simply by scienee—e. g. by mechanics or ehemistry. Ceremonial magic is chiefly eabbalistical, and treats of raising spirits, exorcising, finding treasures, and eonseerating talismans by reeiting sacred formulas when in cireles drawn at eertain hours with the aid of peculiar perfumes. Works on this subject are innumerable. As a specimen the reader may consult the *Heptameron, or Magical Elements* of Peter di Abano, or the *Magus* of Franeis Barrett (London, 1824). Soreery involved many horrible iniquities. Aeeording to Philo and Eliphas Levi, some of the old Hebrew works of magie are enough to cause their writers to be execrated by all the world. Magic was a passion—we might say the prineipal study—in Egypt and Assyria; several papyri and eylinders in the British Museum treat of it. In Alexandria, from the second to the fourth century, where the relics of old Egypt combined with Neoplatonic doctrines and many strange seets, magic revived, as it did subsequently at Cairo in the ninth century under the Arabs. The Knights Templar are believed to have bronght Oriental magie to the West. The Renaissanee, as well as the Reformation, had its sehool of devotees to oeeult philosophy; and sinee the doetrine is essentially religious, the movement of Luther, which made religious diseussion eommon to all, also popularized the study of magie, and books up to that time kept in Latin for the learned were now translated, so that everybody eould raise the devil in his native tongue. The last grand revival of such studies took plaee with that of Masonry, Illumination, and the extraordinary fancies of the eighteenth century. The lives of Cagliostro and Casanova, the works of Pierre le Brun, of Lasearis, the Count de Saint-Germain, and the Marquis d'Argens throw mueh light on the follies of this period. As astrology and the Cabbala lost ground in popular faith, and witches and devils grew dim, magic took refuge in mesmerism, and more reeently in its nearly related Spiritualism. As of old, its professors did not disdain to aid their sacred lore with marvels which modern scienee claims were mere juggling, as many of the miracles of modern magieians from their very humble and useless nature appear to be prineipally based on "hankey-pankey." (See JUGGLERS AND JUGGLERY.) Among the immense number of works on magie are *Histoire et Traité des Sciences occultes*, by Count de Résie (Paris, 1857); *Histoire du Merveilleux dans les Temps modernes*, by Louis Figuier (Paris, 1860); *Réalité de la Magie*, by Collin de Plancy; *Von der alten und neuen Magie, Ursprung, Idee, Umfang und Geschichte*, by Horst (Mentz, 1820); *Curiosités des Sciences occultes*, by the Bibliophile Jacob (Paul Lacroix); *Dialogus in Magica Arte*, by Symphorien Champier (Lyons, 1506); *Entretiens du Comte de Gabalis, etc.*, by de Villars (Abbé de Montfaucon); *System of Magic*, by Defoe; the works of Delrio; *La Magie*, by L. F. Alfred Maury; *La Magie au XIX^e^ Siècle*, by the Chevalier Gougenot; the *Clavis Solomonis*, by Rabbi Hawa (1714); *Trois Livres de Charmes*, by du Vair; *Bibliotheca Magica*, by Johann Geo. Th. Grässe (Leipzig, 1843); *Arcanes de la Vie future, Magie magnétique*, and other works, by Cahognet (Paris, 1848–56); *Sammlung der merkwürdigsten Visionen, etc.*, by Carl von Eckhartshausen (Munich, 1792); *Le Diable Rouge* (Paris, 1843); *Das Siebente Buch Mosis* (the eommon hand-book of magic in Germany); *History of the Supernatural*, by William Howitt (1863); Fabart, *Histoire philosophique et politique de l'occulte magie, etc.* (1885); J. Bodinus, *Demonomania* (Paris, 1501); Johannis Macarei, *Abraxas: a Treatise on Talismans*, by Jean Chifflet (Antwerp, 1657); Johann Wierus, *De Præstigiis* (Frankfort-on-the-Main, 1566).

CHARLES G. LELAND.

Magic Lantern: an optical contrivance for producing enlarged images of transparent or translueent objects, usually paintings, drawings, or photographs on glass. It is the device of Father Athanasius Kircher, a German Jesuit of the seventeenth eentury. Optically considered, it eonsists of two distinet parts. an illuminating apparatus and a magnifying apparatus. The illuminating apparatus embraees a source of light (in the original construetion a lamp) inclosed in a tightly shutting box or chamber opening on the side, a condensing lens some inches in diameter adapted to an opening in the front of the box, and a eoncave mirror behind the light within and opposite to the lens. Properly, this is the lantern; the magnifying apparatus is external to it, and eonsists of one or more converging lenses fixed in a sliding tube. Fig. 1 shows the entire apparatus in section. M is the mirror, here shown as attached to the oil-chamber of the lamp, whieh is secured to the baek of the lantern by means of bracket-hooks; L is the condensing lens; *a b* is a figure upon a glass plate, supported by a frame which slides in the grooves or ways shown in the diagram; *m* is the magnifying system of lenses; and A B is the magnified image as received upon a plane white surface, or screen. In order to give distinetness to this image, the tube carrying the lenses *m* is

drawn out or pushed in till the true focus is found. The mirror M, in this design, is parabolic, and is supposed to be perforated, or notched, at the top to accommodate the lamp-chimney; but in the simpler forms it is of spherical curva-

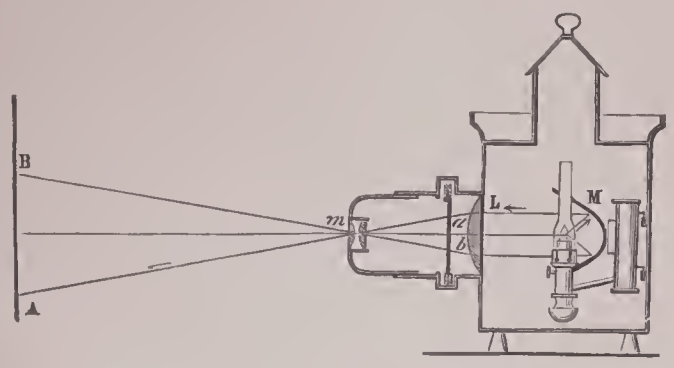


Fig. 1.—The magic lantern.

ture, and is entirely behind the lamp. In order to exhibit the optical effects of this apparatus the room must be darkened; and inasmuch as there must be provision for the admission of air to the lantern, and for the escape of the gaseous products of combustion, care must be taken that the apertures so provided are screened against the entrance of light into the apartment.

For a very long time after its invention, the magic lantern was employed for no more important purpose than to surprise or to amuse. It was in high esteem with professional conjurers and jugglers, who found in it a means of producing startling effects. A construction much employed by them was the phantasmagoria lantern, represented in Fig. 2. This is a lantern supported by a stand on wheels, and designed to run upon a horizontal table. One of these wheels carries a pulley, R, which is connected by a band with another pulley, R′, higher up. On the axis of the pulley R′ is a cam, against which one extremity of a lever, *l*, rests, the other extremity acting on a sliding tube carrying the magnifying lenses within the larger tube, T. The proportions of the cam and lever are such that if, when the magnifiers are at the nearest practicable approach to the object, and the size of the image is therefore a maximum, the lantern be placed at the distance from the screen which gives a distinct image, then on rolling the apparatus toward the screen the magnifier will be drawn backward at precisely the rate necessary to preserve the distinctness of the image, while this will rapidly diminish in size till it vanishes in a point. In preparing designs for phantasmagorial displays, the ground is made absolutely black, so that no light may pass except that which exhibits the figures. The lantern is also placed behind the screen, so as to be invisible to the spectators of the display, the screen being of dampened or varnished muslin, and translucent. Under these circumstances, the sudden increase of size of the image irresistibly creates the impression that the object represented is rapidly approaching the observer; and the sudden diminution of size of the same image causes the object to seem to recede. It contributes to the force of these impressions that, by means of another simple contrivance, not here represented, the aperture of the lantern is gradually closed as the image diminishes in size, and gradually reopened as it again increases, so as to preserve a harmony, such as we see in nature, between the brightness of the image and the imagined distance. When the image has dwindled to so minute a point as to be unrecognizable, the exhibitor often avails himself of the opportunity to change the slider in the lantern; so that when the object, after apparently receding into the distance, returns again, it appears with a new and often formidable aspect. Thus a being of angelic beauty may seem to fade away almost to vanishing, and then come suddenly rushing back in the character of a gorgon or a fiend.

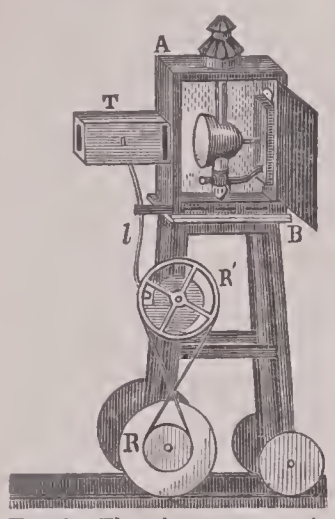


Fig. 2.—The phantasmagoria lantern.

The magic lantern has been greatly improved. Designs on glass of objects of every kind in nature and art are so expeditiously, accurately, and cheaply produced by means of photography as almost indefinitely to have increased its resources and to have made it an invaluable auxiliary to the teacher and public lecturer. The substitution also of the calcium light, or, better still, of the electric light, for the oil-lamp, as a source of illumination, has added immensely to the power and brilliancy of its displays. Both the mechanical and the optical arrangements have been carried to a high degree of perfection. See Lime-light.

A very popular use of the magic lantern is for the production of the optical illusions called "dissolving views." For these, two lanterns are necessary, placed either side by side or one above the other. They must be adjusted in position so as to have a common luminous field upon the screen. Each has a different object, and the two images when superposed to a great extent obliterate each other. A sliding or rotating stop placed before the lanterns is so constructed as, on being moved to left or right, to close the aperture of the one while it opens that of the other. At the mean position, both are half open and half closed; at either extreme position, one is wholly open and the other wholly closed. The movement of this stop therefore causes the images alternately to come out distinctly and to melt away. Advantage is taken of the moments when the lanterns are successively closed to change the objects, so that each dissolution is followed by the presentation of a new picture. When the calcium light is used, a stop is not necessary for the dissolving effect; but this is produced more simply by gradually and alternately shutting off and turning on the gases which feed the light in the lanterns severally. For this purpose a six-way cock is sometimes employed. A form originally introduced by B. G. Malden, of the Royal Polytechnic Institution, London, and called the "Malden tap," is represented in Fig. 3. The gases enter from the reservoirs through H and O; they pass to one of the lanterns through H^1 and O^1, and to the other through H^2 and O^2. When the lever is upright, as in the figure, the gas flows to both lanterns freely; when it is turned down to the right the supply to the left-hand lantern is cut off; when to the left, the supply to the right is cut off. A small cock at C allows a small quantity of hydrogen to flow constantly into either lantern, serving to prevent extinction when the light is cut off.

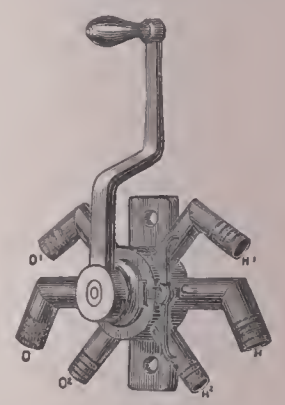


Fig. 3.—The Malden tap.

In the illustration of scientific subjects by means of lantern views, it is frequently desirable to present objects which can not be secured in a vertical position, as, for instance,

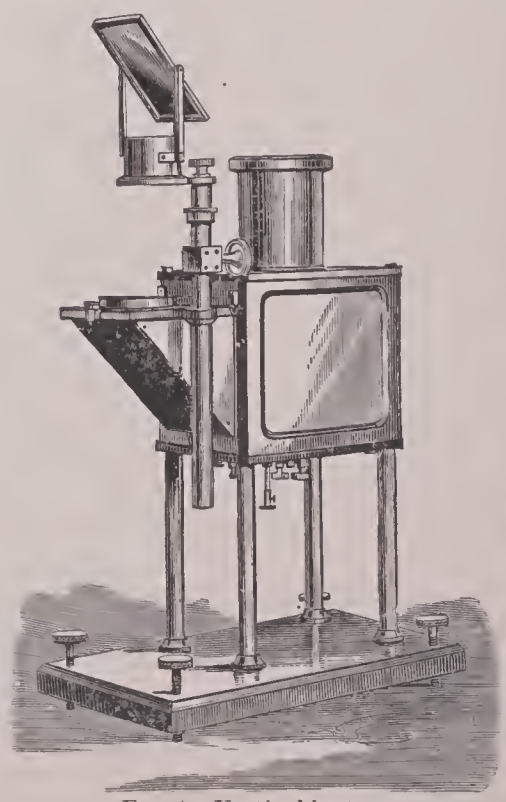


Fig. 4.—Vertical lantern.

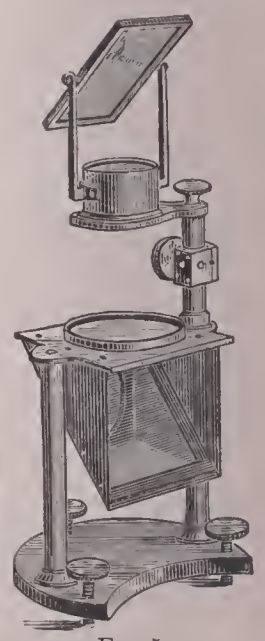


Fig. 5.

objects immersed in a liquid. This case may be provided for by removing the magnifying apparatus from the lantern, and placing before the condensing lenses a diagonal mirror mounted as in Fig. 5, by which the illuminating beam is

thrown vertically upward, passing through a horizontal stage of glass, intended to receive the objects. Immediately above this is fixed the magnifying apparatus, as represented; and above this still is a second diagonal mirror which restores

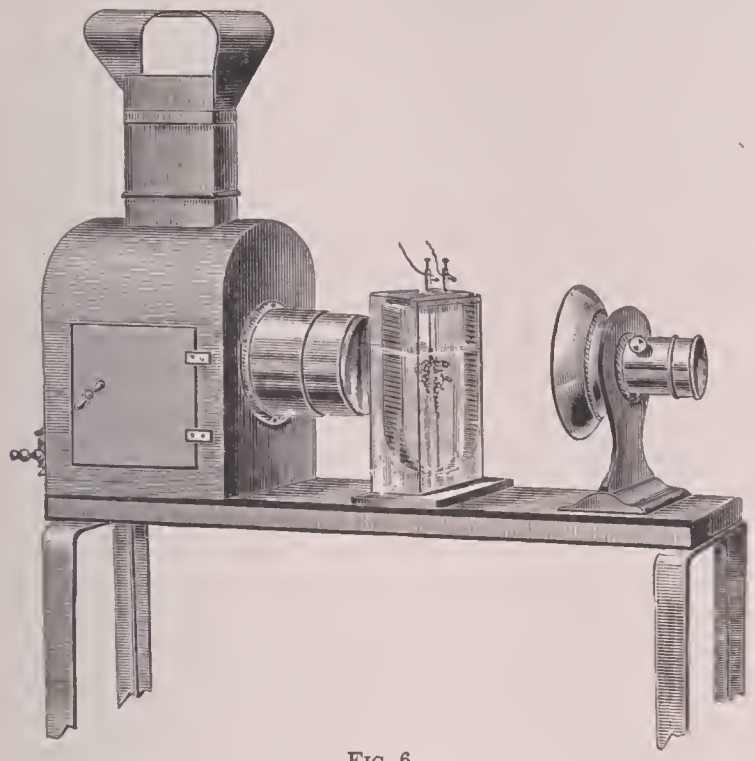


FIG. 6.

the beam to the horizontal direction. Prof. Henry Morton, of the Stevens Technological Institute, Hoboken, N. J., constructed a lantern which admits of being used either as a horizontal or vertical lantern at pleasure, the transformation being effected very expeditiously and easily. This is shown in Fig. 4, arranged as a vertical lantern. In lanterns for use in scientific demonstration, it is customary to mount the objective upon a separate stand leaving space between it and the condensing lens for the various pieces of apparatus used in the art of projection. Fig. 6 shows the typical arrangement of such an instrument. For details concerning the manipulation of the lantern, etc., see Dolbear, *The Art of Projection*; Wright *On Light*; and Hopkins, *Experimental Science*.

Revised by E. L. NICHOLS.

Magic Square: an arrangement of numbers from 1 up to 9, 16, 25, or any other square number in the form of a square, so that the sum of those contained in any straight line, horizontal, vertical, or diagonal, shall be the same. The most familiar form of magic square is that made with the nine digits, arranged as in the diagram. Here the digits are placed in a square, with three on each side. It will be seen that, in whatever way they are added, the sum of any three which lie in a straight line amounts to 15.

6	1	8
7	5	3
2	9	4

The following shows how a magic square with five numbers on a side may be formed: Write the five numbers 1, 6, 11, 16, 21, in five of the squares, putting 1 anywhere we please, 6 in the square two lines to the right, and one below from 1; then write in 11 at the same distance from 6, and so on with 16 and 21, but going back or up five lines when a number falls in lines outside of the diagram. Then fill in the numbers 2, 3, 4, 5 by continually counting two lines below and one to the right from 1. Start from 6, 11, etc., in the same way. The same system may be applied to squares of any prime number of sides.

1	24	17	15	8
20	13	6	4	22
9	2	25	18	11
23	16	14	7	5
12	10	3	21	19

S. NEWCOMB.

Magill, EDWARD HICKS, A. B., LL. D.: educator; b. at Solebury, Bucks co., Pa., Sept. 24, 1825; graduated at Brown University in 1852; was principal of the classical department of Providence High School 1852–59; sub-master Boston Public Latin School 1859–67; spent some time in foreign travel; was president of Swarthmore College from 1871 till 1889, when he became Professor of French Language and Literature in that institution. He is the author of *French Grammar*; *Introductory French Reader*; *French Prose and Poetry*; *Key to French Grammar*; *Reading French Grammar* (1892); and *Modern French Series* (begun 1892).

C. H. THURBER.

Magliabecchi, maăl-yaă-bek′keē, ANTONIO: bibliographer; b. at Florence, Oct. 28, 1633, of poor parents; followed the trade of goldsmith until forty years of age, but his eagerness to acquire book knowledge triumphed over all obstacles, and by diligent study he made himself one of the most learned men of his time. The librarian of Cardinal Leopold de Medici finally brought him to public notice, and he was appointed to take charge of the library of the Grand Duke of Tuscany. Though possessing but scanty means, he contrived by his frugal mode of life to gratify his absorbing passion for the collection of books, and amassed a library of over 30,000 volumes, including many works of great value. Many anecdotes illustrate his vast knowledge and the high esteem in which he was held by contemporary savants, but, with the exception of his correspondence and editorial work, he left no record of his extraordinary learning. On his death, which occurred at Florence, July 4, 1714, he bequeathed his library to the grand duke, and since 1859 it has formed a part of the National Library. A portion of his correspondence was published by Targioni in 1745, and many of his letters are given in Valery's *Correspondance de Mabillon et de Montfaucon avec l'Italie*.

F. M. COLBY.

Magna Charta, măg′na-kaar′ta [Lat., the Great Charter]: a charter of liberties originally granted by King John (A. D. 1215) to the clergy, barons, and freemen of England, and repeatedly confirmed by subsequent monarchs, and justly regarded as forming the most important part of the British Constitution. The tyrannical character and oppressive acts of King John, and his open violation of all law, aroused an opposition among the clergy and barons at an early period in his reign. This opposition, which at length became well organized and extensive, was headed and guided by Stephen de Langton, cardinal of the Roman Catholic Church and Archbishop of Canterbury, to whose wisdom, firmness, and patriotism the successful issue of the great struggle between the people of the realm and the crown was largely due. On Aug. 25, 1213, a council of the prelates and barons was held in London for the purpose of concerting measures by which the royal authority might be confined within legal bounds, and the rights and liberties of all estates in the kingdom might be secured and guaranteed. The contest which was thus openly begun lasted through the two succeeding years. On the one side were arrayed the freemen of England, the clergy, the barons, and the commons, united in one common cause and contending for rights which belonged to them all. On the other side was the king, standing almost alone, but using every artifice to divide and weaken his opponents. He applied for aid to Pope Innocent III., who, as a reward for his previous surrender of the English crown and reception of it again as a vassal of the papal see, openly sided with him, censured the barons, and ordered the archbishop to excommunicate them. He also endeavored to detach the clergy from their union with the laity by granting (Jan. 15, 1215) a special charter to the English Church. All these manœuvers were unsuccessful: the clergy, as well as the nobility and the commons, remained firm in their demands for such fundamental guarantees as should secure their rights and liberties, and the king was forced to yield, after much delay and even violence in attempting to overthrow the organization which had been formed against him. The barons, with whom had collected a large force of armed knights and yeomen, proclaimed their array to be the "army of God and Holy Church." On May 24, 1215, they entered London, the king having fled from the Tower to Odiham, in Hampshire. From this place he sent word that he would comply with the petitions, and asked that a time and place should be appointed for a conference. The barons named Runnymede as the place and June 9 as the day. The conference actually began on the 15th, and lasted until the 19th. An outline was first drawn up and assented to in the form of articles (*articuli magnæ chartæ*), upon the basis of which, although differing in some particulars, the more complete and formal instrument was prepared. The Great Charter itself was finally consummated and the royal seal affixed at Runnymede on Friday, the 19th, although it bears the date of June 15, 1215, the day on which the negotiations were begun. At the death of John the charter was at once renewed by the Earl of Pembroke, who administered the government as protector on account of the minority of Henry III. In the next year it was again

renewed, and again in the ninth year of Henry's reign, and on five subsequent occasions before the death of that monarch. The Great Charter as it was promulgated in the ninth year of Henry III. was most solemnly re-established and confirmed by the king and Parliament A. D. 1300, being the twenty-fifth year of the reign of Edward I., and in the form as thus finally adopted, although differing in several particulars from the original, it appears in the English statute-book, and has been again confirmed by kings and Parliaments more than thirty times. The original charter of King John contained 61 chapters or articles. All of these after the 49th, except the 54th, were entirely temporary, relating to certain personal acts of the king, and establishing a means of enforcing its provisions by a commission of twenty-five, to be elected by the barons from among their own number, in case the king should refuse or neglect to carry it into effect. This portion was of course omitted in every subsequent renewal. Of the permanent articles a few only related to the clergy. The charter which had been granted to the Church earlier in the same year was deemed sufficient, and was expressly confirmed. By far the greater part of these chapters had reference to the laity, and they may be separated into two groups—namely, those which legislated for certain designated classes, and especially for the barons as tenants *in capite* of the crown, defining, regulating, and limiting their feudal burdens and duties; and those which legislated for the whole nation, for the entire body of freemen. The former were based upon the then existing social condition; and, with the exceptions hereafter mentioned, they all ceased to be operative with the extinction of the feudal system. The latter remain in full force and effect as the very foundation and security of civil liberty in Great Britain, and the most important and comprehensive of the clauses has been incorporated into all the constitutions, national and State, of the U. S. Among the articles defining the feudal relations of the barons to the crown, the 12th enacts that "no scutage or aid shall be imposed in our kingdom unless by the general council of our kingdom," except for three specified purposes; while the 14th provides for the summoning and holding of the general council in order to assess such "aids." In these clauses are to be found the germs of the constitutional principle that no taxes shall be laid except by the consent of the persons to be taxed expressed through their representatives—a principle which involves the entire theory of representative government. These clauses were omitted in the charter of Henry III., but were re-enacted with even more explicitness in the confirmatory statute of 25 Edw. I. The most important articles by far of the Great Charter—since they contain a sure guaranty of every civil right and liberty belonging to freemen—are the 39th and 40th, the original text of which is: "39. *Nullus liber homo capiatur, vel imprisonetur, aut utlagetur, aut exuletur, aut aliquo modo destruatur; nec super eum ibimus, nec super eum mittemus, nisi per legale judicium parium suorum, vel per legem terræ.* 40. *Nulli vendemus, nulli negabimus, aut differemus rectum aut justitiam.*" The corresponding article of the charter of 9 Hen. III. and 25 Edw. I. is the 29th, the language of which is slightly varied and expanded: "*Nullus liber homo capiatur vel imprisonetur, aut disseisiatur de aliquo libero tenemento suo vel libertatibus vel liberis consuetudinibus suis, aut utlagetur aut exuletur aut aliquo alio modo destruatur; nec super eum,*" etc., the remainder of the clause being exactly the same as in the original form given above. The following is the authoritative translation of this capital provision, as found in the English book of statutes: "No freeman shall be taken, or imprisoned, or be disseised of his freehold, or liberties, or free customs, or be outlawed or exiled, or any otherwise destroyed; nor will we pass upon him nor condemn him, but by lawful judgment of his peers, or by the law of the land. We will sell to no man, we will not deny or defer to any man, either right or justice." To this text it is appropriate to add a sentence from the eloquent eulogium of Lord Chatham: "These three words, '*nullus liber homo*,' have a meaning which interests us all; they deserve to be remembered, they deserve to be inculcated in our minds, *they are worth all the classics.*"

AUTHORITIES.—Thompson's *Magna Charta* treats the history of each of the chapters at length. The significance of the charter at different periods of British history will be found fully presented in Stubbs's *Constitutional History*, Hallam's *Middle Ages*, and in Taswell-Langmead and Creasy. See Stubbs's *Select Charters* (1870).

Revised by C. K. ADAMS.

Mag'na Græ'cia [= Lat., liter., Great (i. e. Greater) Greece]: the name given to the ancient Greek settlements along the southern coast of Italy, such as Tarentum, Croton, Sybaris, Locri, Rhegium, etc. These cities were nearly all founded in the eighth century B. C., by mercantile cities of Greece, as trading-stations, and by means of their commerce attained to great wealth. They possessed a loose confederation, which did little more than keep alive a consciousness of their common origin, and they maintained a certain amount of literary and athletic association with the mother-country, although they did not take any considerable part in its military and political movements. Internal decay and strife between the cities of Magna Græcia were the first causes of a decline in its prosperity, which was further hastened by the aggressions of foreign enemies—Syracusans, native Bruttians, and Lucanians, and, from the third century B. C. on, the Romans. In Cicero's time Tarentum was almost the only city of Magna Græcia which still retained vestiges of earlier importance. The significance of the designation *Magna* Græcia is not altogether clear, but may have arisen from the superior wealth of these cities in the sixth and seventh centuries B. C. to the cities of Greece from which they came. See Lenormant, *La Grande-Grèce, Paysages et Histoire* (3 vols., Paris, 1881–84).

G. L. HENDRICKSON.

Magnan, măăn'yăăn', VALENTIN, M. D.: alienist; b. at Perpignan, France, in 1835; studied medicine in Lyons and Paris, graduating M. D. from the school in Paris in 1866; settled in Paris and devoted himself to nervous diseases; was appointed physician to St. Anne Asylum. Has written a number of papers on subjects connected with diseases of the mind and of the nervous system. His more important works are *De l'alcoolisme, des diverses formes du délire alcoolique, et de leur traitement* (Paris, 1874); *Recherches sur les centres nerveux* (Paris, 1876).

S. T. ARMSTRONG.

Magne, maañ, PIERRE: statesman; b. at Périgueux, France, Dec. 3, 1806; studied jurisprudence at Toulouse; was appointed councilor of the prefecture in 1835; elected deputy in 1843, and Under Secretary of State in the ministry of War in 1847, but resigned this office during the revolution of February, and returned to Périgueux. Napoleon, however, called him back in 1849, and made him a secretary in the ministry of Finance, and in 1851 Minister of Public Works. In 1855 he became Minister of Finance. Questions relating to the internal policy caused Magne to change his office several times, but his great financial talent always brought him back to this department. In 1863 he retired on account of a controversy with Fould, but (Nov. 13, 1867) he was again appointed Minister of Finance in order to effect the new great loan. When Napoleon formed the cabinet of Ollivier (Dec. 27, 1869), Magne retired into private life. Once more, however, he took charge of the ministry of Finance, from May 25, 1873, to May 16, 1874, in the cabinet of Broglie, but withdrew on account of a vote of the National Assembly which went against the ministry. D. Feb. 18, 1879.

Magne'sia: the name of two ancient cities in Asia Minor—(1) a city of Ionia lying on the Mæander, not far from Miletus and Ephesus, famous for its temple of Artemis (Diana), of which excavations have disclosed some remains; and (2) a city (the modern Manisa) of Lydia, N. E. of Smyrna, at the foot of Mt. Sipylus, celebrated for the battle which was fought here in the year 190 B. C. between the two Scipios and Antiochus the Great, of Syria, by which the Romans laid the foundations of their rule in the East.

G. L. HENDRICKSON.

Magnesia: magnesium oxide. See MAGNESIUM.

Magne'sium: a light, silver-white metal. Its ores are the magnesian minerals and rocks, among which *serpentine* is the richest, as it contains 25·8 per cent. of the metal. Other widely distributed and abundant natural compounds of magnesium are *magnesite*, $MgCO_3$; *kieserite*, $MgSO_4.H_2O$; *kainite*, $MgSO_4.KCl.6H_2O$; *carnallite*, $MgCl_2.KCl.6H_2O$; *talc*, *meerschaum*, *augite*, *olivine*, etc. Each cubic foot of the ocean contains 1·34 oz. of metallic magnesium, or over three-fifths of a cubic inch. A cube of 30 feet of sea water contains 2,240 lb. of the metal magnesium.

Properties, Chemical and Physical.—Magnesium is silver-white and very brilliant, malleable, and ductile. It melts at a red heat, and is readily cast into ingots. At a higher heat it volatilizes and distills, like zinc. One of the most remarkable characters of magnesium is its combustibility in

the form of filings, wire, or ribbon, with a light of dazzling brilliancy. In this also it is like zinc, which will burn in the same way if in sufficiently thin foil.

Magnesium does not rust rapidly in damp air, a thin, white film of carbonate forming, which, from its insolubility, protects the metal. Carbonate of magnesium is devoid of toxic qualities, and not destructive to organic matter like that of iron. Being by far the lightest substance of equal strength that is known (except possibly calcium, which is comparatively little known), and obtainable in unlimited quantities, magnesium would seem to be, next to aluminium, the most important of the metals of the future.

Manufacture of Magnesium.—The manufacture of magnesium is dependent on that of sodium. The improved method of Sonstadt consists in heating in a closed crucible 6 parts of chloride of magnesium, 1 of dry common salt, 1 of powdered fluor-spar, and 1 of metallic sodium to a bright-red heat. The granules of magnesium thus formed are separated from the mass, and purified by distillation in a current of dry hydrogen gas, at a white heat, in an apparatus composed of carbon. It is incorporated into a body for casting into ingots by fusing, under a flux composed of the same ingredients as above—mixed chlorides of magnesium and sodium. Magnesium is employed principally in the form of ribbon and powder for producing bright lights for photography, as in the flash-light, for signaling at sea, and for pyrotechny. *White fire* is made by melting together 1 part shell-lac and 6 parts barium nitrate, grinding, and mixing with 2·5 per cent. of powdered magnesium. *Red fire* is made by using 5 parts strontium nitrate in place of the 6 parts barium nitrate used in making white fire, the other ingredients being used in the same proportions.

Compounds of Magnesium.—The principal ones are *magnesia*, which is the *oxide*, MgO; *magnesite*, or the carbonate, $MgCO_3$; *Epsom salt*, or the sulphate, $MgSO_4.7H_2O$; and the chloride, $MgCl_2$.

Magnesia, MgO, is usually made by gently igniting the carbonate, and is called *magnesia usta*, the carbonate being known as *magnesia alba*. Magnesia is a white powder, which is very difficultly soluble in water, forming with it the hydroxide $Mg(OH)_2$. It is used for the purpose of protecting vessels subjected to a high temperature. Mixed with water and exposed to the air, it becomes very hard. A mixture of magnesia, water, and magnesium chloride forms Sorel's cement, which hardens to an oxychloride as hard as marble. Magnesia and the carbonate are valuable in medicine; in the first place as alkalies to neutralize acidity in the alimentary canal, both from their high saturating power and from the absence of any corrosive properties of their own. Hence in poisoning by the mineral acids and in acid dyspepsia they are very useful, but from their low diffusion power they are little absorbed, and hence can not be employed to alkalize the blood. All soluble magnesium salts are purgative, producing watery discharges, while at the same time not irritating the intestinal mucous membrane. Thus magnesia and magnesium carbonate combine the virtues of an alkali and a mild purge, and are accordingly useful in acid dyspepsia with constipation. *Magnesium sulphate*, *Epsom salt* (Germ. *Bittersalz*), was discovered in the springs at Epsom, in England. It is used in medicine as a powerful though safe neutral purge, and, from its less offensive taste, has superseded Glauber's salt. If infused into the blood, it acts as a dangerous poison. It is used, further, in the manufacture of sodium sulphate and potassium sulphate, and as a fertilizer in place of gypsum. Its chief use is in the Lancashire cotton-trade for warp-sizing. The chloride is used in the preparation of the metal. Magnesium citrate may also be mentioned. It is used in medicine as an agreeable laxative and mild purge in the form of the officinal effervescing solution of the U. S. Pharmacopœia.

Revised by Ira Remsen.

Magnet [viâ O. Fr. from Lat. *mag'nes*, *magne'tis*, from Gr. **Μαγνῆτις λίθος**, or **Μαγνησία λίθος**, liter., Magnesian stone. Cf. Lat. *la'pis Heracle'us*, magnet, liter., Heraclean stone, named from *Heracle'a*, capital of Magnesia]: a name which from early times has been applied to the loadstone or native magnet, an ore consisting of the magnetic oxide of iron, Fe_3O_4, more properly termed magnetite. This ore is extensively distributed over the globe, and its peculiar property of attracting metallic iron has been known from the remotest antiquity. Some (following Pliny) trace the derivation of the name from Magnes, a Greek shepherd, who, on Mt. Ida, observed the attractive power of a large mass of loadstone on his iron crook. It was this power of the loadstone to attract to itself small particles of iron that made it famous, being referred to by Plato, Euripides, Aristotle, Pliny, and others. The power of the loadstone to impart its properties to iron or steel rubbed or even touched by it was likewise known at an early date, but it was not until the twelfth century or thereabouts that it was discovered that the loadstone when freely suspended would assume a north and south direction. The philosophy of the loadstone was a favorite subject for discussion by many writers, most of whom were led astray by conceptions handed down from generation to generation. William Gilbert, of Colchester, in a scholarly work entitled *De Magnete, Magneticisque Corporibus, et de Magno Magnete Tellure* (London, 1600), treats the subject of the loadstone exhaustively; he states all that was previously known about it, and adds important discoveries of his own. It was he who first understood the nature of the polarity of the magnet, which he refers to as follows in the introductory chapter of his book: "The loadstone has from nature its two poles, a northern and a southern, fixed definite points in the stone. . . . It is to be understood, however, that the force of the stone does not emanate from a mathematical point, but from the parts themselves, and from all of these parts. . . . These poles point toward the poles of the earth, and move toward them, and are subject to them. . . . Whether its shape is due to design or to chance, . . . the loadstone ever has and ever shows its poles." Dr. Gilbert was careful in all his work and scientific in his methods, and much credit is due to him for his clear ideas concerning the magnet. It was he who discovered that midway between the poles there was a place of no attraction, which he calls the equator. The line connecting the imaginary poles he called the magnetic axis. He furthermore pointed out the distinction between magnets and magnetic substances. A magnetic substance (such as a mass of soft iron) has no poles nor equator, and will attract either pole of a magnet to whatever part the magnet is presented. A magnet, on the other hand, attracts only at its poles which display opposite properties, the one attracting and the other repelling a given pole of another magnet brought near, like poles repelling and unlike attracting. If a piece of iron or steel be rubbed by a magnet it will become magnetized. This method of magnetizing, or of producing an artificial magnet, was formerly of great importance, particularly in constructing the mariner's compass, and various modifications of the method have been used since the magnetizing effects of a current have been known. These have been supplanted for the most part by methods in which an electric current is used. The method of *simple touch* consists in passing the pole of a powerful magnet along the bar to be magnetized, and repeating this operation several times, always moving the pole of the magnet in the same direction until the magnetization is complete. In the method of *double touch*, two bar magnets are placed upon the bar to be magnetized with opposite poles in proximity, but separated by a small piece of wood. (See Fig. 1.) The magnets are then moved back and forth until the bar is magnetized. A slightly different method is that of *separated* or *divided touch*, in which two magnets with opposite poles together are placed at the middle of the bar to be magnetized, and drawn apart from the middle of the bar toward its end and back several times. All these methods, however, have been replaced, except for special cases, by the methods described further on, in which an electric current is employed. Laminated magnets (see Fig. 1) have been used where a strong permanent magnet is wanted, and are found to be more powerful in proportion to their weight than those consisting of one piece. A magnet is less liable to deteriorate in strength if it forms part of a closed magnetic circuit, and for this reason a *keeper* or *armature* is often placed so as to connect the two poles. A sudden slamming on of the armature will weaken the strength of the magnet, but not so the sudden pulling off, as is commonly supposed.

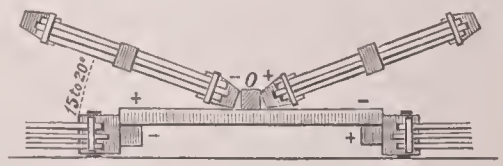


Fig. 1.—Method of double touch.

The Electro-magnet.—The discovery of Oersted (1819), that magnetic influences surrounded a conductor carrying an electric current, led to the discovery by Arago that a needle placed at right angles to the conductor becomes magnetized, and the further discovery by Ampère that if a

number of turns of wire be substituted for the straight conductor, the magnetizing power will be increased. These principles led to the electro-magnet, first constructed by William Sturgeon, and described by him before the Society of Arts in 1825. After the invention of the electro-magnet, the determination of its laws received the attention of Sturgeon, Henry, Joule, and Faraday, and additions have since been made to our knowledge of the subject by various men of science. An electro-magnet is simply a piece of iron surrounded by a magnetizing coil of wire carrying a current. (See Fig. 2.) The polarity of an electro-magnet depends upon the direction of the current magnetizing it, as in Fig. 3. The tractive power of a magnet depends upon the magnetic induction (lines per square centimeter) and the polar surface, and is equal to $\mathfrak{B}^2A \div 4\pi$ dynes, where $\mathfrak{B}$ is the *induction* or number of lines per square centimeter (see MAGNETISM OF IRON) and A the polar surface in square centimeters. Expressed in grammes, this becomes $\mathfrak{B}^2A \div 4\pi \times 981$; and in pounds, $\mathfrak{B}^2A \div 11{,}183{,}000$. These formulas are strictly true only when the induction is uniform; where $\mathfrak{B}$ is not uniform, for $\mathfrak{B}^2A$ in above we should write $\int \mathfrak{B}^2 dA$. This law holds in all cases for permanent magnets as well as electro-magnets. A full account of the electro-magnet may be found in *The Electro-magnet*, by S. P. Thompson. The properties of an electro-magnet depend upon the magnetic properties of the iron which constitutes the core, and these, together with the laws of the magnetic circuit, are discussed at length under MAGNETISM OF IRON (*q. v.*).

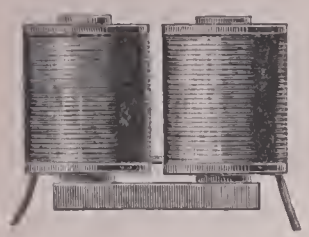


FIG. 2.—Electro-magnet.

FIG. 3.—Direction of currents around the poles of an electro-magnet.

FREDERICK BEDELL.

Magnetism: a term applied to the phenomena observed in the region surrounding a magnet and in the neighborhood of a conductor conveying an electric current. In these regions there exists a magnetic force which acts upon a magnetic substance (such as a compass-needle or iron filings) or upon a wire carrying a current of electricity.

If fine filings of soft iron be uniformly sifted over a plate of glass, we shall observe that the distribution of the filings is influenced by the position of a magnet introduced beneath. The approach of the magnet is first indicated by a bristling of the iron filings. If the plate be gently vibrated the filings will arrange themselves in a system of lines, more or less regular, as shown in Fig. 1, each particle of iron taking a direction according to the direction of the magnetic force to which it is subjected. The study of these curves, in connection with the action of magnets on magnetic and diamagnetic bodies, led Faraday to the adoption of the terms "magnetic field" and "lines of magnetic force." We see that these lines of force extend throughout the whole region surrounding a magnet. A magnetic field may be defined as any space throughout which there exists a magnetic force, while a line of magnetic force is a line drawn through a magnetic field in the direction of the force at each point through which it passes. The magnetic field set up by a current is similar to that in the neighborhood of a magnet, and may also be shown by means of iron filings which arrange themselves in circles about the conductor, as illustrated under ELECTRICITY (*q. v.*). Although earlier experiments showed that the magnetism of a piece of iron was influenced by the flow of electricity in a neighboring conductor, it was not until 1819 that these phenomena were definitely pointed out. In that year Prof. Oersted, of Copenhagen, made known the fact that if a compass-needle be placed near a conductor carrying a current and parallel to it, it turns, and tends to set itself in a direction at right angles to the current. This first announcement of the relation between electricity and magnetism attracted considerable attention in the scientific world. During the following year Arago, in France, and Davy, in England, showed that iron filings placed in the vicinity of an electric current became magnetized, and Ampère, of the French Academy, published his generalizations, which formed the foundation of the science of electro-magnetism. He showed that not only were magnetic bodies influenced by the passage of a current, but that there were mutual forces between neighboring currents; that parallel currents flowing in the same direction attract, and that those flowing in opposite directions repel. These early experiments demonstrated the fact that a current of electricity establishes about itself a magnetic field possessed of the same properties as the field surrounding a magnet. The direction of the lines of force in this magnetic field form concentric circles with the conductor at the center, as shown in Fig. 2. The phenomena of magnetic fields containing iron are fully discussed under MAGNETISM OF IRON (*q. v.*), where also are given the technical meanings assigned to *a line of force*, *unit pole*, etc.

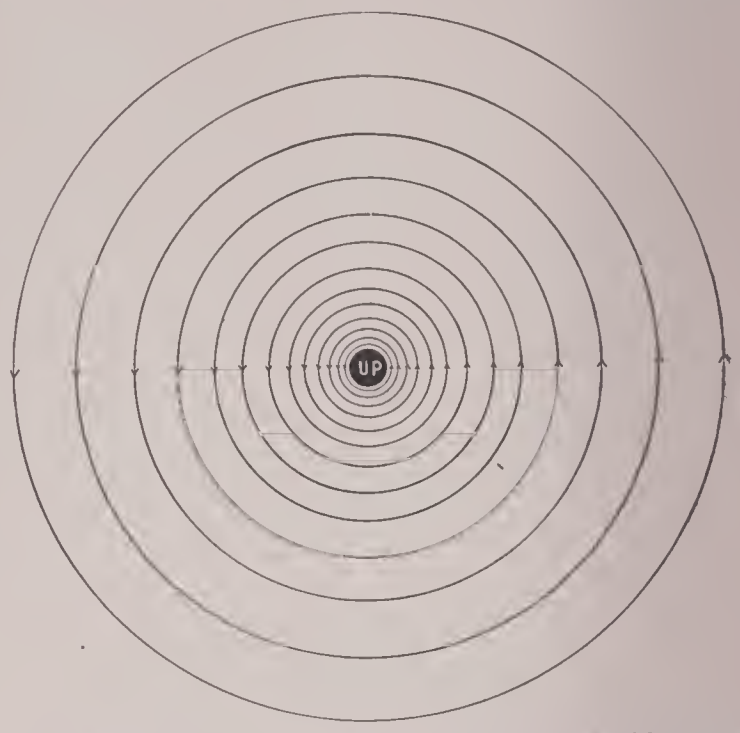


FIG. 2.—Magnetic lines of force around a straight wire with current flowing upward.

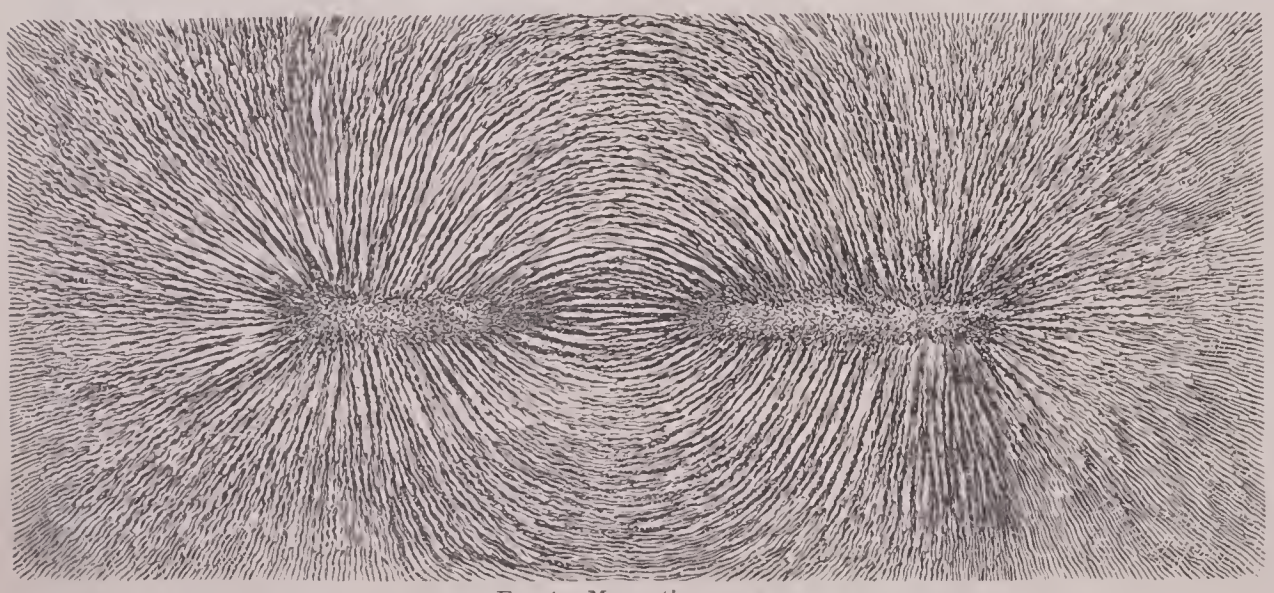


FIG. 1.—Magnetic curves.

Magnetic Field Produced by a Current.—We have seen that a current of electricity flowing in a circuit produces a magnetic field in the surrounding region, and that the lines of force which constitute this field are always closed lines encircling the conductor. The total number of lines passing through the area bounded by a closed electric circuit is the total magnetic induction of the circuit. As the current

is increased in strength, the intensity of the magnetic field at every point is increased, and, if there is no magnetic substance in the region, the intensity of the field is increased in direct proportion to the strength of the current. A *unit current* is defined in terms of the magnetic field which it generates. A unit current is that which, flowing in a circuit of a centimeter radius, acts on a unit magnetic pole, placed at the center, with the force of a dyne per centimeter length of the circumference. This is the C. G. S. unit of current; but the practical unit, the *ampère*, is one-tenth of the C. G. S. unit. It has been found, as the result of experiment, that the magnetic effect of a current is the same as that of a magnetic shell of suitable strength, having for its boundary the circuit in which the current flows. By a magnetic shell is meant a very thin sheet of magnetic material magnetized in the direction of its thickness. The strength of shell, j, is equal to the magnetic moment per unit of area, i. e. $j = \frac{ml}{A}$, where m is the pole strength and l the distance between the poles of the magnet with cross-section A. A shell of uniform strength, j, having the same boundaries as a circuit in which the current I is flowing, will exactly replace the current, so far as magnetic effect is concerned, when I and j are numerically equal. The magnetic potential at a point P, at which a closed circuit carrying a current I subtends a solid angle Ω, is $I\Omega$. (See POTENTIAL.) The direction of the magnetic force set up by a current is shown by Figs. 2 and 3.

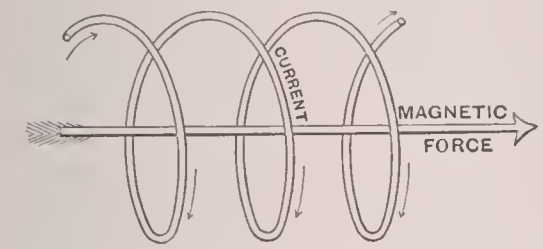


FIG. 3.—Direction of magnetic force set up in a solenoid.

Electro-magnetic Induction.—We have seen that a magnetic field is set up by a current of electricity. Of equal importance is the fact discovered by Faraday that an electromotive force (E. M. F.) is produced in a conductor which is moved through a magnetic field so as to cut the magnetic lines of force. This electromotive force is directly proportional to the rate at which the lines are cut, and is in a direction at right angles to the direction of motion and also to the direction of the lines of force. Faraday further showed that if the magnetic induction, N, throughout any closed circuit be varied by *any* means, an E. M. F. is developed in the circuit proportional at any instant to the rate of change (increase or decrease) of the induction at that instant. This change in magnetic induction may be produced by an alteration in the position of the circuit in its relation to magnets or other circuit, or to a variation in the intensity of the current in a neighboring conductor or in itself. However the change in the induction is produced, the law always holds, and may be expressed by the equation $E = -\frac{dN}{dt}$. The negative sign indicates that an electromotive force is induced in such a direction as to oppose the change in number of lines threading the circuit. A C. G. S. unit of E. M. F. is developed when there is a change in the induction of the circuit at the rate of one line per second, or when the conductor is *cutting* one line per second. The practical unit of E. M. F., the *volt*, is 10^8 times the C. G. S. unit just defined. If the circuit in which the induction is changing is closed, the E. M. F. produced by this change will cause a current to flow in a direction so as to oppose the change producing it (Lenz's law); for example, if the field is increasing in strength, the current developed will tend to weaken it by sending lines in the opposite direction. Again, if the electromotive force is produced by the motion of a wire, the current induced will exert a force which tends to resist this motion. This law is a particular case of the general law of the conservation of energy. An E. M. F. is induced, as explained above, whenever the number of lines inclosed by a circuit is varied, no matter what may be the source of the lines or the cause of the variation. Any variation in the strength of the current itself will produce a variation in the field which will induce an E. M. F. in the circuit, called the E. M. F. of self-induction, in such a direction as to oppose the change in the current. The effect of self-induction is to make a current act as if it possessed inertia, but this apparent inertia is a function of the shape of the circuit and the magnetic properties of the bodies near it. The spark observed on breaking a circuit in which a heavy current is flowing is due to self-induction. If the circuit contains iron, and has a large number of turns, a considerable spark may be obtained with a very small current. The E. M. F. of self-induction may be expressed as a function of the rate of change of current thus: $e = -L\frac{dI}{dt}$. The coefficient L is called the *coefficient* of *self-induction*, and has been defined as the ratio between the counter E. M. F. of self-induction in any circuit and the time rate of variation of the current producing it. If the current is changing at the rate of one unit per second, and the E. M. F. caused thereby is unity, then L is unity. The practical unit of self-induction is the *henry*, and is equal to 10^9 times the C. G. S. unit. This definition of L is in accordance with the Chicago congress (1893). The E. M. F. of self-induction may be written in terms of the change in magnetic induction thus: $e = -\frac{dN}{dt} = -L\frac{dI}{dt}$. If the permeability of the medium surrounding the conductor is constant, the value of L is constant for all values of current, and $N = LI$. From this equation the coefficient of self-induction has been defined as the ratio of the total induction threading the circuit to the current producing it. When there is iron, this is approximately true when a high degree of saturation is not reached. The *quantity* of electricity which will flow in a circuit on account of the change in the number of lines which thread it is equal to the change in the number of lines divided by the resistance, i. e. $Q = \frac{N_2 - N_1}{R}$. This is entirely independent of the manner of the change and the time occupied in making it. This principle is illustrated in the use of the earth inductor and the ballistic galvanometer.

Energy of a Magnetic Field.—When a current is caused to flow in a conductor it produces a magnetic field in the surrounding region, and stores up a certain amount of energy in this magnetic field which depends upon the value of the current and the self-induction of the circuit, and is equal to $\frac{1}{2}LI^2$. This energy is kinetic, and when the current decreases this energy is *returned* to the circuit, and tends to maintain the flow of current, just as the kinetic energy of a revolving fly-wheel tends to maintain the rotation of the wheel when slowing down. The energy of the field increases and decreases with the current, and its rate of change depends upon the value of the current and also upon its rate of change. Thus in the time dt the change in the field energy is $LI\frac{dI}{dt}dt$, which is positive when the current is increasing and negative when it is decreasing. No energy is lost in the magnetic field when in air, i. e. it is *all* restored to the circuit; but when the field contains iron the energy is not entirely returned to the circuit, part of it being lost due to *hysteresis*. (See MAGNETISM OF IRON.) In air the energy of the magnetic field is $\frac{\mathfrak{H}^2}{8\pi}$ ergs per cubic centimeter[3]—(where $\mathfrak{H}$ is the intensity of the field); in iron it is much greater, increasing almost directly with the permeability until saturation is reached.

Properties of Lines of Force.—Many facts in connection with electro-magnetism are more readily understood by assigning certain "properties" to the lines of force. Lines of force in the same direction repel each other, while those in opposite directions attract and tend to neutralize each other. Lines of force exert a tension which tends to shorten them. This tension explains the tractive power of magnets, and is equal to $\frac{\mathfrak{H}^2}{8\pi}$ dynes per square centimeter. The tension is only displayed at the points where the lines enter the iron, just as the tension of a stretched rubber band is evident only at the points at which it is attached. If a conductor carrying a current, I, be placed at right angles to the lines of force in a uniform field of intensity, $\mathfrak{H}$, it will be acted upon with a force, $l\mathfrak{H}I$, where l represents the length of the conductor in the field. This electro-dynamic action

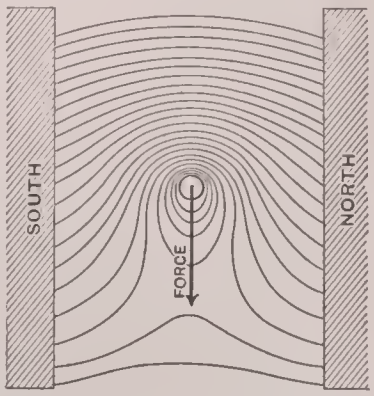


FIG. 4.—Conductor in uniform field carrying current upward.

may also be explained by the tension of lines of force. Fig. 4 shows the lines of force which result when a conductor carrying a current is placed in a uniform magnetic field. The direction in which the conductor is urged is indicated by the arrow. Upon this principle depend the action of the electric motor and the resistance offered to the rotation of the armature of a dynamo.

The subject of magnetism is so intimately connected, both logically and by association, with that of the magnetism of iron, that a treatment of this latter subject is rendered necessary for a complete understanding of the more general subject of magnetism. Therefore, further discussion of magnetism will be taken up under MAGNETISM OF IRON. Classical works on magnetism are those by Maxwell, Mascart and Joubert, and Gray.

FREDERICK BEDELL.

Magnetism of Iron: although many substances possess magnetic properties to some extent, iron (and steel) possesses these properties to a greater extent than any other body, and is by far the most important of the magnetic metals. Nickel and cobalt possess similar properties to a lesser degree. In addition to these three may be named chromium, cerium, and manganese, and a few other substances which are appreciably magnetic. If a magnetized needle be thrust into iron filings, it will be found that these cling in clusters near the ends which are called *poles*, which, however, as Gilbert pointed out (see MAGNET) are never mathematical points. For convenience in the study of magnetism, however, we may suppose that a magnetic pole may be concentrated at a point, and we define a *unit magnetic pole* as one which exerts a force of a dyne upon another equal pole at the distance of a centimeter. Such a pole forms the basis of our study of magnetism and the foundation upon which is based the whole system of electro-magnetic units. By *strength of pole* (m) we mean the number of unit poles to which a magnetic pole is equivalent; this is measured by the force (in dynes) that the pole exerts upon a pole of unit strength placed a centimeter away. In this definition it is assumed that the pole is concentrated at a point; whereas, in the case of actual magnets, the attractive power is found to be distributed over considerable area, called the *polar surface* of the magnet. Each element of this surface, however, may be treated as a pole in the sense used above, with its attractive power varying as the inverse square of the distance. The combined action of these infinitesimal poles is equivalent to the actual effect of the magnet. Coulomb investigated the action between magnetic poles, and established the following law of force from experiments performed with a torsion balance. The attraction or repulsion between two poles is inversely as the square of the distance between them, and directly as the product of their strengths; that is, $f \propto \frac{m\,m'}{r^2}$, where m and m' are the strengths of the poles and r the distance between them. A unit pole being defined as above, the sign of variation may be changed to one of equality if r is measured in centimeters and f in dynes. The force between two magnetic poles is then $= \frac{m\,m'}{r^2}$. When the two poles have the same sign, the product $m\,m'$ is positive, and, inasmuch as the poles repel, a force of repulsion has a positive sign. Similarly, a force of attraction has a negative sign. It is not possible for an isolated pole to exist, but this condition may be practically obtained by using a long, uniformly magnetized needle with one pole so far removed that measurements upon the other are uninfluenced by it.

Magnetic Force ($\mathfrak{H}$).—If we could place a free magnetic pole in a magnetic field, it would always be urged in a certain direction, and if free to move would actually move in this direction. The direction in which a + pole would be urged is called the positive direction of the line of force which passes through the pole. The value of the magnetic force, $\mathfrak{H}$, at any point in a magnetic field is measured by the force (in dynes) that would be exerted on a unit pole placed at that point. When dealing with induced magnetism, $\mathfrak{H}$ is frequently called the *magnetizing force*, since it measures the tendency of the field to magnetize a piece of iron placed in it. Usually it is found that $\mathfrak{H}$ varies at different points in the field; but if $\mathfrak{H}$ has the same value at every point, both in magnitude and direction, the field is said to be uniform. *A line of force* is an imaginary line which shows by its direction at any point the direction of the magnetic force $\mathfrak{H}$. If the uniform field be one of *unit intensity*, then $\mathfrak{H}$ equals 1, and there is said to be one line of force per square centimeter; and when the intensity is $\mathfrak{H}$ there are $\mathfrak{H}$ lines of force per square centimeter. Thus the intensity of a magnetic field is considered as being determined by the number of lines which pass through a centimeter of a surface normal to the direction of the lines of force. When lines of force are imagined as drawn in this way so as to give the magnitude as well as the direction of the force, they are commonly spoken of as C. G. S. lines. By the definition of a unit pole the intensity of field $\mathfrak{H}$ is unity at a distance of a centimeter from the pole. If a sphere be described about the unit pole as center, having a radius of a centimeter, there is consequently one line of force passing through the surface of the sphere for every square centimeter. As the surface of a sphere contains 4π sq. cm., there are in all 4π lines of force that emanate from a unit pole, and $4\pi m$ lines from a pole whose strength is m. The *magnetic moment* ($\mathfrak{M}$) of a magnetized piece of iron is defined as the distance between its two poles multiplied by the strength of one pole; thus $\mathfrak{M} = ml$. Generally the two factors m and l can not be separated, for it is the effective strength of pole that is required. If a magnet of moment $\mathfrak{M}$ is suspended in a uniform field of intensity $\mathfrak{H}$, so as to make an angle θ with its position of equilibrium, the moment of the couple tending to restore the magnet to equilibrium is $\mathfrak{M}\mathfrak{H}\sin\theta$. Magnetic moment is accurately defined by this relation.

Magnetic Induction in Iron.—When a piece of iron is placed in a magnetic field, that is, when it is subjected to a magnetizing force, it becomes magnetized, and if the iron is isotropic this magnetization is in the direction of the magnetizing force. The amount of this magnetization may be expressed in various ways—for instance, in terms of its magnetic moment, already defined, intensity of magnetization, magnetic induction, etc., each of which ways has its advantages. Magnetism is sometimes considered as consisting of two hypothetical fluids, positive and negative, equal amounts of which appear at the ends of the magnetized bar. The middle portion of a uniformly magnetized bar shows no positive or negative magnetism, for the poles of successive elementary magnets neutralize each other. Although magnetism is only displayed at the ends of a bar where its unneutralized poles exist, the magnetic state is continuous throughout the bar. If we cut the uniformly magnetized bar into pieces of any shape whatsoever, the magnetic moments of the separate pieces are proportional to the volumes. The magnetic moment per unit volume is taken as a measure of the magnetization, and is called *the intensity of magnetization* ($\mathfrak{I}$). For a magnet of uniform cross-section A and length l, $\mathfrak{I} = \frac{\mathfrak{M}}{\text{vol.}} = \frac{ml}{la} = \frac{m}{A}$; that is, the intensity of magnetization is equal to the pole strength per unit of polar surface. The intensity of magnetization is a function of the magnetizing force; the ratio of the intensity of magnetization to the magnetizing force is called the *magnetic susceptibility* (κ), and is dependent upon the quality of the iron; thus, $\kappa = \frac{\mathfrak{I}}{\mathfrak{H}}$.

We have seen above that $4\pi m$ lines of force emanate from a pole of strength m. From the polar surface, A, of a bar of iron with intensity of magnetization $\mathfrak{I}$, there will emanate $4\pi\mathfrak{I}A$ lines, or $4\pi\mathfrak{I}$ lines per square centimeter. These lines are called *induced lines of magnetization*, and are added to the lines of force $\mathfrak{H}$ which magnetized the bar. The total number of lines of force which now pass through each square centimeter is $\mathfrak{H} + 4\pi\mathfrak{I}$; that is, it is the sum of the magnetizing force (lines of force per square centimeter) before iron was placed in the field and the induced lines of magnetization due to the presence of the iron. This quantity, the total number of lines of force per square centimeter, is usually called the *induction* or the *magnetic induction*, designated by the letter $\mathfrak{B}$: or $\mathfrak{B} = \mathfrak{H} + 4\pi\mathfrak{I}$. The total induction N throughout any area A is $\int \mathfrak{B}\,dA$; and when the iron is uniformly magnetized we have $N = \mathfrak{B}A$. In air or other non-magnetic substance the magnetic induction is equal to the magnetizing force, that is, $\mathfrak{B} = \mathfrak{H}$; but in a magnetic substance such as iron the number of lines is increased by $4\pi\mathfrak{I}$ lines due to the presence of the iron. The ratio of the induction to the magnetizing force is called the *magnetic permeability* μ; that is, $\mathfrak{B} = \mu\mathfrak{H}$. The permeability is, so to speak, a multiplying factor the value of which depends upon the magnetic properties of the iron. The relation between permeability and susceptibility may be obtained by dividing the equation $\mathfrak{B} = \mathfrak{H} + 4\pi\mathfrak{I}$ by $\mathfrak{H}$. We then have $\frac{\mathfrak{B}}{\mathfrak{H}} = \frac{\mathfrak{H}}{\mathfrak{H}} + \frac{4\pi\mathfrak{I}}{\mathfrak{H}}$, or $\mu = 1 + 4\pi\kappa$.

Meaning of $\mathfrak{B}$ *and* $\mathfrak{H}$.—Suppose a narrow crevasse cut in the iron perpendicular to the direction of magnetization. The force on a unit pole in this crevasse is due to the magnetizing force $\mathfrak{H}$, and the induced lines of magnetization $4\pi\mathfrak{I}$, and is a measure therefore of $\mathfrak{B}$ for $\mathfrak{B} = \mathfrak{H} + 4\pi\mathfrak{I}$. Now, suppose a hole drilled through the magnet in the direction of magnetization. The force upon a unit pole in this hole is a measure of $\mathfrak{H}$, for in this hole there are no induced lines of magnetization. $\mathfrak{B}$ and $\mathfrak{H}$ are *vector* quantities, and equations in which they occur should be so interpreted; they become algebraic when the medium is isotropic.

Work done in Moving a Magnetic Pole.—In moving a magnetic pole in a magnetic field, work is done either by the magnetic force or against it. Suppose that we have two magnetic poles of strengths m and m', and that r_1 is the distance between them. If m' is moved from the point P_1 to P_2 so that the distance between m and m' is increased from r_1 to r_2, work is done. The work done in thus moving m' from P_1 to P_2 can be found by first ascertaining the work done in moving m' over an element of distance ds with an increase dr in the distance r from the magnetic pole m. The force between two poles of strengths m and m' at a distance r apart is $f = \frac{m\,m'}{r^2}$. This force may be considered constant while the pole m' is moving through an element of distance ds. The distance through which the pole is moved *against* this force is dr; hence the work done is $dW = mm'\frac{dr}{r^2}$. To find the work *done by* the magnetic force in moving m' from P_1 to P_2, this expression must be integrated between the limits r_1 and r_2; thus $W = mm'\left(\frac{1}{r_2} - \frac{1}{r_1}\right)$. The work *done against* the magnetic force is $mm'\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$. This work is independent of the path, depending simply upon the pole strengths and upon the initial and final distances.

Magnetic Potential.—If the distance r_2 is infinite (meaning that the pole m is carried from an infinite distance to a point at a distance r_1), the work done against the magnetic force becomes $W = \frac{mm'}{r_1}$. If m' is unity, meaning that a unit pole is moved, the work done becomes $W = \frac{m}{r_1}$. It is seen that each point in the region surrounding a magnetic pole possesses a certain characteristic which determines the amount of work done in bringing a unit magnetic pole from infinity to that point. This characteristic of the point has been called its *magnetic potential.* The magnetic potential V at a point is therefore defined as the work done in moving a unit positive pole from an infinite distance to that point; thus, $V = \frac{m}{r}$. This potential is positive when the work done is positive; that is, when work is done, in moving the pole, by some agent external to the system. The potential at a point due to a number of magnetic poles is the sum of the potentials at that point due to each pole independently; thus $V = \Sigma\frac{m}{r}$. We have seen under the head of Magnetism that the magnetic potential at any point due to a current flowing in a closed circuit is $I\Omega$, the product of the current and the solid angle which the circuit subtends as seen from the point. It may be shown that the work done in carrying a pole around a wire in which a current I is flowing is $W = 4\pi I$ ergs. If, instead of one wire, there are S turns around which the pole is carried, the work will be S times as much, and $W = 4\pi SI$ ergs.

Magnetizing Force of an Ampère Turn.—When a unit pole is moved in a magnetic field, the work done is the product of the magnetic force and the distance through which the pole is moved against the force. If l is the length of the path described by the pole and α the angle at any point in the path between the direction of motion and the direction of the force $\mathfrak{H}$, the work in moving a unit pole, being the product of the force and the distance through which the pole moves, is $W = \int\mathfrak{H}\cos\alpha\,dl$. Therefore $\int\mathfrak{H}\cos\alpha\,dl = 4\pi SI$ in C. G. S. units. In case the path of the pole is coincident with the direction of force, $\cos\alpha = 1$ at all points. This is the case when the medium is isotropic and there is no residual magnetism in a direction inclined to the magnetizing force. If the current be expressed in ampères (and not in C. G. S. units as above) and $\cos\alpha = 1$, then $\int\mathfrak{H}dl = \frac{4\pi SI}{10}$. If $\mathfrak{H}$ has a constant value, $\mathfrak{H}_1$, through a portion l_1 of the path, another value $\mathfrak{H}_2$ through the distance l_2, etc., then $\mathfrak{H}_1 l_1 + \mathfrak{H}_2 l_2 + \text{etc.} = \frac{4\pi SI}{10}$. This is the form in which the equation is generally used, and is the basis for most magnetic computations. The "line integral of magnetic force," $\int\mathfrak{H}dl$, is called the *magnetomotive force.* In the case of a torus, or anchor ring, wound uniformly with wire carrying a current I, the force is constant along any circle concentric with the ring. If l is the circumference of such a circle, $\int\mathfrak{H}dl = \mathfrak{H}l$, and $\mathfrak{H} = \frac{4\pi SI}{l}$, where I is in C. G. S units. If r is the distance from the center, $l = 2\pi r$ and $\mathfrak{H} = \frac{2SI}{r}$. At any point within the winding $\mathfrak{H}$ is evidently inversely proportional to the distance from the center, and $\mathfrak{H} = 0$ for all points outside of the winding. At a distance r from an infinite straight conductor with current I, $S = 1$, $l = 2\pi r$, and $\mathfrak{H} = \frac{2I}{r}$, for C. G. S. units. In the case of a long solenoid $\mathfrak{H}$ is very nearly uniform throughout the length, and is much greater at points within the solenoid than at points outside. By far the greater work is done in carrying the pole through the solenoid. If $\mathfrak{H}_1$ is the force inside and l_1 the length, we have therefore $\mathfrak{H}_1 l_1 = \frac{4\pi SI}{10}$, approximately. $\mathfrak{H}_1$, as computed from this formula, will always be somewhat greater than the true value. The approximation is close only when the length is great as compared with the diameter. For short solenoids it does not hold.

The Magnetic Circuit.—We see that a current flowing in a conductor creates a magnetizing force in the surrounding region, and the value of this force is given in the equations above. Now, the total number of lines which will be set up through this surrounding medium which constitutes the magnetic circuit depends not only upon the magnetizing force $\mathfrak{H}$, but also upon the permeability of the material composing the magnetic circuit and upon its dimensions.

Electric Analogy.—The analogy between magnetic lines of force and the lines of flow of electric currents was first pointed out by Faraday. So many magnetic phenomena may be more clearly explained by this electric analogy that it is very generally used. If a voltaic cell consisting of a tube with electrodes at each end is placed in a poorly conducting liquid, such as salt water, the current in flowing between the two poles of the cell will be distributed throughout the whole liquid. *If lines of flow*, or *stream lines*, be drawn so that they indicate the direction of the current at every point in the liquid, these lines will be exactly similar to the lines of force of a magnet having the same shape and size as the cell. The number of stream lines per square centimeter will be a measure of the *current density*, just as the number of lines of force in a magnetic field gives the value of $\mathfrak{H}$ or $\mathfrak{B}$. If a good conductor is placed near by, the currents will flow through it in preference to the water, on account of its greater *conductivity*, and the stream lines will be deflected. Similarly a piece of soft iron in a magnetic field will converge lines of force toward itself on account of its greater permeability, as shown under Electricity. A coil of wire carrying a current tends to produce lines of force, just as an electromotive force tends to develop a current. A coil may therefore be said to produce a *magnetomotive force.* The electromotive force in a circuit is equal to the sum of all the differences of electrical potential. The magnetomotive force in a magnetic circuit should therefore be equal to the sum of all the differences of magnetic potential, so that the magnetomotive force of a coil must be equal to $\frac{4\pi SI}{10}$. In a magnet circuit the total induction is equal to magnetomotive force divided by the reluctance, or magnetic resistance. This law for the magnetic circuit is analogous to Ohm's law for the electric circuit.

Law of the Magnetic Circuit.—Prof. Rowland first expressed this law in its mathematical form. The analogy to Ohm's law is obvious. The first member is the analogue of electric current—i. e. the magnetic flux or induction. The second member is the magnetomotive force divided by the *reluctance* or magnetic resistance, and corresponds to electromotive force divided by Ohm's resistance. The *specific*

magnetic resistance (sometimes called reluctivity) of each portion of the circuit is $\frac{1}{\mu}$; when multiplied by the length and divided by the sectional area, this gives the magnetic resistance for each particular portion. The total magnetic resistance, first called *reluctance* by O. Heaviside, is found by summing up these partial resistances; that is, $\mathfrak{B} = \Sigma \frac{l}{A\mu}$. In words the law is: Magnetic flux equals magnetomotive force divided by reluctance, or $\mathcal{N} = \frac{M.M.F.}{\mathfrak{B}}$. The Greek letter ρ is used to denote the specific magnetic resistance $\frac{1}{\mu}$. The word *permeance* or *magnetic conductance* is sometimes used to denote the reciprocal of reluctance. The American Institute of Electrical Engineers (1894) has adopted the following magnetic units: The *gilbert* for the C. G. S. unit of magnetomotive force, the same being produced by 0·7958 ampère-turn approximately; the *weber* for the C. G. S. unit of magnetic flux, sometimes described as the C. G. S. line of flux; the *oersted* for the C. G. S. unit of reluctance; the *gauss* for the C. G. S. unit of flux density, or one weber per square centimeter. Although the laws of the electric and the magnetic circuit are similar in many respects, it must not be supposed that the analogues hold throughout. It requires no energy to maintain the magnetic flow when once established; there is therefore no analogy to Joule's law for the energy which is continually dissipated in heat during the flow of current. There is a difference, too, between electric resistance and magnetic resistance or reluctance, inasmuch as the former is approximately constant for ordinary ranges of current, while the value of the reluctance of a magnetic current depends upon the value of the magnetic flux.

If two paths are open for lines of force they will divide just as an electric current would do between two wires. In a circuit made up of masses of iron of different dimensions and qualities, the total magnetic resistance, *for the particular induction used*, may be computed by summing up the separate resistances, just as in the case of an electric circuit.

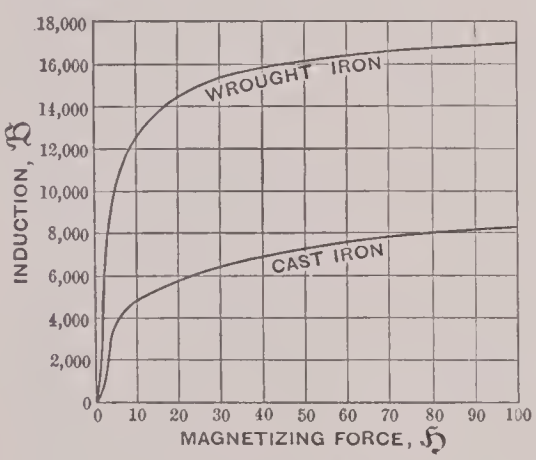


FIG. 1.—Curves of magnetization.

The Magnetic Properties of Iron.—(For complete treatment see Ewing, *Magnetism of Iron.*) The magnetic properties of iron are best shown by curves of magnetization which show the relation between the magnetic induction and the magnetizing force. Such curves for cast and wrought iron are shown in Fig. 1, from experimental data obtained by Hopkinson and given in the accompanying table:

Wrought iron.			Cast iron.		
$\mathfrak{B}$	μ	$\mathfrak{H}$	$\mathfrak{B}$	μ	$\mathfrak{H}$
5,000	2,500	2·0	4,000	800	5·0
9,000	2,250	4·0	5,000	500	10·0
10,000	2,000	5·0	6,000	279	21·5
11,000	1,692	6·5	7,000	133	42·0
12,000	1,412	8·5	8,000	100	80·0
14,000	823	17·0	9,000	71	127·0
16,000	308	52·0	10,000	53	188·0
2,000	30	666·0	11,000	37	292·0

For any point on one of the curves the abscissa represents the value of the magnetizing force $\mathfrak{H}$ in C. G. S. units, and the ordinate the corresponding value of the induction $\mathfrak{B}$. If a line be drawn from a point on the curve to the origin, the tangent of the angle which this line makes with the horizontal is a measure of the permeability; that is, the ratio of $\mathfrak{B}$ to $\mathfrak{H}$. In the case of wrought iron, we see from the curve that as $\mathfrak{H}$ increases from 0 to 1 C. G. S. units, the induction increases in about the same ratio, the permeability being comparatively small and nearly constant. As $\mathfrak{H}$ becomes still greater, $\mathfrak{B}$ is found to increase more rapidly, and the permeability increases suddenly to a very high value. This continues until $\mathfrak{H}$ has reached the value of about 15, after which the permeability begins to diminish, and any further increase of $\mathfrak{H}$ produces only a comparatively small increase of $\mathfrak{B}$. When this condition of affairs is reached, the iron is said to be *saturated*. Up to the present time no experimenter has succeeded in producing absolute saturation, although the induction has been carried to over 40,000 with the permeability between 1 and 2. There are theoretical reasons for believing that a limit exists to the intensity of magnetization which can be reached. The induction can always be increased with the increase of $\mathfrak{H}$, for $\mathfrak{B} = \mathfrak{H} + 4\pi\mathfrak{J}$. If, after a piece of iron has been magnetized, the magnetizing force is gradually reduced again to zero, and the corresponding change in $\mathfrak{B}$ observed, we obtain what is known as the *descending curve of magnetization*. It is found that the value of $\mathfrak{B}$ corresponding to a given value of $\mathfrak{H}$ is always greater when the magnetization is decreasing than when it is increasing—i. e. the descending curve lies above the ascending. The amount of magnetization remaining in a piece of iron after the magnetizing force is removed is called the *residual magnetism*. Its amount in the case of any given sample of iron is found to depend not only on the quality of the iron, but on the shape of the specimen. A short bar, for example, on account of the demagnetizing influence of its induced poles, will show very little residual magnetization; while a ring of iron, even though quite soft, will remain strongly magnetized for a long time after the magnetizing force has been withdrawn. Since, in the latter case, the magnetic circuit is closed, there are no poles to exert a demagnetizing influence. Fig. 2 shows the behavior of a ring of soft iron when carried through a complete cycle of magnetization; i. e. $\mathfrak{H}$ is first carried to a maximum in the positive direction, then reduced to zero and carried to an equal negative value, and finally brought again to zero. After this process has been repeated several times the curve will be found to repeat itself. The residual magnetism of the specimen is shown by the line OM or OM′. The value of $\mathfrak{H}$ which is required to destroy this residual magnetism is called the *coercive force*, and is given in the figure by ON or ON′. The residual magnetism of soft iron is very high (from 70 to 90 per cent. of the total induction), but on account of its small coercive force a short bar of iron will retain scarcely any magnetization after the magnetizing force is removed. Cast iron and steel show considerably less residual magnetism than soft iron when in the form of rings (40 to 60 per cent.); but when in the form of bars, their high coercive force enables them to retain more residual magnetism than iron. For small magnetizing forces (less than 1 C. G. S.) the permeability of soft iron is very small, e. g. about 150 in one case. The residual magnetism in such cases is also a very small fraction of the total induction. The residual magnetism for a wrought-iron ring is shown in Fig. 3. The magnetic properties of a metal may also be shown by curves which show the value of the permeability for different values of the magnetizing force or the magnetic induction. In

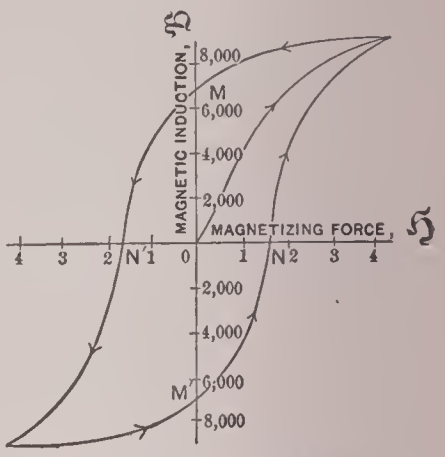


FIG. 2.—Cyclic curve of magnetization.

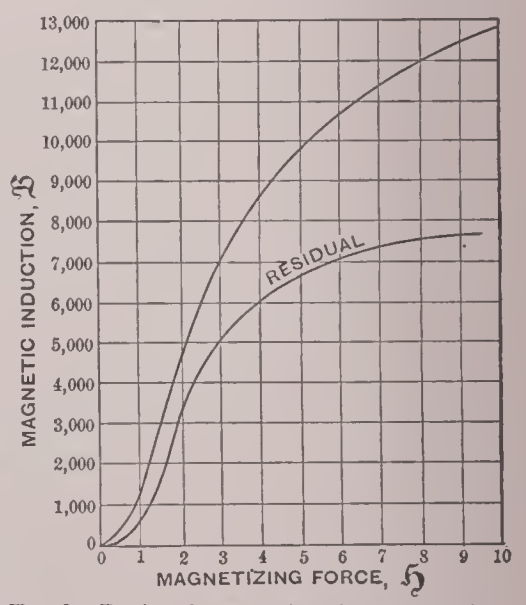


FIG. 3.—Residual magnetism in wrought-iron ring.

Fig. 4 a curve (Rowland) is given showing the permeability of a ring of Norway iron for different values of the induction. The specific magnetic resistance (the reciprocal of μ) may likewise be plotted as a function of $\mathfrak{B}$ or $\mathfrak{H}$. Curves are sometimes used showing the relation between the intensity of magnetization $\mathfrak{I}$ and the magnetizing force, but these differ but little from those showing the relation between $\mathfrak{B}$ and $\mathfrak{H}$. The curves here given are typical, but the results will, for different specimens of iron, vary through more or less range according to the chemical composition and process of manufacture.

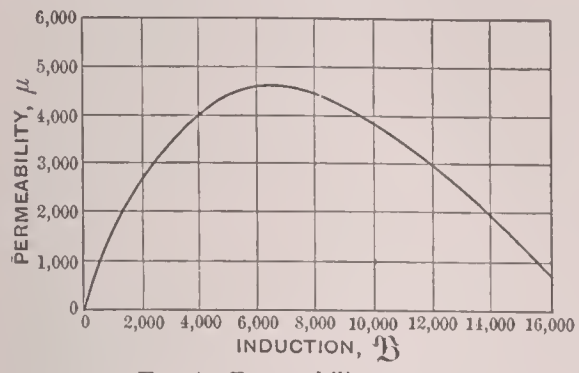


Fig. 4.—Permeability curve.

Hysteresis Loss.—When a current flows in a circuit, energy is stored up in the magnetic field. When the current ceases to flow, all this energy is restored to the circuit if there is no neighboring magnetic material; but if the field is in part set up through iron or other magnetic substance, some of the energy is dissipated in hysteresis, increasing the molecular energy of the iron, and only part is restored to the circuit. For any cyclic change in the magnetization of iron, the curve showing the relation between the intensity of magnetization and the magnetizing force forms a loop, the area of which, namely, $\int \mathfrak{H} d\mathfrak{I}$, is a measure in ergs of the energy dissipated per cycle per cubic centimeter. If the curve is drawn so as to show the relation between $\mathfrak{B}$ and $\mathfrak{H}$, as in Fig. 2, then the energy dissipated per cycle is $\frac{1}{4\pi}\int \mathfrak{H} d\mathfrak{B}$. The persistence of the magnetic state due to hysteresis causes the rate of change of magnetization to be slow immediately after a reversal of the magnetizing force. This is shown by the nearly horizontal direction of the curve after reversal; at this time $\frac{d\mathfrak{B}}{d\mathfrak{H}}$ may be less than 200, whereas it is often over 14,000 at the steepest portion of the curve. After a loop is formed (Fig. 5) by the removal and reapplication of the magnetizing force, when the magnetizing force is increased up to its old value, the magnetization usually has a higher value than before. A loop higher than the first is found by a second removal and reapplication of the force; the process becomes cyclic after several repetitions. Evidently, on account of hysteresis, $\mathfrak{B}$ and $\mathfrak{I}$ are not simple functions of $\mathfrak{H}$. For one value of $\mathfrak{H}$ we may have any value of $\mathfrak{B}$ and $\mathfrak{I}$ within the hysteresis loop. Moreover, the gradient at any point is not fixed. When iron is perfectly demagnetized the direction of the curve, i. e. its initial permeability, depends upon the direction by which it was brought to zero. In Fig. 6 compare the solid curve A′ B′ O C′, in which B′ O C′ is reversed at zero, and A B O C, in which B O C is continuous through zero. The greater permeability, indicated by the slope O C being greater than that of O C′, shows a greater readiness of the curve to pass continuously through zero. This *prejudice* of the iron can not be known without a knowledge of its previous history. It may be removed by demagnetization by reversals. Steinmetz has experimentally investigated the subject of hysteresis loss, and has formulated the following experimental law: The hysteresis loss per cubic centimeter per cycle $= \eta\left(\frac{\mathfrak{B}_1 - \mathfrak{B}_2}{2}\right)^{1.6}$, where η is a constant coefficient dependent upon the material, and $\mathfrak{B}_1$ and $\mathfrak{B}_2$ are the limits of magnetization. For soft iron η is ·002 approximately. With the value $\eta = ·002$ above, the energy lost per cubic centimeter per cycle for $\mathfrak{B} = 16{,}000$ is 10,657 ergs $= \frac{1}{4\pi}\int \mathfrak{H} d\mathfrak{B} = \int \mathfrak{H} d\mathfrak{I}$. The rate of expenditure of energy depends upon the rapidity of reversal. Let n = complete reversals per second; then watts $= \frac{\text{ergs per sec}}{10^7} = \frac{n}{10^7}\int \mathfrak{H} d\mathfrak{I}$. If $n = 100$ reversals per second, and $\int \mathfrak{H} d\mathfrak{I} = 10{,}000$ ergs per cubic centimeter per reversal, the expenditure of energy is ·1 watt for each centimeter of volume, or 13 watts per kilogramme, or 59 watts per pound. These figures apply to good soft iron taken through the complete range of magnetization 100 times per second. In exceptionally good specimens the loss is below these figures, and in some cases is half as much again. The losses in cast iron magnetized to saturation are three or four times as much. The losses for nickel and cobalt are between wrought and cast iron. Steel losses vary from those given above to five or six times as much. Hopkinson found loss twenty times as much in an exceptional piece of oil-hardened steel containing carbon, tungsten, and manganese. These last data are for high magnetization reversals. *The amount of energy stored in a field* at any time is shown by the area $\int \mathfrak{H} d\mathfrak{B}$, included between the $\mathfrak{B}$-axis and the curve of magnetization, as shown by the shaded area in Fig. 7. $W = \frac{1}{4\pi}\int \mathfrak{B} d\mathfrak{H}$ per cubic centimeter.

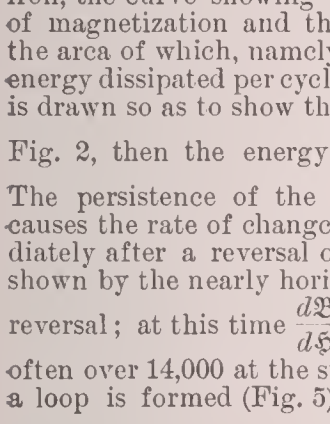


Fig. 5.—Effect of removal and reapplication of magnetizing force.

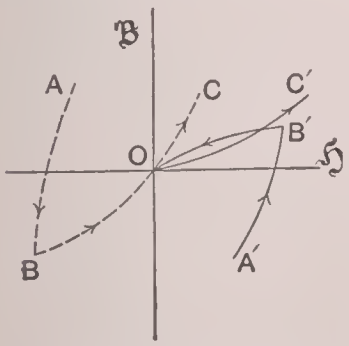


Fig. 6.—Effect of previous history upon curve of magnetization.

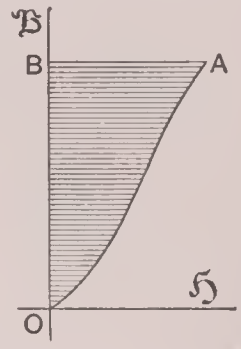


Fig. 7.—Energy of magnetization.

Foucault Currents.—If a mass of conducting material be moved in a magnetic field currents will, in general, be induced by the movement in it. These currents are called *foucault* or *eddy currents*, and always give rise to a waste of energy. Since the electromotive force induced by the motion is proportional to the speed, and since the eddy currents are proportional to the electromotive force, the heat developed must vary as the square of the speed, other things being equal. The loss of energy due to foucault currents is also proportional to the conductivity of the moving material. Eddy currents are developed in stationary masses by any change in the number of lines through them. The lamination of armature-cores, transformer cores, etc., is in order to prevent as far as possible the development of eddy currents and the consequent loss of energy. Steinmetz formulates an empirical law for the losses due to "eddy" or "foucault" currents induced in the iron by a reversal of magnetization: thus *eddy current* loss per cubic centimeter per cycle $= \epsilon n\left(\frac{\mathfrak{B}_1 - \mathfrak{B}_2}{2}\right)^2$, where ϵ is a constant dependent upon the material (about 75×10^{-6} for well-laminated soft iron), n is the frequency of complete reversal, and $\mathfrak{B}_1$, $\mathfrak{B}_2$ the limits of magnetization as before. The losses caused by the reversal of the magnetization of iron are of importance in connection with the construction of armatures for dynamos and motors. In these the magnetization is reversed for every revolution of the armature. Foucault currents and hysteresis are undesirable for two reasons: First, on account of the rise of temperature caused thereby; and second, on account of the energy dissipated and the consequent decrease in efficiency. Foucault currents may be reduced by lamination, but not so hysteresis, which can only be reduced by improving the quality of the iron. These losses due to reversal of magnetization become important in the case of alternating current apparatus in which the magnetization is reversed for every alternation, thus passing through a cycle perhaps in the one-hundredth of a second.

Effects of Physical Change upon Magnetic Substances.—Temperature changes have a marked effect which is different for different degrees of magnetization. Above a certain critical temperature iron is non-magnetic. At this point marked molecular changes take place, and the values of many of the physical constants change abruptly. In cooling, a generation of heat takes place as this critical point is passed, and for a short time the temperature remains steady or rises slightly and the iron becomes a brighter red, although it is all the time radiating heat. This phenomenon is called *recalescence*. Under a weak magnetizing force the permeability increases at first gradually, with the temperature, then suddenly, until the temperature 775° is reached, when

it quickly drops to zero at 785°. Beyond this point it is non-magnetic. This is shown in Fig. 8, curve I., for $\mathfrak{H} = 0{\cdot}3$.

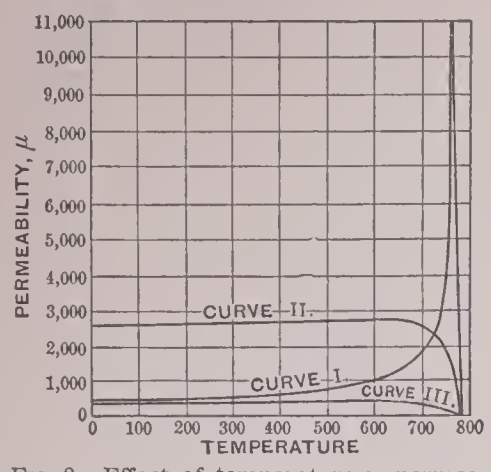


Fig. 8.—Effect of temperature on permeability.

For strong magnetizing forces the permeability changes but little with the temperature, but finally falls off to zero at 785°. In curves II. and III. in Fig. 8 is shown the variation in permeability for magnetizing forces of 4, and 45 C. G. S. units, respectively. Stress produces change in magnetic qualities, these effects being more marked in the case of hardened than annealed iron. A moderate pull increases the permeability when magnetization is weak, but decreases it when strong. A strong pull always decreases the permeability. After stretching the permeability is less. Pressure decreases permeability. Vibration diminishes all residual actions, and facilitates the rearrangement of the molecules so that the body is more free to assume a new state; thus there is little difference in the ascending and descending curves of magnetization. This effect is greater in soft than in hard iron. It is very great when the magnetizing force is small, but is scarcely noticeable in strong fields. Although an appreciable time is taken in changing the magnetization of a piece of iron, the *time-lag* is small, and is of little practical importance. Such effect is shown by the curves in Fig. 9 for the magnetizing force of $\mathfrak{H} = {\cdot}081$ and ·035.

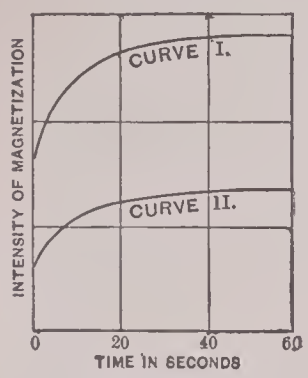


Fig. 9.—Increase of magnetization with time.

Experimental Determination of Curves of Magnetization.—The ways of determining the magnetic properties of a piece of iron are many and various, some being valuable for their accuracy and others for their convenience. They consist in determining, either directly or indirectly, the amount of magnetization produced by a certain magnetizing force. Pieces of various shapes are used in the different methods, and more or less error from the demagnetizing effects of the ends may be introduced. To avoid these errors we may employ (1) an endless piece, as a ring, with uniform section and winding; (2) a rod with ends far removed (for instance, with the length equal to 400 times its diameter), in which the effects of the ends are negligible; or (3) a long ellipsoid in which correction can be made for the demagnetizing effect. Ellipsoids are hard to shape and so are scarcely practicable, but when they are used they should be quite long, inasmuch as slight irregularities produce large errors in the case of short ones. The correction for a long rod is practically the same as for an ellipsoid.

Magnetometric Methods.—These methods are among the oldest, being due to Müller, but are now little used. A magnetized bar or an ellipsoid is placed near the magnetometer-needle, from the deflection of which the intensity of magnetization may be calculated. In these methods the forces due to the magnetized bar deflect the needle against the directive force of the earth's field, which must therefore be known for absolute measurement.

Balance Methods.—In these methods the magnetometer-needle is acted upon by an unknown force due to the piece of iron being tested, and also by a known force from a compensating magnet. These are usually adjusted differentially so as to give no deflection. In this class may be placed Hughes's magnetic balance, Eickemeyer's differential magnetometer, etc.

Edison's Magnetic Bridge.—A magnetic bridge similar to the Wheatstone bridge for measuring resistance has been devised by Edison for determining the magnetic properties of iron. The ends of the bridge are subjected to a difference of magnetic potential. The four arms are of iron and are adjusted until a magnetometer-needle across the middle of the bridge shows no deflection, and indicates no difference of magnetic potential.

Tractive Methods.—Various devices of divided rings and divided bars have been used by which the tractive force can be measured and the value of $\mathfrak{B}$ obtained. They are not capable of a high degree of precision, but are convenient for ready calculation. S. P. Thompson has devised an instrument, which he terms a permeameter, based upon this principle.

Ewing's Magnetic Curve Tracer.—Prof. Ewing has devised an automatic instrument for determining the relation between $\mathfrak{B}$ and $\mathfrak{H}$. The instrument is shown in Fig. 10, and consists of a mirror which may be given a vertical and a horizontal movement, shown by a spot of light on a screen. The horizontal movement is made to depend upon the magnetizing current of the test-piece, and is therefore a measure of $\mathfrak{H}$. The magnetization $\mathfrak{B}$ is shown by the vertical motion which is obtained by a wire carrying a constant current, which is drawn into a slit in the magnetic circuit as the induction increases.

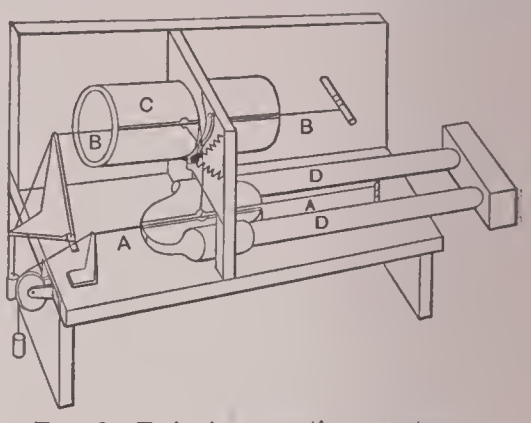


Fig. 10.—Ewing's magnetic curve tracer.

Ballistic Method.—This method is due to Weber, and is the one in most general use. The induction in the test-piece is made to vary through any cycle desired by a series of "steps," each change being produced by a sudden variation in the magnetizing current. The instantaneous current induced in a "secondary" coil surrounding the test-piece is then measured by means of a *ballistic galvanometer*, and is proportional to the change in N that produced it. The test-piece may be in the form of a long rod, but more commonly the magnetic current is completely closed and the sample is in the form of a ring. Now, if the rush of current takes place almost instantaneously (as will be the case unless the specimen is without lamination, and so large that the change in N is retarded by eddy currents), the throw of the ballistic galvanometer (for small deflections) will be proportional to Q. $\mathfrak{H}$ can be computed from the strength of the magnetizing current; $\mathfrak{B}$ can of course be obtained from N, if the cross-section is known. To reduce the specimen to a non-magnetic condition, before beginning the test it should be annealed; or, if this is not convenient, it may be *demagnetized* by *reversals*. The latter process consists in sending an alternating current through the magnetizing coil, beginning with a rather large value and gradually reducing it to zero by introducing resistance. The same result may be accomplished by using a continuous current, which is reversed by hand and at the same time gradually reduced in intensity. The maximum current should be greater than any current that has previously been used to magnetize the specimen. Unless the iron is quite hard, this treatment will reduce it to a neutral condition.

In determining hysteresis loops, the iron should be carried through several complete cycles before beginning the observations, in order to make sure that the curve will repeat itself. Preliminary demagnetization is unnecessary. For ordinary "ascending curves" of magnetization, however, it is very important that the specimen should originally be in a neutral condition, otherwise the curves obtained will be distorted and useless. Care must be taken in using the method of "steps" to make the changes of current continuous. While going up the curve, for example, the current should not be diminished or broken, even for an instant. The resistance-box by which the current is varied must be constructed with this point in view. A modification of the ballistic method is sometimes used, in which N is determined from the throw of the needle that is obtained when the magnetizing current is suddenly reversed. In this case the throw is proportional to $2N$. In the case of hard iron there is some danger of this method leading to incorrect results, but with soft specimens it is often more convenient than the "step" method. Hopkinson has devised an apparatus consisting of a divided bar and a yoke; the induction is measured by separating the two parts of the

bar and allowing the test-coil to be drawn suddenly away by means of a spring.

Theory of Magnetism.—Inasmuch as the phenomena of magnetization are manifested chiefly upon the surface, it is natural that one of the earliest theories should be that in which magnetism is considered as being caused by two fluids of opposite polarity distributed upon the polar surface. As in the theories of electricity, it was supposed that these fluids were equal in amount, and in an unmagnetized bar combined and annuled each other. In accordance with this fluid theory, magnetization consisted in the separation of the positive and negative magnetisms to the two poles. Such a theory is now abandoned, although commonly used to explain certain phenomena as forming a convenient mathematical conception in the solution of certain problems. It is now well known that the magnetic state is continuous throughout the whole magnet, for the smallest pieces into which a magnet may be broken will exhibit magnetic polarity. We may suppose, therefore, that if we subdivide the magnet into separate molecules, each will itself be a magnet with a north and south pole. The question then presents itself, of what does the process of magnetization consist? Poisson explains the process as consisting of the magnetization of each molecule separately; the molecules are fixed in position, and become magnets only when the bar is magnetized. According to Weber, each molecule is always a magnet, whether the bar as a whole is magnetized or not; in an unmagnetized bar, these have no regularity of arrangement, and therefore exhibit no resultant polarity. The application of a magnetizing force rotates these molecular magnets until their axes are more or less parallel. In the interior of the magnet the molecules are so arranged that each north pole is adjacent to the south pole of a neighboring molecule. This theory of Weber, or a modification of it, is the one now commonly accepted. As to the cause of the polarity of each separate molecule, we can reach no definite conclusion. Ampère, one of the earliest experimenters in electro-magnetism, conceived the idea that circular currents are continually flowing in each molecule. When the molecules are brought into an orderly arrangement by the application of a magnetizing force, the currents in any two adjacent molecules in the interior of the magnet will be in opposite directions, and will therefore neutralize each other. The currents on the outside of the magnetized bar will, however, be unneutralized, and the magnetization is seen to be the same in effect as a current of electricity flowing around the bar as a whole. Any theory of magnetization to be adequate must explain the observed phenomena, including saturation, residual magnetism, hysteresis, etc. Inasmuch as the application of a small magnetizing force does not immediately magnetize the bar to saturation, it is evident that the molecules are moved against some constraining force. Weber supposed the existence of some directive force by which the molecules were constrained to remain in the positions they originally occupied in the unmagnetized bar. Maxwell extended Weber's hypothesis by assuming that the deflected molecules acquire a permanent set, thus accounting for the phenomenon of hysteresis. Some have explained the resistance to molecular movement as being the resistance due to friction; but if this were so we would not expect any magnetization to result from small magnetizing forces, and we would expect that after a bar had been once magnetized the molecules would remain in their deflected position even after the removal of the magnetizing force.

Ewing's Theory.—Ewing explains the phenomenon of magnetization by means of the molecular magnets of Weber and Ampère, under the assumption of directive force due to their own mutual actions. By this hypothesis he explains the known facts and interprets the curve of magnetization

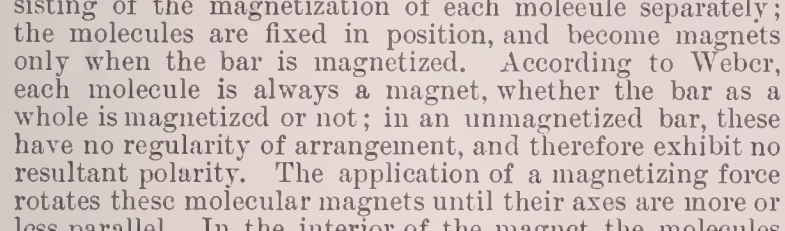


FIG. 11.—Stages of magnetization.

in a satisfactory manner. By this theory the molecules in an unmagnetized bar would be in a state of equilibrium, as far as their mutual attractions and repulsions are concerned, as is illustrated in Fig. 11(*a*), where the simple case of a group of four molecules is represented. Suppose now that a small magnetizing force $\mathfrak{H}$ be applied, as represented in Fig. 11(*b*), the magnets will be slightly deflected from their initial position, but will still be in a state of equilibrium. As the magnetizing force increases, this deflection increases until a point is reached, whereupon the molecules fly around into such a position as that in Fig. 11(*c*). As the magnetizing force is further increased the elementary magnets would tend to turn into a direction parallel with it, but would be restrained by their own mutual actions. Saturation would only be attained when this condition of parallelism is reached. Of course, in an actual magnet the grouping would be much more complex than the simple one here described. Certain groups of molecules would swing around from one state of equilibrium to another before other groups, according to their relative positions. This theory accords well with observed phenomena; for small magnetizing forces the magnetization is small, and there is scarcely any residual magnetism. This means that the molecules are turned but little from their initial position, and return to it when the magnetizing force is removed. This stage is one of equilibrium. The succeeding stage, for an increasing magnetizing force, is the one in which the several groups are swinging around into approximate parallelism with the magnetizing force, and is one of unstable equilibrium. The third stage begins after all the groups are more or less parallel with the magnetizing force, and here an increase in magnetizing force can increase the magnetization but little. When the magnetizing force is removed, many of the groups remain nearly in the position in which they were left, residual magnetism being thus accounted for. The ascending and descending curves of magnetization, therefore, do not coincide, that is, there is hysteresis. When a molecule is swung around from one position of stable equilibrium to another, it oscillates back and forth, and finally comes to rest when this motion has been damped by the eddy currents it set up. The energy lost by hysteresis is thus explained. The readiness with which a bar responds to a magnetizing force when tapped or vibrated is accounted for by the fact that the molecules are more free to move on account of the vibration. The increased permeability of a piece of iron when heated is due to the vibration of the molecules which the heat produces. As the heating is increased the vibration of each molecule increases, and finally becomes a rotation at that temperature at which the iron becomes non-magnetic. The *time-lag* in magnetization is explained by the fact that the molecular groupings are broken down by degrees, one molecule swinging around first, and then others in rapid succession. The theory of magnetism thus briefly outlined has been carefully worked out by Prof. Ewing. It is not necessary to explain the nature of the molecular magnets. Objection has been raised to Ampère's theory of circular currents; for, how are these currents maintained? They are not supplied with energy from any external source, and to maintain a flow of current against a resistance necessitates an expenditure of energy. To many this objection seemed fatal, but Lodge boldly explains it by saying that the resistance of a molecule is nil, and that it is no more preposterous to assign to a molecule an infinite conductivity than an infinite elasticity, as is universally done. We end, then, as we began, by recognizing the close correlation of magnetism and electricity. Our hypotheses explain not what electricity and magnetism actually are, but how they act and are manifested; that hypothesis is accepted as best which best accords with known facts, and any hypothesis must be considered simply as tentative, to be replaced by comprehensive theory, as we acquire increased ability to look into the secrets of nature.

FREDERICK BEDELL.

Magnetism, Terrestrial: In order that the development of the subject of terrestrial magnetism may be understood, since the time of the discovery of the directive influence of the earth on the compass-needle, it will be necessary to consider briefly the magnetic conditions surrounding a spherical magnet. It has been found that the earth may be treated as a great magnet, so far as its action upon a freely suspended needle is concerned. Take first an ideal sphere magnetized homogeneously throughout its substance, and the distribution of the magnetic forces will be as indicated in the diagram, which is the section of a magnetized sphere along its axis of polarization.

A polarized sphere may be treated as if it had one of its hemispheres, marked + in the figure, covered with positive

magnetic matter, and the other, marked —, covered with negative magnetic matter. The lines of magnetic force originate in the surface of the positive hemisphere, and proceed to the surface of the negative hemisphere along two sets of

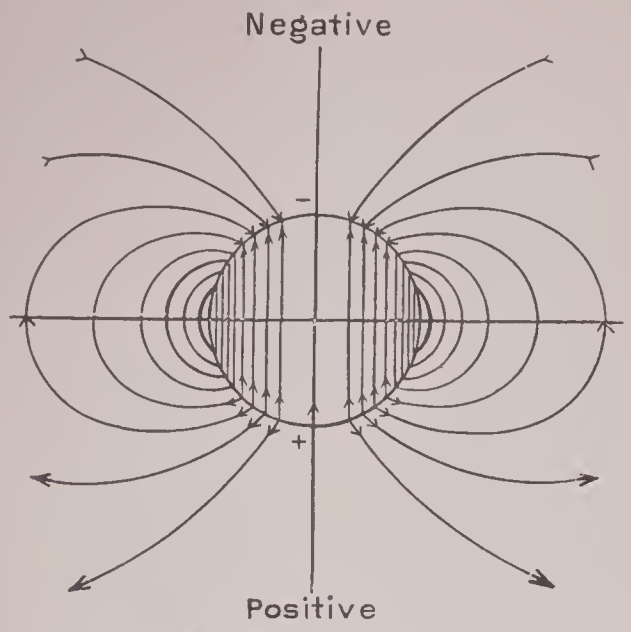


FIG. 1.—Section of a magnetized sphere along its axis of polarization.

paths, on the outside in wide sweeping curves, as indicated, and on the inside in straight lines parallel to the axis of magnetization.

If V_i represents the magnetic potential in the inside of the sphere, V on the surface, V_e in the space exterior to the sphere, (r,θ) the polar co-ordinates of any point, then

$V_i = \frac{4\pi}{3} Cr \cos\theta$ inside the sphere, $V = C \cos\theta$ on the surface of the sphere, $V_e = \frac{4\pi}{3} CR^3 \frac{\cos\theta}{r^2}$ outside the sphere, where C is a constant showing how strongly the sphere is magnetized, and R is the radius of the sphere. These satisfy the fundamental differential equation

$$\frac{dV_i}{dr} - \frac{dV_e}{dr} + 4\pi V = o.$$

The equation for the lines of force is

$$N = \frac{8\pi}{3}(\pi R^3 V_o)\frac{\sin^2\theta}{r};$$

and for the corresponding equipotential surfaces,

$$V = \frac{4\pi}{3}(R^3 V_o)\frac{\cos\theta}{r^2},$$

N representing the order of a line of force, and V_o the surface density of magnetic matter, on the axis at the surface of the sphere. Important derived formulas are, $\tan I = 2\cos\theta = 2\tan\phi$, where I is the angle with the tangent to the surface at which the line of force pierces it, called *the inclination*, ϕ the magnetic latitude, and θ the magnetic polar distance.

The tangential component of force, $F_t = \frac{4}{3}\pi.CR^3\frac{\sin\theta}{r^3}$.

The normal component of force, $F_n = \frac{8}{3}\pi.CR^3\frac{\cos\theta}{r^3}$.

The polar component of force $F_p = -\frac{4}{3}\pi.CR^3\frac{(1-3\cos^2\theta)}{r^3}$.

The equatorial component of force, $F_e = \frac{4}{3}\pi.CR^3\frac{3\sin\theta\cos\theta}{r^3}$.

The moment of the sphere, $M = \frac{4}{3}\pi Cr\cos\theta$.

The whole quantity of magnetism, $m = (2\pi R)^2 C$.

For the purposes of drawing a typical diagram these simple forms suffice, $V_i = r\cos\theta$, $V_e = \frac{\cos\theta}{r^2}$, as has been the case in Fig. 2 (given on page 469). This theoretical case is analogous to the magnetic condition of the earth. The southern hemisphere is positively magnetized, and the northern hemisphere is negatively magnetized, and hence the magnetism is called respectively austral magnetism in the southern and boreal magnetism in the northern. The property of a magnet, freely suspended in a magnetic field, is to take up a direction parallel to the lines of force of the field, and in such a position that the positive end of the magnet is nearest the region of negative potential, while the negative end of the magnet is nearest the region of positive potential of the field. Then starting at the surface of the earth in the southern hemisphere, the free magnet will point above the horizon, with which it will make an angle of negative inclination, called $-I$; on traveling along this line of force till it reaches its point of entrance at the surface of the northern hemisphere, the same needle would point downward, and make with the plane of the horizon an angle of positive inclination, $+I$. Thus the positive end of a free needle is called the north-seeking and the negative the south-seeking, because if disturbed from the direction of the line of force it will seek to resume the position just indicated.

There is another method of regarding this matter, related closely to the forces of repulsion involved. All the material in the universe seems to divide itself into two general classes, first, that in which the parts attract each other, in accordance with Newton's law of gravitation, $+\frac{mm'}{d^2} = f_a$; and second, that in which the parts repel each other, in accordance with the same law, $-\frac{mm'}{d^2} = f_r$, f_a and f_r representing the forces of attraction and repulsion, respectively. Electricity and magnetism include this latter case. Suppose an isolated positive pole (which it is impossible to produce in practice) were situated at any point of one of the lines of force indicated in the diagram, it would tend to travel along this line under the force of repulsion, just as an attractive particle of matter tends toward the center of gravitation. Thus it is proper to employ all the mathematics of the composition and the resolution of forces in the case of repulsion, just as in the case of attraction. Every line of force has a repulsion at each point peculiar to itself, and the equal repulsions may be marked out by equipotential surfaces. If we take a unit length of the line of force at the surface of the earth, in which the magnet lies, it may be considered as having a certain total intensity T, resolvable into two components, first, H, horizontal along the magnetic meridian, positive to the north continuously; and second, V, vertical along the normal, positive upward in the southern hemisphere, and positive downward in the northern hemisphere, as the preceding formulas indicate; or V may be best taken positive downward in the northern and negative upward in the southern hemisphere, to conform to the conventional values of the inclination I. There has been great diversity of use among magneticians regarding the choice of co-ordinates and absolute units of measurement, but it is believed that the system of co-ordinates here indicated is the most suitable. For systems of units there have been extensively used the following:

Foot-grain-second (F. G. S.), called the British units.

Millimeter-milligramme-second (M. M. S.), called the metric unit.

Centimeter-gramme-second (C. G. S.) unit.

There are also others which occur in Gauss and in German authors.

The following table gives the factors for transformation from one system to the other:

TABLE GIVING THE NUMERICAL FACTORS FOR PASSING FROM ONE SYSTEM OF UNITS TO ANOTHER.

SYSTEM OF UNITS.	Gauss.	Common use.	British.	Metric.	C. G. S.	Example.
Gauss.....	1·0	0·001	0·0075776	0·0034941	0·00034941	1357·0
Common use	1000·0	1·0	7·5776	3·4941	0·34941	1·357
British.....	131·97	0·13197	1·0	0·4611	0·04611	10·283
Metric.....	286·2	0·2862	2·1687	1·0	0·1	4·7414
C. G. S.....	2862·0	2·862	21·687	10·0	1·0	0·47414

It is agreed that the C. G. S. system shall be the one adopted in magnetic science for the future, and all values should be reduced to it. Modern observations are for the most part found in (F. G. S.) British, (M. M. S.) metric, and (C. G. S.) units, and hence the factors are 0·04611 for the (F. G. S.), and 0·1 for the (M. M. S.) systems. Great confusion exists in published magnetic observations by reason of the different systems of units, systems of time for observations, and systems of prineiple for the instruments. The latter will be explained in a later paragraph. Under time it is noted that some use: Local mean time; local mean time, astronomical reckoning; Göttingen mean time; local mean time, with correction to the nearest hour of even Göttingen time. The influence of Gauss and Weber was such that Göttingen received an undue prominence as the center from which magnetie times should be reckoned for the purpose of simultaneous observations, as in the stated intervals of the so-called "term days." It would be better to use Greenwich

WORLD, SHOWING THE LINES OF EQUAL MAGNETIC DECLINATION, EPOCH 1890

The figure near each line indicates, in degrees, the variation of the Magnetic needle from the true North, at the places situated on that line.

Lines of equal East Declination.
" " " West "
No Declination or Zero. — 0°

ARCTIC OCEAN
NORTH AMERICA
EUROPE
ASIA
Siberia
PACIFIC OCEAN
ATLANTIC OCEAN
INDIAN OCEAN
SOUTH AMERICA
AFRICA
AUSTRALIA
ANTARCTIC OCEAN

Longitude from Greenwich
Longitude from Washington

POSITION OF THE MAGNETIC POLES IN LATITUDE AND LONGITUDE.

EPOCH.	Method.	NORTH MAGNETIC POLE.			SOUTH MAGNETIC POLE.		
		Authority.	Latitude.	Longitude.	Authority.	Latitude.	Longitude.
1829.....	C.	Gauss.....			Gauss.....	−72° 35′ S.	−152° 30′ E.
1829.....	C.	Erman and Petersen....	+73° 21′	93° 56′ W.	Erman and Petersen....	−72° 40′ S.	−150° 45′ E.
1840-45.....	Obs.	Ross.....	+70° 7′	98° 39′ W.	Ross.....	−73° 50′ S.	−147° 0′ E.
	C.	Airy.....	.....	95° 0′ W.	Airy.....	.....	−152° 0′ E.
	C.	Lemstrom.....	+73° 35′	95° 39′ W.	Lemstrom.....	−72° 35′ S.	−152° 30′ E.
1890.....	C.	Newmayer.....	+70° 30′	92° 50′ W.			
1890.....	C.	Schott.....	+70° 0′	94° 30′ W.			

mean time for such purposes, because of its adoption in astronomical and civil reckoning, and because magnetic phenomena have certainly an astronomical side to them.

In the same way magnetic latitudes and longitudes were taken on a different system from the astronomical and geographical co-ordinates, but they should be restored to the common system. Gauss used u = north polar distance, λ east longitude, and r distance from the earth's center, X in the meridian north, Y perpendicular east, Z positive upward. Maxwell uses X to the north, Y to the west, Z upward; but, as already indicated, the best system is $H = T\cos I$, $V = T\sin I$, the convention being that I is positive in the northern and negative in the southern hemisphere. At the same time the convention for D (declination) is positive to the west and negative to the east, so that the azimuth rotation is N. W. S. E.

The magnetic poles of the earth do not coincide with the poles on the axis of revolution, and therefore a complication is introduced into the conditions by the simultaneous existence of these two polar systems. The positions of the magnetic poles are not very well determined at any epoch, though several attempts have been made to define them both by computation and by observation.

It will be seen that the location of the poles is derived almost exclusively from computation, and that they are not accurately known. The poles themselves are supposed to be changing along the surface of the earth, and it is therefore necessary to locate them carefully at some epoch in order to know the rate of such motion.

The combination of the two systems is shown in Fig. 2.

Let NAS represent the meridian on which a northern station, A, is located; NBS the meridian on which the station B is situated, such that the same wide sweeping line of force, BOA, passes through each: If D is the declination, positive west; if I is the inclination, positive below horizon; if T is the total intensity, positive along the line of force; if H is the horizontal component, positive northward; and if V is the vertical component, positive downward, the relative positions at the two stations are illustrated on the diagram by the arrow-lines.

In order to show the type of changes through which these elements pass in different parts of the earth, a table compiled for the most important observatories, where more or less continuous observations have been made, given for the epoch of the mean observations, is added.

Such observations with portable instruments have been made in widely extended regions of the earth as permit the construction of charts, showing by means of continuous curves the places where a given element has the same values. These curves of equal declination, and equal inclination, and of equal horizontal, equal vertical, and equal total forces, have been constructed by magneticians, notably by Gauss, Erman and Petersen, Airy, Schott, and Neumayer. Those for equal declinations are especially useful in navigation, and all the sailing charts furnished by hydrographic

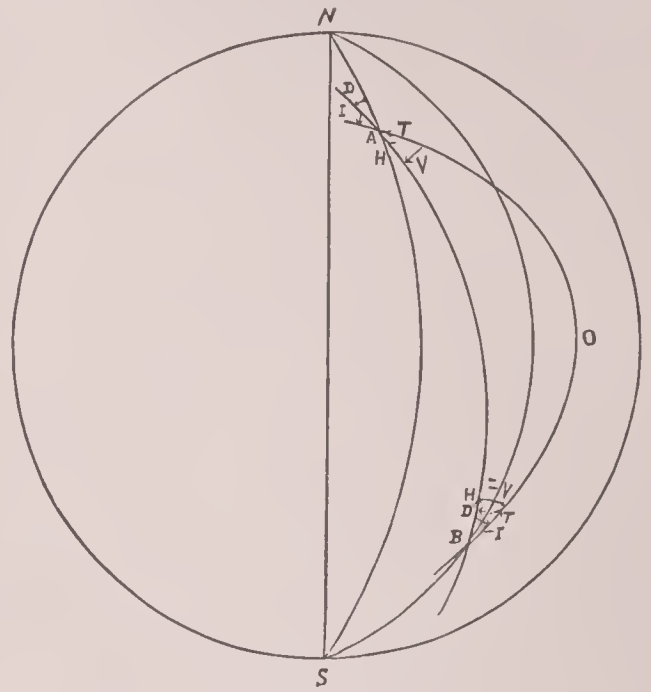


FIG. 2.

offices have the lines of equal declination marked upon them, so that the deviation of the compass direction, which is that of the horizontal component, may be allowed for in the navigation of vessels.

Neumayer's chart of equal declinations for the year 1890, which faces this page, will serve as a specimen.

The magnetic meridians form continuously varying angles

THE MAGNETIC ELEMENTS AT THIRTY IMPORTANT STATIONS, IN C. G. S. ABSOLUTE UNITS AND MINUTES OF ARC.

STATION.	Longitude.	Latitude.	Years.	Declination.	Inclination.	Horizontal force.	Vertical force.	Total force.
Fort Conger.....	4h. 18m. 55s. W.	+81° 44′ 0″	1882-83	100° 37′ W.	85° 1′	0·05155	0·59120	0·59340
Kingua Fjord.....	4h. 29m. 21s. W.	+66° 35′ 40″	1882-83	72° 12′ W.	83° 52′	0·06379	0·59321	0·59662
Fort Rae.....	7h. 42m. 55s. W.	+62° 38′ 52″	1882-83	40° 20′ E.	82° 55′	0·07669	0·61760	0·62234
Uglaamie.....	10h. 26m. 30s. W.	+71° 17′ 42″	1882-83	35° 37′ E.	81° 23′	0·08940	0·58980	0·59652
Cap Thordsen.....	−1h. 2m. 49s. E.	+78° 28′ 27″	1882-83	12° 49′ W.	80° 27′	0·08921	0·53006	0·53751
Jan Mayen.....	0h. 33m. 52s. W.	+70° 59′ 48″	1882-83	29° 53′ W.	79° 2′	0·09745	0·50294	0·51229
Bossekop.....	−1h. 35m. 59s. E.	+69° 57′ 29″	1882-83	4° 3′ W.	76° 32′	0·12087	0·50456	0·51885
Toronto.....	5h. 17m. 33s. W.	+43° 39′ 24″	1843-48	1° 29′ W.	75° 15′	0·16325	0·62000	0·64121
Sodankyla.....	−1h. 46m. 25s. E.	+67° 24′ 30″	1882-83	1° 20′ W.	74° 45′	0·13352	0·49095	0·50781
Makerstoun.....	0h. 10m. 4s. W.	+55° 34′ 45″	1845	25° 11′ W.	71° 15′	0·15603	0·45963	0·48540
Washington.....	5h. 8m. 12s. W.	+38° 53′ 39″	1890	4° 6′ W.	71° 5′	0·19860	0·57928	0·61238
Pawlowsk.....	−2h. 1m. 56s. E.	+59° 41′ 0″	1883	0° 42′ W.	70° 44′	0·16380	0·46858	0·49638
Dublin.....	0h. 25m. 4s. W.	+53° 21′ 0″	1842-43	27° 17′ W.	70° 41′	0·16182	0·46166	0·48919
Wilhelmshaven.....	−0h. 32m. 35s. E.	+53° 31′ 52″	1882-83	13° 54′ W.	68° 1′	0·17773	0·44030	0·47483
Greenwich.....	0h. 0m. 0s.	+51° 28′ 38″	1883	18° 15′ W.	67° 32′	0·18100	0·43762	0·47359
Parc St.-Maur..... ...	−0h. 9m. 23s. E.	+48° 48′ 34″	1889	15° 14′ W.	65° 13′	0·19522	0·42269	0·46559
Vienna.....	−1h. 5m. 28s. E.	+48° 14′ 0″	1884	9° 35′ W.	63° 24′	0·20554	0·41031	0·45885
Pola.....	−0h. 55m. 24s. E.	+44° 52′ 0″	1890	10° 14′ W.	60° 43′	0·21948	0·39127	0·44863
Los Angeles..... ...	+7h. 53m. 2s. W.	+34° 2′ 58″	1882-89	14° 28′ E.	59° 30′	0·27273	0·46300	0·53730
Tiflis	−2h. 39m. 10s. E.	+41° 43′ 8″	1883	0° 59′ E.	55° 35′	0·25742	0·37566	0·45560
Sikawei (Shanghai).....	−8h. 5m. 45s. E.	+31° 12′ 30″	1885	2° 9′ W.	46° 18′	0·32911	0·34435	0·47633
Bombay.....	−4h. 51m. 16s. E.	+18° 53′ 30″	1863	0° 34′ E.	19° 13′	0·37187	0·12967	0·38969
Madras.....	−5h. 20m. 59s. E.	+13° 4′ 8″	1851-55	1° 0′ E.	7° 38′	0·37383	0·05015	0·37718
St. Helena.....	0h. 22m. 42s. W.	−15° 56′ 41″ S.	1841-45	22° 46′ W.	−21° 37′	0·25710	−0·10188	0·27655
Batavia.....	−7h. 7m. 14s. E.	−6° 11′ 0″ S.	1888	1° 47′ E.	−28° 25′	0·37094	−0·20070	0·42175
Süd Georgien.....	2h. 24m. 0s. W.	−54° 51′ 0″ S.	1882-83	0° 15′ W.	−48° 53′	0·25668	−0·29405	0·39033
Cape Horn	4h. 41m. 41s. W.	−55° 31′ 24″ S.	1882-83	20° 11′ E.	−52° 55′	0·28536	−0·37760	0·47329
Cape Good Hope.....	−1h. 13m. 55s. E.	−33° 56′ 0″ S.	1841-46	29° 7′ W.	−53° 21′	0·20740	−0·27876	0 34745
Melbourne.....	−9h. 39m. 53s. E.	−37° 48′ 45″ S.	1858-63	8° 28′ E.	−67° 20′	0·23567	−0·56409	0·61134
Hobart Town.....	−9h. 49m. 50s. E.	−42° 52′ 30″ S.	1841-48	9° 47′ E.	−70° 36′	0·20700	−0·58790	0·62319

with the geographical meridians, as likewise the magnetic equator with the geographical equator. The maps from

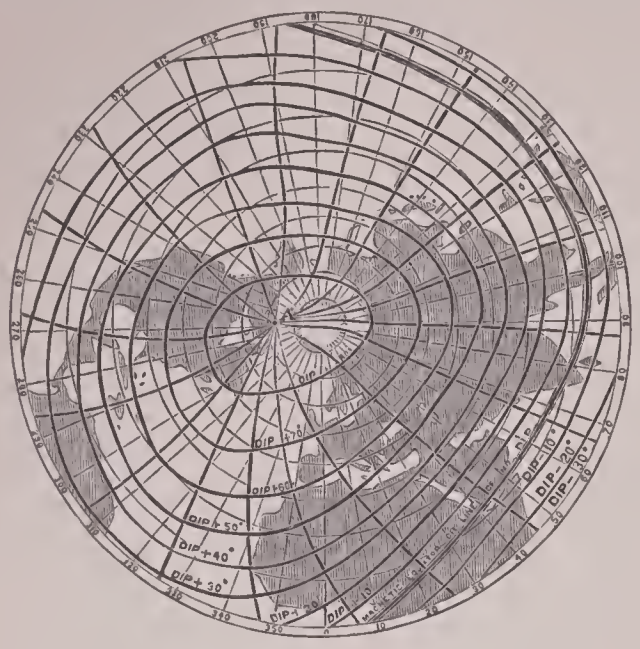


FIG. 3.—North magnetic pole.

Gauss for the year 1829 represent the magnetic meridians, and also the lines of equal inclination, or dip, as this angle is often called.

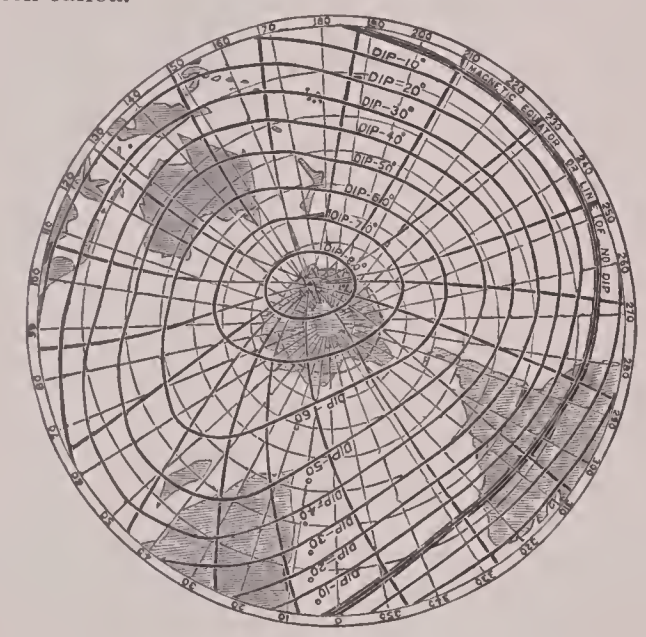


FIG. 4.—South magnetic pole.

The map by Airy exhibits the dip and the total intensity in a comparative way. Airy used the word blue to represent positive and red to represent negative magnetism.

The general magnetic distribution, as seen by the lines

FIG. 5.—Magnetic dip and intensity.

upon the charts, is a very complicated matter. The chief points in the phenomena may be briefly summarized:

1. The surface of the globe is divided into two hemispheres of easterly and westerly declination, the meridians of no declination being about 180° apart.

2. The declination increases with the latitude from the magnetic equator to the poles in latitude about 72° north and south.

3. There is a large area of small declination in the Asiatic continent called the Siberian area, and another in the Pacific Ocean near the equator called the Pacific area. These bear some relation to wide expanses of land and of ocean controlling the amount of the deflection.

4. The inclination is greater in the regions containing the magnetic poles than in regions of similar latitude on the opposite sides of the hemisphere.

5. The magnetic equator intersects the geographical equator in two nodes 180° apart, and has a maximum divergence of nearly 17° in latitude.

6. The tangent of the dip is double the tangent of the magnetic latitude within 20° of the equator.

7. The inclination has two maxima and two minima within the latitudes ± 17°, and but one maximum and one minimum outside of these limits.

8. The horizontal force diminishes in intensity from the equator to the poles, where it vanishes, while the needle loses all its directive energy at the same places.

9. In the northern hemisphere there are two unequal regions of increasing dip, and similarly in the southern hemisphere there are two unequal regions.

10. The inclination is greater in the regions embracing the magnetic and geographical poles than in the corresponding opposite symmetrical regions in each hemisphere.

11. The vertical intensity is less in the larger areas of small declination in high latitudes than in the opposite hemispherical regions.

12. The inclination and vertical intensity increase with the latitude from the magnetic equator to the poles.

13. The focus of greatest intensity in the northern hemisphere is in 52° 19′ N. lat., 92° W. lon.; the weaker focus in 59° 14′ N. lat., 118° E. lon. For the southern hemisphere the stronger focus is at 64° S. lat., 138° E. lon.; the weaker at about 64° S. lat. and 125° W. lon.

All the knowledge of the magnetic system of the earth has been obtained very slowly, and is the aggregate result of the activity of many able men. One of the most noted of these is the astronomer Halley (1656–1742), the author of an important theory, and of charts, showing the lines of equal declination (hence sometimes called the Halleyan lines). The charts, which were published in the year 1701, contained such lines at intervals of 5° through all points of the earth's surface. Other charts have been published by Mountain and Dobson for 1745 and 1756, by Hansteen for 1787, by Barlow for 1833, by Sabine for 1840, by Gauss for 1829, also revised by Erman and Petersen and by Neumayer for 1890. The lines of equal declination have little value compared with lines representing the true magnetic meridians, and in general it was a mistake to introduce them into the science, except possibly in the interest of navigation. Duperrey in 1836 and Airy in his treatise on magnetism published charts of magnetic meridians. The same authors included in their work other elements. Ross made a voyage of observation to the north and the south magnetic poles, and alone has attempted to determine the place of 90° inclination by the use of instruments.

Expeditions for determining the magnetic elements have played an important part in the progress of knowledge of the subject, viz., those of de Lamanon in 1785–87, Rossel in 1791–94, Humboldt 1798–1804, Lutke 1826–29, Hansteen, Due, Erman, 1827–29, Fitzroy 1831–36; the French expeditions 1835–38, and those of Ross 1840–43, Lefroy 1843–44, Elliot 1846–50. The two most important series of observations were carried on in fixed observatories established for a year or more, one set by the British colonial governments, under the supervision of Gen. Sabine, including stations at St. Helena Cape of Good Hope, Hobart, Toronto, and co-operating stations at Göttingen, Madras, Makerstoun, Bombay, etc., from 1840–50. In 1882–83 stations were simultaneously occupied in the extreme northern and southern latitudes, in accordance with the plan of the international polar commission, and at these stations the most accurate observations known to magnetic science were made. A table of the stations and of the governments under whose auspices they were established will be found on the following page.

TABLE OF STATIONS.

STATION.	Nation sending the expedition.	Observer's name.
Jan Mayen	Austria-Hungary	Wohlgemutte.
Godthaab	Denmark	Paulsen.
Lady Franklin Bay	U. S.	Greely.
Kingua Fjord	Germany	Geise.
Fort Rae	Great Britain and Canada	Dawson.
Point Barrow	U. S.	Ray.
Lena Mindg	Russia	Jurgens.
Dicksonhaven	Holland	Snellen.
Moller Bay	Russia	Andrejew.
Sodankyla	Finland	Briese.
Bossekop	Norway	Steen.
Spitzbergen	Sweden	Ekholm.
Süd Georgieu	Germany	Schrader.
Orange Bay	France	Courcelle-Seneuil.

There are also many finely equipped permanent observatories, about seventy-five in number, where extensive series of observations have been conducted, and about forty where continuous self-recording instruments are in use. A brief account of the magnetic instruments will be given, but a full description would involve an extended study of their many physical peculiarities.

Classifications of Magnetic Instruments.—Magnetic instruments are divided into two classes: I. for absolute measures; II. for differential measures. In the first, measurements are so conducted that by suitable computations the observed quantities can be reduced to the corresponding values of the elements in minutes of arc for declination and inclination, and to a system of absolute measures, as C. G. S., for the horizontal force, the vertical force, and the total force. In the second the variations of these angles and forces are recorded from time to time, so that by comparison of the observed values with the known absolute values for given instants the corresponding absolute values may be obtained also for intermediate intervals as required. The labor of obtaining the absolute measures is so great that in practice these are taken once a week in well-conducted observatories, and the values for the intermediate intervals are derived from the combination of the absolute and the differential measures.

TABLE OF TYPES OF INSTRUMENTS.

Elements.	I. Absolute measures.	II. Differential measures.
Declination.	Declinometer and theodolite. Declinometer and collimator. Azimuth compass.	Unifilar declinometer.
Inclination.	Dipping-needle circle. Earth-inductor (Weber).	
Horizontal force.	Sine unifilar magnetometer (Kew). Tangent unifilar magnetometer (Weber). Tangent compass and voltameter.	Bifilar suspension magnetometer. Unifilar deflection magnetometer (Lamont).
Vertical force.	Bifilar galvanometer. Balance magnetometer (Lloyd). $V = H \tan I$.	Lloyd's balance. Unifilar induction magnetometer (Lamont).
Total force.	$T = H \sec I$.	

There is great variety among these instruments both as to size of magnets and the parts. Also there are several forms of apparatus for field observations.

For a description of magnetic instruments, including a history of their development, reference is made to an article by Dr. Th. Edelmann, Munich, read before the Chicago meteorological congress, 1893, and published in *Bulletin No. 11*, part 2, of the U. S. Weather Bureau.

The Horizontal Force.—The determination of the intensity of the horizontal component of the earth's total force depends upon a double operation: (1) the determination of the time of vibration of the freely suspended magnet under the action of this component, and (2) the determination of the angle of deflection caused by a deflecting magnet against this same force. The formula may be given for vibrations:

$$T^2 = T_1^2 \left[1 + \frac{F}{Hm} - Q(t - t_o) + \frac{H\mu}{m}\right],$$

where T_1 is the true observed time of vibration, $\frac{F}{Hm}$, a correction for the effect of torsion, $Q(t-t_o)$, a correction for the effect of temperature, $\frac{H\mu}{m}$, a correction for the induction of the magnet.

$$T_1 = T_o \left[1 - \frac{s}{86400} - \frac{aa_1}{16}\right],$$

where T_o is the observed time of the vibration, $\frac{s}{86400}$, the correction for clock rate, $\frac{aa_1}{16}$, the correction for unequal arcs. Hence we have by theory $mH = \frac{\pi^2 I}{T^2}$, the moment of inertia being I.

For the deflections:

$$\frac{m}{H} = \left(1 - \frac{P}{r_o^2}\right) \left[1 + \frac{2\mu}{r^3} + Q(t - t_o)\right] \tfrac{1}{2} r^3 \sin u_o,$$

where r is the distance between the centers of the magnets, u the angle of deflection, $\left(1 - \frac{P}{r_o^2}\right)$, a term depending upon the distribution of magnetism, $\frac{2\mu}{r^3}$, a term depending upon the induction, $Q(t - t_o)$, a correction for temperature. Finally, $mH \div \frac{m}{H} = H^2$, by which the horizontal component is given. A good circumstantial account of the portable magnetometer is to be found in Stewart and Gee's *Practical Physics*, as of the dip circle and declinometer, pages 275–313, to which reference is made for a description of the accompanying figure.

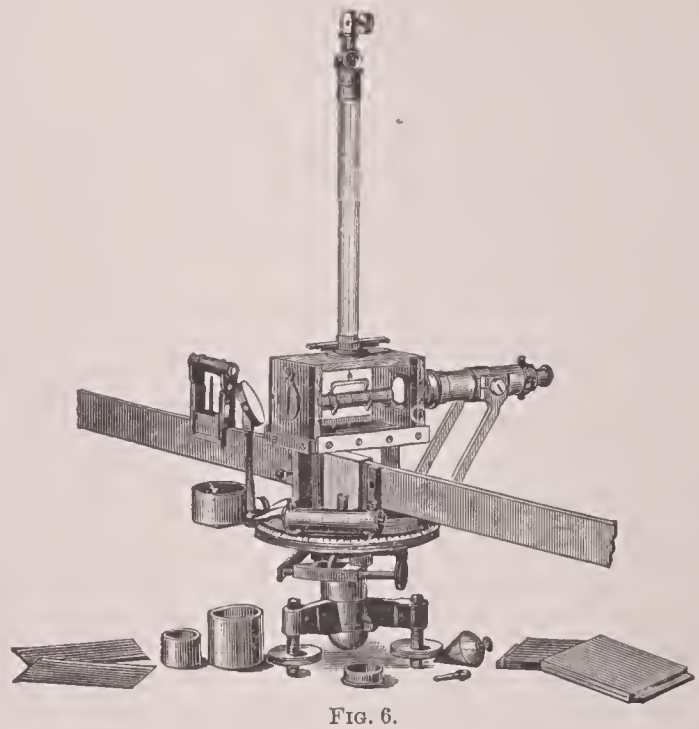


FIG. 6.

The Differential Apparatus.—There is one very important system that has been widely employed. It was introduced by Lamont into Germany, and depends upon the induction of soft iron in a varying magnetic field. If the force of the field changes, the attractive power of the magnet is assumed to vary in accordance with a law which gives a simple proportion to the relations of the field and the magnet. In spite of the great care expended upon this form of instrument, it has never given quite so satisfactory results as those which rely upon the simple mechanical forces of gravitation for their action. There are two reasons for this lack of precision: the first is that the mechanism and the magnetic action is more complicated, and therefore less reliable; and the second is that the doctrine of hysteresis shows that the induction of soft iron is not a simple function of the inducing force, but that it is a function depending upon the whole history of the molecular constitution of the particular piece of iron that is employed, and this is so complex as to be beyond our immediate knowledge. The other system of the apparatus for differential measures depends upon the bifilar suspension and the balanced horizontal needle. In the bifilar the magnet is suspended by two wires, which are twisted until the magnet hangs at right angles to the meridian, and is in equilibrium between the horizontal force and the torsional force of gravity. The balance is simply a magnet set on an agate edge, and weighted at one end, so that the action between it and the vertical component produces equilibrium. It is not quite sensitive enough to be as useful an instrument as

the declination or the bifilar magnets, but on the whole it is better than any induetion apparatus. For differential measures the majority of observatories use a unifilar suspension for deelination, a bifilar suspension for horizontal foree, a balanee for vertieal force, while a number employ, either alone or in eombination with the preeeding, a unifilar for deelination, a unifilar with deflectors for horizontal force, a unifilar with soft-iron inductors for vertical force.

The self-registering apparatus is of the Kew pattern, in which all the photographic rolls are inclosed in a single dark box, the three components having a separate cylinder for each, or of the Mascart pattern, where all the three traees are made upon the same sheet of paper. Wild has introduced certain improvements in registration. Upon these traees are recorded all the minute fluctuations through which the terrestrial field is continually passing.

Variations of the Magnetic Elements at the same Station.—It has been seen that the distribution of magnetism is of an asymmetric kind, and does not follow any mathematical law representing a homogeneous mass. This is no doubt due to the mixed nature of the material inside the earth, and it is in eonsequence a difficult subjeet to investigate. There are also large superfieial changes going on all the time, which it is one of the ehief objects of the scienee to elueidate. Before attempting to describe a law to aecount for these changes, it will be neeessary to pass some of them in review.

The Physical Cause of Magnetic Variations of the Terrestrial Field.—Through the long period of time during whieh the observations of the magnetic elements have been carried on, the causes that produce the periodic variations have eluded analysis. Many hypotheses have been advanced for their explanation, some aseribing them to changes originating inside the earth, others to changes in the atmosphere, and others to the direet magnetic action of the other bodies of the solar system. Probably the favorite hypotheses are those whieh associate the changes with the action of heating effects of the solar radiation, producing electrical currents through frietion and other physieal conditions.

It will not be necessary to explain these suppositions fully, because it is well known that they are wholly inadequate to the purpose for which they have been invented. In view of the laek of knowledge on this important subject, the writer has succeeded in placing the facts in such connection as to point very clearly to a definite solution, one which is in harmony with the best results of modern physics. The experimental and mathematieal researches of Faraday and Maxwell upon the nature of electro-magnetic energy in various conductors and dielectrics, combined with the later researches of Hertz and the wonderful development of the theory and praetice of alternating currents and oscillating electrieal discharges, render it almost certain that the solar radiations are themselves electro-magnetic forms of energy. They originate in the sun, by the oscillations of electric charges upon condensers of atomic dimensions, thereby producing variations of thousands of millions per seeond, and elosely associated with many physical phenomena observed in the solar corona, the solar spectrum, and other well-known phenomena. These vibrations, partly eleetrostatic and partly electro-dynamic, thus also being electro-magnetic, are propagated across the ether spaces with the velocity of light. Upon contact with the denser medium of the earth's atmosphere they undergo many peculiar transformations, which it is the province of meteorology to elucidate and which must be omitted here. These same electro-magnetic radiations, in one portion of their transformation, appear to behave to the earth as if it were a polarized magnetic body, and they assume in its neighborhood those peculiar curves and that complicated distribution, which is imperfectly understood, whenever a rotating spherical magnet is placed at varying angles of its axis of polarization to the direction of the magnetic field. Much of this subject remains as yet undeveloped on its analytical side, but it seems to be of great interest. From the unpublished material in the writer's possession, by permission of the U. S. Weather Bureau, which has the investigation in charge, some preliminary statement of the evidenee can be made. This is of a very complex character, and it is difficult to convey a just view of it in a short notice, and without the auxiliary apparatus that exhibits the phenomena at one view. It was found necessary to construct a model whieh should exhibit this magnetic system as it surrounds the earth all the time, beeause the eontinual variations of the directions made it impossible for the mind to construct a pieture from the study of the computations by themselves. What is here presented rests upon the best magnetic observations, whieh extend over fifty years. All the testimony is taken together, so that we do not introduee any theory into the statement. Our argument is simply to eall attention to the harmony existing between the model thus built up and the known mathematieal relations developed from wholly different sources. The conelusion is that the solar radiation field is magnetic, and that its lines of force pass through the earth in the proper curves, beeause the earth is a better transmitting medium for such rays than the surrounding space dieleetric. A simple law, which is sometimes called magnetic refraction, is at the basis of the phenomena. As rays of light are transmitted through a glass sphere in peculiar curves, so the magnetic rays are carried into the earth and through it in characteristic curves.

Treatment of the Observations.—The residual values of the elements H, D, V, as given in the reports of the thirty observatories whose mean elements have already been compiled for this article, taken month by month, are treated in the following way: These values, ΔH, ΔD, ΔV, are reduced as components of a deflecting force aeting on the normal force at the station, and their resultant determined in polar coordinates, $dx = \Delta H$, $dy = H \tan \Delta D$, $dz = \Delta V$, dx, dy, dz, being taken consistently, after all neeessary reductions, in units of the fifth decimal place of a dyne, C. G. S. units. Then $dS = \sqrt{dx^2 + dy^2 + dz^2}$, $\alpha = \frac{dz}{\sqrt{dx^2 + dy^2}}$, $\beta = \frac{dy}{dx}$, where S = the total deflecting force, α its angle with the plane of the horizon at the station, β its angle in azimuth, counted from the magnetic meridian. Now, instead of rotating the ball representing the earth about its axis in the presence of the sun, the magnetic system is supposed to rotate about the surface of the earth, so that when a station reaches a given hour-angle the deflecting force (S, α, β) will have its special value as given by the observations. It would be possible thus to construct a model for each month, but the mean of the twelve months was taken so as to produce a mean annual result. This is as if the sun were on the equator all the year, and the magnetic axis were perpendicular to the plane of the ecliptic. It will be seen upon consideration that the magnetic defleeting system acts instantaneously over all the surfaee of the earth, that each station takes up that part of it peculiar to its place and registers that by itself. Henee differences of longitude and differences of the years of the observations do not need to be regarded, which simplifies the problem, because it is not necessary to reduce observations to an epoeh, as in other physical functions depending upon the time. The observations therefore may include all available data that have ever been taken, though it is to be limited to those whieh have the twenty-four hourly readings, and stations may be considered as moved to the same meridian. Instead of constructing by order of geographical latitude, it is clearly proper to take magnetic inclinations, calculating the magnetic latitude corresponding to any inclination.

The Model.—The following description contains a statement of the main features of the instantaneous magnetic distribution as displayed by the model. The drawing (Fig. 7), however, contains some of the essential features. The two circles represent the magnetic equator, and the two magnetic hemispheres are orthographically projeeted upon that plane. The sun is on the meridian N. S., and an observer at any point, local hour-angle, will see the sun in its astronomical position.

The field is divided into two portions, the first containing the forces which enter the surface of the earth at suitable angles; the seeond eomprising those forces which emerge from the surface of the earth. The darker parts represent the entering forces, and the lighter parts the emerging forces. In the northern hemisphere these forces enter the dark side of the earth and emerge on the light side; in the southern hemisphere they enter on the light side and emerge on the dark side. Henee generally all the forces in the northern hemisphere are directed toward the sun, and all the forces in the southern hemisphere away from the sun; but the northern hemisphere is a negatively magnetized region, and the southern hemisphere a positively magnetized region, and therefore the northern hemisphere is pulled toward the sun and the southern is pushed away from the sun. In a word, the earth is acted upon by a magnetic couple, and the field is such that the magnetic potential diminishes in the direction from the sun outward past the earth. A magnet with-

in a magnetic field is acted upon by a couple; its positive pole is driven and its negative pole is drawn in the direction of the lines of force passing through them. The axis of the magnet tends to coincide as nearly as possible with a line of

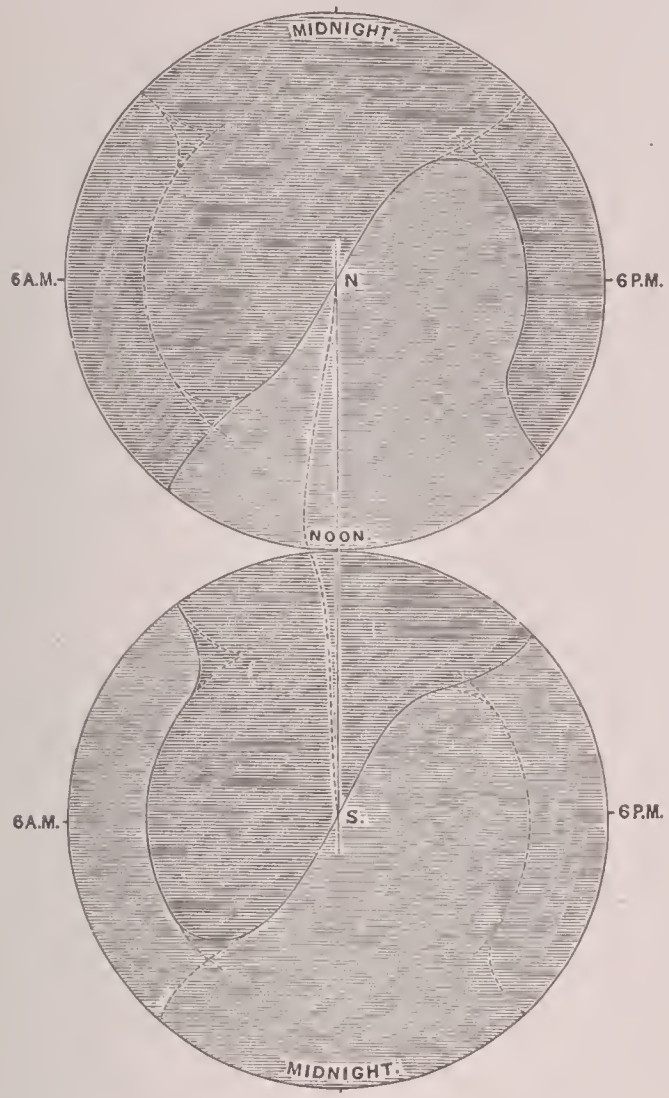


FIG. 7.

force passing through its center. We can hardly resist the conclusion that the radiations from the sun have the property, among others, of acting like magnetic lines of force, and that the earth is pulled by this force continuously. This magnetic force does not affect the solar constant of gravitation, because it acts only as a couple; it does not tend to alter the earth's angular velocity of rotation because the forces are distributed symmetrically about a plane passing through the center of the earth. This couple does, however, tend to draw the axis of rotation toward the plane of the ecliptic, being a force similar to that which produces precession of the equinoxes and nutation of the poles. It is also pointed out that it is of the right physical type to produce a change of latitude in the stations on the earth. It will be necessary here to state that these forces range in dynes per gramme from 0·00120 to 0·00005 C. G. S., and that they will average about 0·00050 if integrated over the surface of the earth. The attraction of the sun at the distance of the earth is, in the same units of absolute measure, 0·58940 C. G. S. Now, in the case of disturbances of the magnetic field it is known that the deflecting forces will increase from 0·00020 to at least 0·00200 at Washington, that is, tenfold. Hence we may say very roughly that the force 0·00050 may become 0·00500, or about one-thousandth of the sun's total attractive force. This is a fair estimate of the change in the forces of the couple.

The argument for the magnetic action of the sun's rays is greatly strengthened by another phenomenon which is present in certain critical places of the field.

If θ is the angle that the ray makes with the normal outside the surface, and ω the angle with the normal inside the surface, then the index of refraction is $\mu = \dfrac{\tan \omega}{\tan \theta}$.

The lines at which the rays enter and emerge immediately, or, as it may be said, are tangential, occur along the unbroken line separating the red and blue regions. At N. and S. the forces are nearly perpendicular to the surface; following the heavy lines on either side of the poles, these angles become more and more inclined, till near the equator there is a region of conflict or uncertain directions where the two sets of forces from opposite hemispheres change places.

The normal magnetic field of the earth has also been shown to be subject to a system of periodic variations that have been first studied by the author. On combining the residuals obtained by subtracting the monthly from the daily means, in the horizontal, declination, and vertical components, the vectors that represent these disturbing forces are found to pass through periodic fluctuations represented by the following curve, in a period of 26·68 days, with epoch June 12·22, 1887, Greenwich mean time.

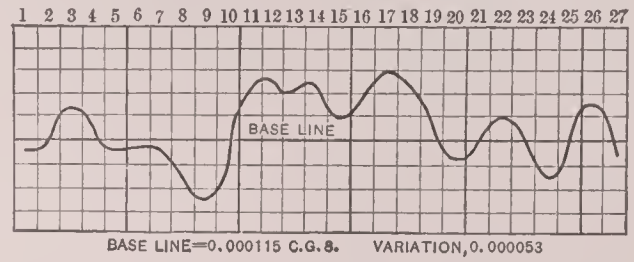


FIG. 8.—Variations of the solar polar magnetic field in the 26·68 day period.

This result depends upon the European observations, 1878–89, seven stations, reduced by a least square computation. The force is derived from the solar magnetic field, having its seat in the nucleus of the sun, emerging poleward and sweeping over through space till it approaches the earth at right angles to the ecliptic. It is concentrated chiefly in the ovals surrounding the magnetic and geographical poles, since the earth's axis of magnetic conductivity points in that direction. At the sun the lines of this field become in part visible in the coronal streamers about the poles. From the coronal observations and the study of this field at the earth it is concluded that the sun is a magnetic sphere, the magnetic poles being separated from the axis of rotation by $4\frac{1}{2}°$, the southern (negative) preceding the northern (positive) by about 100°. The true time of solar rotation is not that of the sun-spot belts at latitudes 10°–13° N. and S., but that derived from the sun-spot observations for the equator, being 13·4936° daily motion instead of 14·1844° (Carrington), the former corresponding to 26·68 days and the latter to 27·275 days in a synodic revolution.

At the earth this field manifests the changes taking place in it by outbursts of the aurora, by magnetic storms, by earth currents, and in variations in the meteorological elements of temperature, pressure, humidity, atmospheric electricity. These synchronous changes are much distorted by the convectional circulation of the atmosphere. On reducing the several elements by means of the ephemeris derived from this period, the typical change is found to survive in high and low pressures of the U. S. and the North Atlantic, U. S. and European weather curves, temperatures, atmospheric electricity, and relative humidity. The effect of convection is nearly eliminated by using for data the temperatures of the Northwestern States, and thereby taking sufficient data the original magnetic curve is found quite perfectly. This arises from the transformation of the impressed polar radiant energy into heat in the atmosphere of that region. It is

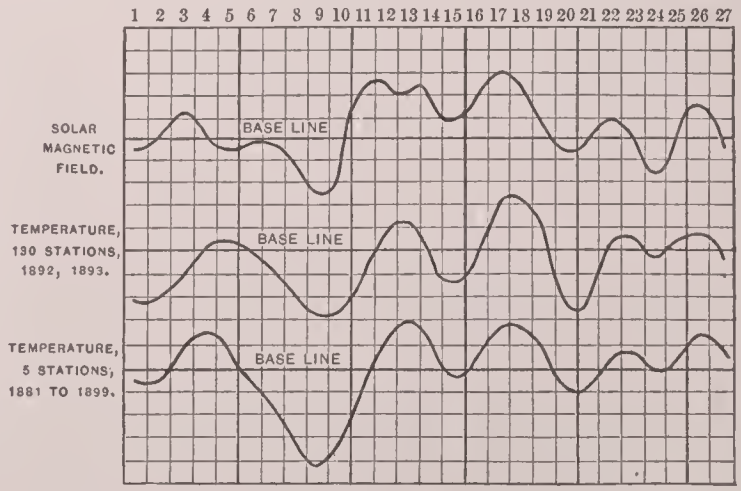


FIG. 9.—Variations of solar magnetic field and temperature changes in the U. S.

found that in some periods the curve of temperature agrees with the magnetic curve in its *direct* position and in others in the *inverse* position, that is, when turned over on its longer

axis. This points to an action of magnetic inversion, or polarization, not yet understood. The result of such comparison is seen in the following curves. The direct and the inverse periods are collected by themselves, and the direct *minus* the inverse gives the data for the temperature curves. All temperatures of the U. S. are arranged so as to eliminate the eastward drift of the waves, and are referred to an origin in lon. 115° W. and lat. 55° N.

Similar comparisons are extended to a sun-spot period within the years 1878–93, and the result shows that there is a distinct synchronous variation in the sun-spot numbers, the intensity of the European magnetic field, the movement in latitude of the mean tracks of low and high pressures in the U. S., the motion in longitude of lows and highs, the amplitudes of the temperatures, and the mean annual temperatures; also that the changes related as direct and inverse follow in the same sun-spots period, the direct varying with and the inverse varying inversely, as shown in Fig. 10.

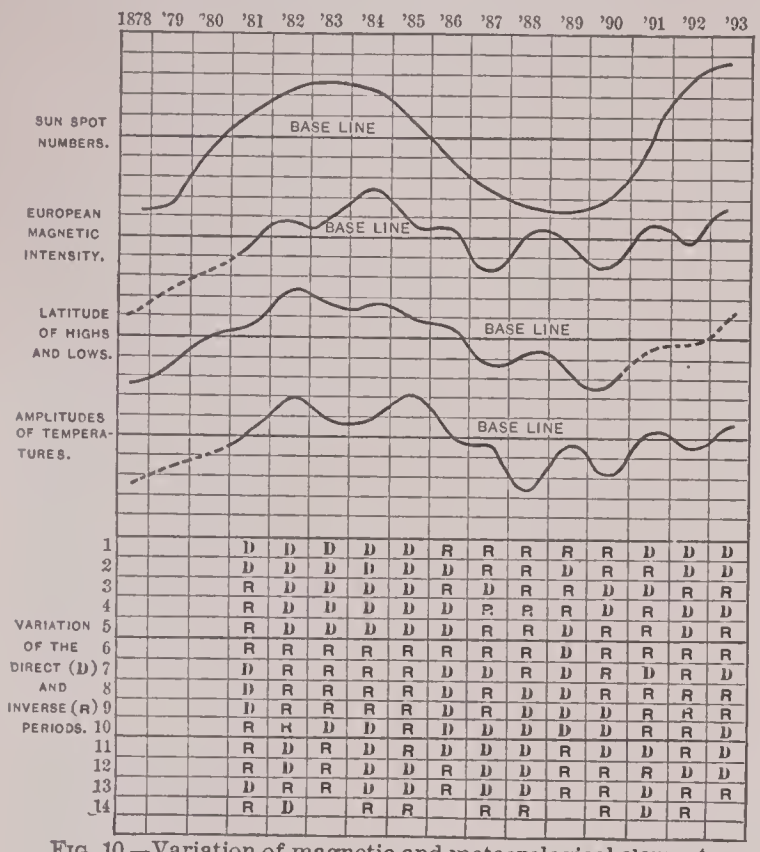


FIG. 10.—Variation of magnetic and meteorological elements in a sun-spot period.

It is inferred from the results of the computation, upon which these remarkable sets of curves depend, that two types of radiation traverse the space between the sun and the earth: (1) the electro-magnetic, or visible ray, falling upon the equatorial regions of the earth; (2) the magnetic, or invisible ray, falling upon the polar regions of the earth. The polar field is clearly the seat of that hitherto unknown system of forces which are displayed in the aurora, magnetic storms, earth currents, variations of the magnetic field, and some of the meteorological changes that make up the weather. Its full extension can not yet be seen, but evidently the cosmical conditions of the problem includes in its scope the nature of the sun that emits this magnetic energy, of the ether that transmits it in curved paths through such enormous distances, and the transformations in the atmosphere or at the surface of the earth. FRANK H. BIGELOW.

Magnif'icat [named from the first word in the Latin version *Magnificat anima mea, Dominum*, My soul magnifies the Lord]: the song of the Virgin Mary, as recorded in Luke i. 46–55. This song of praise by the Virgin Mother in thankfulness for the Incarnation, and uttered while yet she was the tabernacle of the Sun of Righteousness, must have formed a part of the worship of the Church from early times. It is first found prescribed about the year 506, when in France it was ordered to be sung at lauds. In the Eastern and Armenian Churches it is still a lauds canticle. In the West it has during the last 800 years been sung only at vespers. A prominent place is given to this hymn in the vesper and other services of the Roman Catholic Church and the Church of England. It was omitted from the evening service of the Protestant Episcopal Church in the U. S. at the revision of 1789, but it forms a part of the prescribed evensong in the Standard of 1892. Revised by W. S. PERRY.

Magnin, maăn'yăn', CHARLES: critic and poet; b. in Paris, Nov. 4, 1793; was appointed assistant at the National Library in 1813, and one of the directors in 1832. As early as 1815 he began to make himself known by his verses. In 1826 he produced a successful comedy, *Racine, ou la troisième représentation des "Plaideurs."* As contributor to the *Globe*, with Guizot, to the *National*, with Armand Carrel, and afterward to the *Revue des Deux Mondes*, he acquired great reputation as a spirited and acute critic, especially of dramatic poetry and art. A number of his articles he collected under the title *Causeries et Méditations historiques et littéraires* (2 vols., 1843). He also wrote *Les Origines du Théâtre moderne* (1838); *Le Théâtre de Hrosvitha* (1845), with translation and commentaries; and *Histoire des Marionnettes* (1852). D. in Paris, Oct. 8, 1862. See Wallon, *Notice sur la vie et les travaux de Charles Magnin* (Paris, 1875). Revised by A. R. MARSH.

Magnitnde [from Lat. *magnitu'do*, greatness, size, deriv. of *mag'nus*, great]: anything that can be measured. Originally the term was applied to signify a portion of space possessing the three attributes, length, breadth, and thickness; by extension of meaning it has come to signify any quantity that can be expressed in terms of a quantity of the same kind taken as a unit. Lines, surfaces, and volumes are called geometrical magnitudes. An angle is also a species of geometrical magnitude. Time, weight, and numbers are arithmetical magnitudes. See QUANTITY.

Magnolia: See MAGNOLIA FAMILY.

Magnolia: town; capital of Columbia co., Ark. (for location of county, see map of Arkansas, ref. 6–B); on the St. Louis S. W. Railway; 40 miles S. W. of Camden. It is in a region abounding in good water, fine timber, and valuable grasses, and though level and fruitful has been developed but little. The town has saw and grist mills, two weekly newspapers, and churches and public schools. Pop. (1880) 536; (1890) 1,486; (1900) 1,614. EDITOR OF "COLUMBIA BANNER."

Magnolia Family: a small group of dicotyledonous trees and shrubs (the *Magnoliaceæ*), numbering about eighty-five species, natives of America, tropical Asia, Australia, and New Zealand. They have simple, alternate leaves, and flowers usually composed of many separate sepals, petals, stamens, and pistils. They are therefore to be considered as among the lowest of the dicotyledons. Of the thirteen genera now recognized, four are represented in the U. S. by eleven species, viz.: *Liriodendron*, 1; *Magnolia*, 7; *Illicium*, 2; *Schizandra*, 1. Of the first there is but one species, *L. tulipifera*, the tulip-tree of the Eastern U. S., one of the most stately, as well as useful, of forest-trees. A variety of this species is found in China. The magnolias are remarkable for their fine foliage and large, beautiful flowers.

CHARLES E. BESSEY.

Magnus, HEINRICH GUSTAV: physician; b. in Berlin, May 2, 1802; studied natural science at the university of his native city, and chemistry under Berzelius in Stockholm, where he discovered the compound known as the green salt of Magnus; was appointed Professor of Physics and Technology at the University of Berlin in 1834. D. in Berlin, Apr. 5, 1870. The result of his numerous original researches he communicated in Poggendorff's *Annalen* and in the transactions of the Berlin Academy of Science. The most remarkable were his experiments on the coefficient of the dilatation of gases, published in 1841, a few days after Regnault's publication of the same results; and his experiments on the transmission of heat through gases, which gave rise to a controversy with Tyndall.

Magnus, HUGO FRIEDRICH, M. D.: ophthalmologist; b. at Neumarkt, Prussia, May 31, 1842; educated at the University of Breslau; has been Professor of Ophthalmology in the University of Breslau since 1876; is author of *Ophthalmoskopischer Atlas* (1872); *Geschichte des grauen Staares* (1876); *Die Geschichtliche Entwickelung des Farbensinnes* (1877; Fr. and Span. trans.); *Die Blindheit, ihre Entstehung und ihre Verhütung* (1883); *Die Sprache der Augen* (1885; Ital. trans.); *Die Erziehung des Farbensinnes* (1879; Eng. trans. Boston, 1882); *Augenärztliche Unterrichtstafeln* (1892); and numerous professional essays.

Mag'nusen, FINN: Icelandic antiquarian; b. at Skalholt, in Iceland, Aug. 27, 1781; studied at the University of Copenhagen; began to practice as a lawyer in Iceland in 1803, but returned in 1812 to Copenhagen; was appointed Professor of Northern Antiquities in 1815, and keeper of the archives in 1842. His principal works are a translation of

the older *Edda*, with accompanying commentaries (4 vols., 1821–23), a critical exposition of the Scandinavian mythology (4 vols., 1824–26), and *Priscæ Veterum Borealium Mythologiæ Lexicon* (1828); but besides these works he wrote a great number of minor essays relating to Icelandic literature, Scandinavian mythology, and Northern antiquities, remarkable as well for learning as for critical acuteness. D. at Copenhagen, Dec. 24, 1847. Revised by P. GROTH.

Magnússon, ARNI: historian and collector; b. in the western part of Iceland 1663; was educated at Hvamm by his uncle, Ketil the Priest, who was famous for his learning in Icelandic lore and as a copyist of old Icelandic manuscripts. In 1683 Magnússon went to Copenhagen and received employment first as secretary to Bartholinus, afterward in the royal archives. In 1701 he was made Professor of Philosophy and Northern Antiquity at the university, and in the following year he accompanied the royal commission of survey to Iceland, where he remained, with some interruptions, until 1712. During his ten years' stay in Iceland he made a unique collection of Icelandic manuscripts, which he bequeathed, together with his whole fortune, to the university library. A catalogue of the collection is in course of preparation by its custodian, Dr. Kr. Kålund (1894). In the fire of 1728 a large portion of the collection, including Magnússon's notes, copies, etc., was destroyed. He was the author of several works on Scandinavian history. D. Jan. 6, 1730. Revised by D. K. DODGE.

Magog: See GOG AND MAGOG.

Magog: river, lake, and town of Southern Quebec, near the borders of Vermont (see map of Quebec, ref. 6–C). The river drains Lake Memphremagog, traverses Lake Magog (10 miles long by 3 or 4 broad), and at Sherbrooke, after a course of 20 miles, empties into the St. Francis, a tributary of the St. Lawrence. It contains a considerable volume of water, and its fall affords large water-power to the towns of Magog and Sherbrooke. The town of Magog is on the river near where it leaves Lake Memphremagog, County Stanstead, 19 miles S. W. of Sherbrooke, on the Canadian Pacific Railway. Pop. 2,100, about half being French-Canadians.
MARK W. HARRINGTON.

Magot: See BARBARY APE.

Magpie [*Mag*, nickname of *Marguerite* + *pie*, magpie, from Lat. *pi'ca*, magpie, jay]: a name for the birds of the genus *Pica*, members of the crow family, the European magpie (*Pica pica*) being the most common species. It is of a lustrous black with green and bronze reflections, white on the belly, shoulders, and inner webs of many primaries. The bird is 15 to 20 inches long according to the length of the tail, which may be a foot or less in length. The magpie is social and omnivorous, wary and mischievous. It occurs throughout Europe and Northern Asia, and a local race (*Pica pica hudsonica*) is found in parts of Northern North America. The name magpie is sometimes applied to the long-tailed jays of the genera *Urocissa* and *Cyanopolius*.
F. A. LUCAS.

Magruder, JOHN BANKHEAD: soldier; b. in Virginia about 1810; graduated at West Point 1830; assigned to the infantry as second lieutenant July 1, 1830; transferred to the artillery Aug., 1831; first lieutenant Mar., 1836, and captain June 18, 1846. He was distinguished in the Mexican war in command of the light battery of Gen. Pillow's division, earning the brevet of major for gallantry at Cerro Gordo, and lieutenant-colonel for Chapultepec, where he was wounded; resigned from the U. S. army Apr. 20, 1861; entered the Confederate army; commanded at Yorktown until its evacuation; took part in the campaign on the Chickahominy; was appointed brigadier and major-general, and sent Oct. 16, 1862, to assume command of the western department, including Texas, Arizona, and New Mexico. He recovered Galveston from the Federal forces, and took an active part in military affairs in Texas throughout the war. He afterward resided for a time in Mexico, but soon returned to Texas. D. at Houston, Tex., Feb. 19, 1871.
Revised by JAMES MERCUR.

Maguire, JOHN FRANCIS: editor and politician; b. at Cork, Ireland, in 1815; was called to the bar in 1843; was a member of Parliament from 1852 until his death; was proprietor and editor of the Cork *Examiner*, a Roman Catholic organ, and was a leading exponent of Irish Roman Catholic interests in Parliament, in journalism, and in literature. He wrote *Rome and its Ruler* (1857), revised, enlarged, and republished in 1870, under the title *The Pontificate of Pius IX.*; *The Industrial Movement in Ireland* (1853); *The Irish in America* (1858); *Life of Father Mathew* (1863); and *The Next Generation* (1871), a political novel. Mr. Maguire was an advanced Liberal politician, an advocate of Home Rule, and was four times elected mayor of Cork. He stimulated the growth of flax in the south of Ireland by establishing linen-mills in Cork. D. at Cork, Oct. 31, 1872.

Magyars, mă̆a-jaars': the dominant people of Hungary, especially on the plain. Probably they are a Turkish people, though with decided Ugro-Finnish characteristics. They formerly occupied the steppes of Southern Russia, but in the ninth century were forced over the Carpathians into the vast plain of the Danube, driving before them the Slavs who had previously occupied it. They became the terror of Europe, but later were Christianized and became the bulwark of Europe against the Ottoman Turks. They number about 6,000,000. M. W. H.

Mahâ-bhârata: the name of the great epic of the ancient literature of India. The Aryan tribes of the Vedas lived about the middle Indus and its Punjaub affluents. Later they migrated southeastward and established themselves on the upper course of the Jumna and Ganges, in Madhyadeça, The Mid-land. Foremost among these tribes were the Bhâratas, the Kurus, and the Panchâlas. Indeed, so famous became the eponym of the first of these that ancient India was called after it Bhârata's Continent, or *Bhâratavarsha*. In this Gangetic Mid-land were fought the battles of the Bhâratas; and here, to ever-ready listeners, in school or forest hermitage, at a sacrifice or a funeral, were told the tales of these battles and their heroes. The Hindus were lovers of stories, even in early times, and Patanjali says "they will listen to them all night through, until sunrise." Stories (*itihâsas*) in mingled prose and verse were common in Vedic times, as is indicated by the fact that the metrical parts of some of them are still extant, as the "*itihāsa* hymns" of the Veda. The priests told stories and gave out riddles to each other to beguile the tedium of their sacrifices; and no less at the festivals of the chieftains or tribal kings were the tales of bygone times in order. These tales were probably first circulated in prose, until some more clever teller put them into simple and easily remembered metrical form. Such a teller was often made *sūta* or bard by his chieftain as a reward for his skill; and, as his skill passed on by inheritance to his son, so also did his office. Thus arose an hereditary order of bards or rhapsodists; and thus, too, the epos originated in the warrior caste, and belonged especially to it.

The eighteen-day battle of the Bhâratans forms the principal theme of the poem; and its full title, accordingly, is the *Great Bhâratan Story*; in Sanskrit, *âkhyânam bhâratam mahat*, or, as a compound, *mahâ-bhârata-âkhyânam*. By omission of the word for story, this last is abbreviated to *Mahâ-Bhârata*, which is the title usual in the Occident. The Hindus abbreviate it still more, and often speak of the poem as *Bhârata*, the Bhâratan, an example which it is rather a pity that Western scholars have not followed.

The simple heroic epics that formed the nucleus of the *Bhârata* probably existed several centuries before our era, although, of course, such a thesis is not matter of direct proof. Around this nucleus have been grouped additions—historical, mythological, theological, metaphysical, didactic, and prescriptive—until the *Great Bhârata*, as we now have it, and counting the *Harivança*, contains over 100,000 double verses, or about eight times as much as the *Iliad* and *Odyssey* together. In the printed editions it is divided into eighteen very unequal books or *parvans*. The seventeenth is the shortest, having only 312 double verses, and the twelfth is the longest, with 13,943; although, indeed, the appendix, called *Harivança*, is still longer (16,374).

Only about one-fifth of the whole poem is occupied with the principal story. This, in briefest summary, is as follows: The two brothers Dhrita-râshtra and Pându were brought up in their royal home of Hastinâ-pura, about 60 miles N. E. of modern Delhi. Dhrita-râshtra, the elder, was blind, and so Pându became king, and had a glorious reign. He had five sons, chief of whom were Yudhishthira, Bhîma, and Arjuna. They are called Pândavas, and are types of honor and heroism. Dhrita-râshtra's hundred sons, Duryodhana and the rest, are usually called the Kuru princes or Kauravas, and are represented as in every way bad. After Pându's death his sons are brought up with their cousins. The kingdom devolved on Dhrita-râshtra, who in turn made his nephew Yudhishthira the heir-appar-

ent. Yudhishthira's exploits aroused the ill-will of his cousins, and, to escape their plots, the Pându princes went away to the King of Panchâla, whose daughter, Draupadî, became their common wife. In view of this strong alliance with the Panchâlas, Dhrita-râshtra thought it best to conciliate the Pândus. So he divided the kingdom and gave Hastinâ-pura to his sons, and to his nephews a district to the S. W., where they built Indra-prastha, the modern Delhi. Here the Pândavas and their people lived happily under King Yudhishthira.

On one occasion Dhrita-râshtra held a great assembly of princes at his capital. The Pândavas were invited and came. Yudhishthira was challenged to play with Duryodhana, and accepted. The dice were thrown for Duryodhana by his uncle Çakuni. Yudhishthira loses everything—wealth, kingdom, brothers, wife. A compromise, however, is made, by which the Pândavas give up their part of the kingdom for twelve years, and agree to remain *incognito* for a thirteenth. With Draupadî they retire to the Kâmyaka forest, and there for twelve years they dwell. Many legends are told to divert and console them in their exile; and these stories, with the description of the forest-life of the princes, combine to make up the third or *Forest-book*, which is one of the longest in the poem.

The thirteenth year arrived and passed. "Then in the fourteenth the Pândavas demanded back their possessions, but received them not. From this arose the conflict. They overthrew the ruling house, slew Prince Duryodhana, and then, although losing most of their warriors, they got back again their kingdom." Thus ended the *Bhârata*, doubtless, in its oldest and simplest form.

The poem, as we now have it, spins out the story of the combat through several books and through thousands of distichs. At length Yudhishthira is crowned in Hastinâ-pura, and Bhîshma, the leader of the Kurus, although mortally wounded, instructs him, for about 20,000 distichs, on the duties of kings and on other topics, and then dies. In the seventeenth book the Pândus renounce the kingdom, and in the next—the last—they ascend to heaven with Draupadî.

The episodes and digressions often have only a very loose connection with the main thread of the *Bhârata*, but are not on this account less important or interesting. The first to become famous in the Occident was the story of *Nala and Damayantî*, published by Bopp in 1819, and often since, both in text and translation. *Sâvitrî, or the Glory of Wifely Devotion*, is also especially noted; less so, the *Story of the Deluge*, the *Rape of Draupadî*, and others. Worthy of mention, in part as a type, is the epic form of the Çakuntalâ legend, because it has served Kâlidâsa as the basis for his drama *Çakuntalâ*, the masterpiece of the literature, and in somewhat the same way as the Homeric for the Sophocleean Ajax. Of a very different kind are the philosophical episodes; among these the Bhagavad-gîtâ (*q. v.*) is by far the most celebrated. The appendix, *Harivança*, contains the history of Krishna, one of the most popular deities of India. For a brief account of him, see Monier-Williams, *Indian Wisdom*, lecture xii.

The origin of the epic nucleus of the poem is fairly clear. The completion of the nucleus is set by Jacobi at about the beginning of our era. Difficult is the question of the genesis of the poem in its present shape. See the solution given by E. W. Hopkins, *Journal of the American Oriental Society* (xiii., 68–69). Hindu tradition ascribes the gigantic work to the mythical sage Vyâsa. Certain parts are plainly very ancient; others much less so. The whole is the "precipitate of a long literary period." Holtzmann assumes several redactions and workings-over, and places the beginning of the final one at about 1000 A. D. The studies of Bühler, however, show that as early as Kumârila, 700 A. D., the *Bhârata* consisted in the main of the same divisions which it now has; and that it was not merely a narrative of the great war, but also a *smriti* or work belonging to the sacred tradition, and actually made use of in public readings for teaching to all Hindus the whole duty of man by sententious precepts and by most winning examples; and that is just what the poem now is and pretends to be; and again, an inscription of 600 A. D. from Cambodia states that the king erected a temple, gave it a library, including a complete copy of the *Bhârata*, and made an endowment for its daily recitation in perpetuity. To such sanctity had the book attained—and so early—in a remote Indian colony, 2,000 miles from the scenes of the poem! Finally, an inscription of A. D. 533 mentions the *Bhârata* as a work of 100,000 distichs, and in such a way as to imply that it was then a complete text.

The bibliography is given with great detail in parts ii. and iii. of Holtzmann's work, and in the *Catalogues* by Haas and by Bendall, of the Sanskrit books in the British Museum. Text editions of the entire work: *Editio princeps*, very important because the citations of the great lexicon, etc., refer to this (Calcutta, 1834–39, 4 quarto volumes and index volume); the best recent edition, with Nîlakantha's comment, but without *Harivança*, and with separation of the words and convenient numbering of the chapters, was published in Bombay, 1890. Translations: The nearest approach to a complete English translation is that instituted by Protap Chunder Roy (Calcutta, 1883–94, to date 88 parts), embracing about nine-tenths of the whole, excluding *Harivança*. Translations of parts of the poem are enumerated by Holtzmann, as also by Haas and by Bendall. We may mention *Nala*, translated by H. H. Milman (Oxford, 1860); *Çakuntalâ*, in Sanskrit and French, as an appendix to A. L. Chézy's edition of the drama (Paris, 1830). Sir Edwin Arnold's *Indian Idylls* (Boston, 1883) contains *Sâvitrî*, *Nala*, the *Great Journey* (bk. xvii.), the *Entry into Heaven* (xviii.), and several other stories. Summaries of the main story: One of the best in English, in Talboys Wheeler's *History of India* (vol. i., London, 1867), abridged in his *Short History of India* (New York, 1884); perhaps the very best, by Theodore Goldstücker, *Westminster Review*, Apr., 1868, reprinted in his *Literary Remains* (ii., 96–119, London, 1879); very convenient, that by Monier-Williams, *Indian Epic Poetry* (pages 91–133, London, 1863); see also his *Indian Wisdom*, lecture xiii. (London, 1871). General works: *Das Mahâbhârata*, by Adolf Holtzmann [Jr.]; vol. i., *Zur Geschichte und Kritik des Mahâbhârata* (Kiel, 1892); vol. ii., *Die neunzehn Bücher des Mahâbhârata* (1893); vol. iii., *Das Mahâbhârata nach der nordindischen Recension* (1894); very important criticisms by Jacobi, *Göttingische gelehrte Anzeigen*, 1892, No. 16, and 1893, No. 16; *Indian Studies*, by Bühler and Kirste, *Sitzungsberichte der phil.-hist. Classe der Wiener Akademie* (vol. cxxvii., No. 12, 1892). C. R. Lanman.

Mahaffy, John Pentland: classical scholar; b. at Chafonnaire, on Lake Geneva, Switzerland, Feb. 26, 1839; received his early education in Germany; studied in Dublin (1856); since 1871 Professor of Ancient History in the University of Dublin. He is a prolific author and an elegant stylist. Among his numerous works may be mentioned *The Flinders Petrie Papyri* (Cunningham Memoirs, Royal Irish Academy, 1890–94); *Commentary* to Kant's *Critique* (1866); *Social Life in Greece, from Homer to Menander* (1877, 3d ed.); *Rambles and Studies in Greece* (1878, 2d ed.); *Greek Life and Thought, from the Age of Alexander to the Roman Conquest* (1888); *Greece under Roman Sway* (1890); *Story of Alexander's Empire*; *Old Greek Education*; *History of Classical Greek Literature* (3 vols., 1892, 2d ed.).

Alfred Gudeman.

Mahākalpa [Sanskr., a great kalpa]: in Hindu and Buddhist chronology, the period which elapses from the moment one universe is formed to the moment it is replaced with another. It is divided into four kalpas, which are compared with the four seasons of the year, and is equal to 1,344,000,000 mortal years.

Mahan', Alfred Thayer: U. S. naval officer; b. Sept. 27, 1840, at West Point, N. Y., where his father, Dennis H. Mahan, LL. D., was Professor in Civil Engineering; graduated at the U. S. Naval Academy, 1859; served in the civil war in the South Atlantic and in the Gulf squadrons; was head of the department of gunnery, Naval Academy, 1877–80; president of the U. S. Naval War College, Newport, R. I., 1886–89; president of a commission to select a site for a navy-yard on the northwest coast of the U. S., north of 42° N. latitude, 1889; again president of the War College 1890–93; assigned to command of the U. S. cruiser Chicago and attached to the European squadron May 11, 1893. He was accorded a hearty welcome in European capitals, and received many honors, among them the degree of LL. D. from Cambridge University and of D. C. L. from Oxford. He is author of *The Gulf and Inland Waters* in *The Navy in the Civil War* (New York, 1863) and *The Influence of Sea Power upon History, 1660–1783* (1890), which gave him a wide reputation among naval and historical students in all countries. Author also of *Life of Admiral Farragut* (1892).

C. H. Thurber.

Mahan, Asa, D. D., LL. D.: minister, educator, and author; b. at Vernon, N. Y., Nov. 9, 1800; was educated at Hamilton College and Andover Theological Seminary; was pastor of Congregational churches at Pittsford, N. Y., and

Cincinnati, O.; president and Professor of Philosophy and Theology in Oberlin College 1835–50; president of Cleveland University 1850–56; pastor of the Congregational church, Jackson, Mich., 1856–57; of the Congregational church, Adrian, Mich., 1857–60; and president of Adrian College 1860–71. After 1871 Dr. Mahan spent much of his time in England, where he died at Eastbourne, Apr. 4, 1889. He was a prominent advocate of the views called Perfectionist, which he set forth in the work *Scripture Doctrine of Christian Perfection* (Boston, 1839). He published other works, including *Intellectual Philosophy* (New York, 1845); *The Will* (Oberlin, 1846); *Moral Philosophy* (Oberlin, 1848); *Logic* (New York, 1857); *Theism and Anti-theism in their Relation to Science* (Cleveland, 1872); *Mental Philosophy* (Chicago, 1882); *Critical History of Philosophy* (New York, 1883). C. K. Hoyt.

Mahan, Dennis Hart, LL. D.: soldier and scientist; b. in New York, Apr. 2, 1802. He removed with his parents to Virginia and in 1820 entered the U. S. Military Academy, graduating at the head of his class in 1824, and was appointed a second lieutenant of engineers, but retained at the academy as Assistant Professor of Mathematics and of Engineering until 1826, when he was sent to Europe on professional duty, passing four years, including one year as a student at l'École d'Artillerie et du Génie at Metz, in visiting and studying fortifications and the institutions connected with his profession. Returning to the U. S. in 1830, he was in 1832 appointed Professor of the Department of Civil and Military Engineering, of which he had been in charge since 1830, and at the head of which he continued until 1871. Failing health brought on continued insomnia, resulting in temporary insanity, during an attack of which he drowned himself in the Hudson near Stony Point, N. Y., Sept. 16, 1871. His works on engineering and the art of war are largely used as text-books in the U. S. In 1836 he published a *Treatise on Field Fortifications*, to which was added in 1865 *Military Mining and Siege Operations*, the whole now comprising part i. of *An Elementary Course of Military Engineering*, of which *Permanent Fortifications* constitutes part ii.; *Advanced Guard, Outpost, and Detachment Service of Troops* (1847, enlarged in 1862); *Industrial Drawing* (1853); *Fortification-drawing and Stereotomy* (1865); Mahan's American edition of *Moseley's Mechanical Principles of Engineering and Architecture* (1856; 2d ed. 1869). His *Course of Civil Engineering* (1837) was largely improved and extended up to 1868, when it was almost entirely rewritten; at the time of his death a new revised edition was in preparation and partly printed. He was a member of the Geographical Society of France (1828) and of many other scientific societies, and corporator of the National Academy of Sciences, 1863. Revised by James Mercur.

Mahan'adi, or **Mahānadī** [= Sanskr., liter., great river; *mahā*, great + *nadī*, river]: a river of Hindustan. It rises in lat. 20° 20′ N. and lon. 82° E., flows with an eastward course 520 miles through Berar and Orissa, into the Bay of Bengal, forming a large delta, which is subject to destructive inundations by the ocean. Navigable for 300 miles during the rainy season, it becomes almost dry during the remaining half of the year. The river-bed is celebrated for the fine quality of diamonds found in it.

Mahanoy City: borough; Schuylkill co., Pa. (for location of county, see map of Pennsylvania, ref. 5–H); on Mahanoy creek, and the Lehigh Valley and the Phila. and Read. railways; 80 miles N. W. of Philadelphia. It is in the anthracite coal region; has several valuable mines, and iron-foundries and potteries; and contains a high school, public-school property valued at over $60,000, public library, 2 national banks with combined capital of $200,000, and 4 weekly and 3 other periodicals. Pop. (1890) 11,286; (1900) 13,504.

Mahāyāna [Sanskr. *mahā-*, great + *yāna*, a vehicle or conveyance]: the expanded form of Buddhist doctrine which prevails in the northern school of Buddhism, and is characterized by "an excess of transcendental speculation tending to abstract nihilism, and the substitution of fanciful degrees of meditation and contemplation in place of the practical asceticism of the Hināyāna school" (Eitel's *Handbook of Chinese Buddhism*). See Hināyāna, and Monier-Williams' *Buddhism*, etc. (1889).

Mahdi, El [= Arab. *mahdī*, liter., the guide, or leader]: the name applied by the Mussulmans to Mohammed, twelfth and last Imâm (high priest) of the family of Ali. In 873 he entered a cave at Serinen Rey, and was never seen again. His disappearance gave rise to wild conjectures and theories by which more than once the Mussulman world has been convulsed to its center. The Shiite Mussulmans believe he still exists in the cave, and daily look for him to issue from it in pomp to rule over the earth. The orthodox Mussulmans say he will appear only at the end of the world, when he will be attended by 360 celestial envoys, will convert all mankind to Islam, and reign universally as the vicar of Jesus Christ. Many claiming to be El Mahdi have arisen at different times, and some have attained great power. The last of these pretenders, commonly called The Mahdi by Europeans, was Mohammed Achmet, who was born at Dongola, in Nubia, in 1842. He studied Mussulman theology at Khartum and Berber, and in 1868 was consecrated to the service of Islam by the brotherhoods of Sid Abd-el-Kader and Sid-es-Senoussi. Retiring to the island of Abba in the White Nile, he rapidly won veneration from the neighboring Bagarrah Arabs by his learning, austerities, and apparent piety. In 1880 the Sid-es-Senoussi announced that he was the long-expected Mahdi, and ordered him to undertake the holy war. The Arabs and Ottomans treated his claims with derision; the grand sherif of Mecca in a proclamation branded him as an impostor, but the Mussulmans of the Sudan—then nominally a province of Egypt—accepted him with delirious enthusiasm. He defeated four expeditions sent against him by the Egyptian Government, captured El Obeid, capital of Kordofan, in Sept., 1883, and a few weeks later annihilated the Anglo-Egyptian army commanded by Gen. Hicks Pasha, composed of 10,000 soldiers with 40 European officers. Only two persons escaped death. In Jan., 1885, he captured Khartum, where Gen. Gordon Pasha was killed. The energetic interference of Great Britain then prevented the further spread of the insurrection. The Mahdi died of smallpox in June, 1885. His authority was supposed to be transmitted to a successor, who exercised his functions under the same name. See Ohrwalder, *Ten Years' Captivity in the Mahdi's Camp* (1892). E. A. Grosvenor.

Mahé, maa-hā′: principal island of the Seychelles, belonging to the French; N. N. E. of Madagascar, in lat. 4° 45′ S., lon. 55° 30′ E. It is of irregular form, 20 miles long by 5 broad. It is mountainous, and rises abruptly from the ocean. The village of Mahe, or Victoria, is in the N. E., on an open roadstead which serves as a port. The soil is scanty, but fertile; the climate is hot, but healthful. Pop. 8,000, speaking a corrupt French. M. W. H.

Mahé: French town and colony on the Malabar coast, India, 35 miles N. of Calicut; lat. 11° 42′ N., lon. 75° 31′ E. Area of colony, 23 sq. miles (see map of S. India, ref. 6–D). Pop. (1889) 8,349. The town is a picturesque one, but the colony is in decadence. It was taken in 1726 by Mahé de la Bordonnais, who gave it his own name, which is like the former native name of *Mahi* or *Maihi*. The town was taken by the British in 1761, 1779, and 1793. M. W. H.

Mahi Kanta: a group of fifty-two feudatory states, associated into one political agency, in Bombay, adjoining Southern Rajputana, between the Mahi and Sabarmutti rivers. Combined area, 11,049 sq. miles. Pop. 520,000. The principal states in order are Edar, Danta, and Pol. The feudal lords are mostly Rajputs, though there are some Kulis from Gujerat. The people are Bhils. M. W. H.

Mahmud: the name of two Ottoman sultans. Mahmud I. (1730–54), b. 1696, son of Mustapha II., succeeded his uncle Achmet III.; was an inefficient but kindly prince. D. in 1754.—Mahmud II. (1808–39), b. 1785, second son of Abd-ul Hamid I. His cousin Selim III., who reigned from 1789 to 1807, allowed him a degree of freedom in his youth unusual for an Ottoman prince, and inspired him with zeal for progress and reform. Selim was hated by the Janissaries, who deposed him and raised Mustapha IV., elder son of Abd-ul Hamid, to the throne. Baïractar Pasha, of Rustchuk, a devoted partisan of Selim, rose in revolt, captured Constantinople, stormed the Seraglio, and proclaimed Mahmud as sultan (July 28, 1808), Selim having been strangled by Mustapha's orders during the attack. Mahmud, with Baïractar as grand vizier, impetuously began his reforms. A sudden and desperate insurrection of the Janissaries broke out (November). The grand vizier was slain and the Seraglio about to surrender when Mahmud ordered that Mustapha be bowstrung and his dead body thrown to the rebels. He thus made himself the sole surviving descendant of Osman, and so rendered his person inviolable, it being universally believed among the Ottomans that their empire will end when the dynasty of Osman becomes extinct.

In 1808 the Ottoman empire seemed on the point of dissolution. The Wahabees held Arabia; Mehemet Ali was virtual sovereign of Egypt; in more than half the other provinces the pashas were practically independent; the Janissaries were the real masters of the state; all improvement or application of remedy seemed impossible on account of the fanatic spirit of the Mussulmans, who were bitterly opposed to any innovation. Mahmud's reign of thirty-one years was a constant struggle of one man against a whole people, against all the evils inherent in the Ottoman system and the political circumstances of the empire. At home he attained partial success. By means of Mehemet Ali he crushed the Wahabees and regained Arabia; he brought the pashas to semi-submission, destroyed the Janissaries, and somewhat consolidated the empire. He forced the officials to adopt the European dress and established an official gazette. He introduced a regular police system, put the army on a European footing, and founded military, naval, artillery, and engineering schools. In consequence of these innovations, and specially of his effort to better the political condition of his Christian subjects, he was detested by the vast majority of his coreligionists, who denounced him as a giaour. His two wars with Russia were disastrous. He could not put down the Greek revolution, and was rescued from his rebellious vassal, Mehemet Ali, in 1832 only by the intervention of Russia. A second rebellion of Mehemet Ali seemed about to give the deathblow to the empire when Mahmud died (July 1, 1839). Though a reformer, Mahmud was an Oriental; hence his best efforts were often sanguinary and always despotic. He was pliant, yet persistent even to obstinacy, generous, and brave. Full success in his undertakings was a practical impossibility. The marvel is rather that he accomplished so much as he did. No other Ottoman sultan since Souleïman I., who died in 1566, so nearly deserves the title sometimes accorded him of The Great. E. A. Grosvenor.

Mahmud of Ghazni, Abul-Kasim-Yemin-ed-Daulah: Sultan of Persia; first Mussulman Emperor of India and founder of the Ghaznevide dynasty; b. at Ghazni (Ghizni or Ghuzni), in Candahar, Oct. 2, 971. His father, Subuktigin, who claimed descent from the Sassanian kings of Persia, became governor of the province of Khorassan after the death of his father-in-law, Alptigin, of whom he had formerly been a slave. He owed a nominal allegiance to Persia, but was really independent and extended his frontiers on every side. Mahmud distinguished himself in youth under his father's command against the Tartars, who had invaded Khorassan, and received from Noh, the Samanide sovereign of Persia, the title of Seif-ed-Daulah, sword of the state, together with the government of the province of Segestan. His father died in 997, having appointed Ismaïl, a younger son, his successor. Mahmud overthrew Ismaïl and captured Ghazni in 998; then made alliance with the rulers of Turkistan and Kashgaria against Mansur, the new Persian monarch, and divided the Persian kingdom with his confederates. From 1001 to 1030 he made fourteen generally successful expeditions, in which he accumulated enormous treasures, massacred vast numbers of Hindus, and extended his empire from the Caspian to the Ganges. Though not specially favorable to letters, he founded an academy, library, and fine museum of natural history at Ghazni. Firdausī (*q. v.*), the chief Persian poet, was his subject and friend. Mahmud was the first ruler to take the title of sultan. D. at Ghazni in 1030. Many of his descendants bore the same name. See histories of India by Caldwell, Elliot, and Elphinstone. E. A. Grosvenor.

Mahog'any [from the S. Amer. name]: a noble forest tree of the West Indies and Central and South America, growing also to some extent in Florida. Its scientific name is *Swietenia mahogoni*. It belongs to the order *Cedrelaceæ*. Its wood is of very beautiful reddish color, extremely hard, strong, and heavy, and so costly that for a long time it has been used almost entirely as a veneering. It has for nearly 300 years been a staple article of commerce, and is exported from Honduras, Cuba, Haiti, Jamaica, and South America. The Honduras mahogany is now the most abundant and the largest, but also the coarsest and least handsome variety. The better sorts are called Spanish mahogany. Considerable quantities of the timber of *Khaya senegalensis* from Africa and *Soymida febrifuga* from Calcutta (both cedrelaceous trees) are imported into England as mahogany, but the wood is generally inferior to true mahogany. Madeira mahogany is the wood of *Persea indica*, and is coarse and inferior. Australia and other countries also furnish spurious though often valuable mahoganies. The bark of the true mahogany abounds in an active febrifugal principle. The mountain mahogany of Utah is the *Cercocarpus ledifolius*, of the order *Rosaceæ*.

Mahomet: See Mohammed.

Mahon, Lord: See Stanhope, Earl of.

Mahone, ma-hōn', Gen. William: soldier and politician; b. in Southampton, Va., Dec. 1, 1826; graduated at the Virginia Military Institute 1847; devoted himself to civil engineering; was the constructor of the Norfolk and Petersburg Railroad; took part in the capture of the Norfolk navy-yard Apr. 21, 1861; raised and commanded the Sixth Virginia Regiment; was engaged in most of the battles of the Peninsular campaign, those on the Rappahannock, and those around Petersburg; was appointed brigadier-general Mar., 1864, and major-general Aug. 12, 1864; commanded a division in Hill's corps, and at Lee's surrender was in command at Bermuda Hundred. After the war he devoted himself to the development of Virginia railways, and became president of the Norfolk and Tennessee Railway. He entered actively into politics, and was soon conspicuous as the organizer and leader of the so-called Readjuster party. He was U. S. Senator 1881–87, and failed of re-election. D. in Washington, D. C., Oct. 8, 1895. F. M. Colby.

Ma'hony, Francis: author; b. in Cork, Ireland, about 1805; studied at Jesuit colleges in Paris and Rome, and took orders in the Roman Catholic Church; abandoned the Church about 1831 to connect himself with *Fraser's Magazine*, in which he published an amusing series of articles over the pseudonym of *Father Prout*. These were collected in 1836 as *Reliques of Father Prout*. He was also a contributor to *Bentley's Miscellany* (1837), traveling correspondent, and afterward Roman correspondent, of *The Daily News*, and for many years Paris correspondent of *The Globe*. He advocated the unity of Italy in the powerful letters published as *Facts and Figures from Italy, by Don Jeremy Savonarola, Benedictine Monk* (1849). In 1864 he retired to a monastery in Paris, where he died May 19, 1866. Some of his later essays were edited by Blanchard Jerrold as *Final Reliques of Father Prout* (1874), and an edition of his works by Charles Kent was published in 1880.

Mahopac', Lake: a summer resort in Carmel township, Putnam co., N. Y.; 14 miles from Peekskill. It has many residences and several hotels. The lake is about 3 miles across, has three beautiful wooded islands, and is about 800 feet above the sea-level.

Mahrattas: a people of Central and Western India, who in the eighteenth century overran the greater part of the peninsula, placed the Mohammedan empire of Delhi under tribute, and were for half a century the most formidable obstacle to British supremacy in India. Their origin, geographical and ethnological, and their early history are alike unknown, but the evidence of physical characteristics, customs, religion, and language, combined with the feeble indications of tradition, would point to one (or several) of the numerous irruptions of Turanian races from Central Asia prior to the rise of Mohammedanism (seventh century A. D.). This supposed race must have found its chief seat in the N. W. of the Deccan, along the Indian Ocean southward from the Nerbudda river to the neighborhood of Goa, and by intermarriage with Sudras and other low-caste Hindu women acquired at once a language and a religion, the latter, however, being distinctive in ignoring caste and in permitting the use of meats. See India, and Grant Duff's *History of the Mahrattas*, and, for a comprehensive though brief *résumé* of Mahratta history, Meadows Taylor's *Student's Manual of the History of India*.

Mai, mī, Angelo: classical scholar; b. at Schilpario, near Bergamo, Italy, Mar. 7, 1782; was educated by the Jesuits; was appointed custodian of the Ambrosian Library of Milan in 1813; chief keeper of the Vatican Library in Rome in 1819; secretary to the Propaganda in 1833; cardinal in 1838. D. at Albano, Sept. 9, 1854. When in Milan he acquired great reputation from his publications of fragments of long-lost classical works, chiefly discovered on palimpsests. The most remarkable of these were the fragments of Cicero's *Orationes*, Fronto's *Letters*, Eusebius's *Chronicon*, *Dionysius of Halicarnassus*, *Themistius*, *Isæus*, *Philo*, and others; but by far the most important were very considerable portions of Cicero's *De republica*, published in 1822, and the so-called Ambrosian codex of *Plautus* of the fifth century,

which apart from its paramount critical value proved that the plays of Plautus which we possess are those which Varro pronounced genuine. In 1825 he began the publication of those series of ancient works, Greek and Latin, partly *inedita*, which have made his name celebrated among scholars, namely, *Scriptorum Veterum Nova Collectio e Vaticanis Codicibus edita* (10 vols., 1825–38); *Auctores Classici e Vaticanis Codicibus editi* (10 vols., 1828–38); *Spicilegium Romanum* (10 vols., 1839–44); and *Nova Patrum Bibliotheca* (6 vols., 1845–53). Revised by A. GUDEMAN.

Mai'a (in Gr. Maîa): in Greek mythology, the eldest daughter of Atlas and Pleione, and therefore one of the Pleiades. She was beloved by Zeus, and in a cave of Mt. Cyllene, in Arcadia, she bore to him Hermes. The story of his birth and infancy is told in the beautiful hymn to Hermes sometimes ascribed to Homer. J. R. S. S.

Maidenhair-tree: See PLANTS, FOSSIL.

Maidenhead: town; in the county of Berks, England; 26 miles W. of London (see map of England, ref. 12–J); on the southern bank of the Thames, here crossed by a stone bridge erected in 1772. It is picturesquely situated, and trades in malt, meal, and timber. Pop. (1891) 10,607.

Maid of Kent: a name commonly applied to ELIZABETH BARTON, a religious enthusiast; b. about 1506 and employed for some time as a servant in the village of Aldington, Kent. Left by a serious illness in a state of partial derangement, she saw strange visions, and uttered delirious speeches which the superstition of the people invested with the sanctity of prophecies. Archbishop Warham hearing of her alleged revelations sent Edward Bocking or Bockling, a canon of Canterbury, to investigate them. Whether persuaded of her divine mission or wishing to use her as a tool, Bocking encouraged her to continue prophesying. How far conscious imposture entered into her speeches, or how far they were due to epileptic conditions, or genuine religious enthusiasm can not be determined. It was revealed to her that if Henry VIII. obtained his divorce from Catharine he would come to a miserable end within seven months. Many Roman Catholics upheld her, and among those who showed great interest in her were Sir Thomas More, Warham, and Bishop Fisher, but the king's wrath soon made itself felt. She was arrested and after a public recantation and a confession that her visions were all "feigned of her imagination," she was executed at Tyburn with Bocking and four others on Apr. 21, 1534. F. M. COLBY.

Maidstone: town; in the county of Kent, England; 34 miles E. S. E. of London (see map of England, ref. 13–K); on the Medway, here crossed by a fine stone bridge of three arches, erected in 1879. It is a handsome old place, with a fine church, many good educational institutions, a museum and public library, two hospitals, cavalry and militia barracks, extensive oil and paper mills, breweries, and manufactures of hats and blankets. The Church of All Saints is one of the largest parish churches in the kingdom, and contains several interesting monuments and other antiquities. The surrounding country is famous for the wheat, and especially for the hops, it produces. Pop. (1891) 32,150.

Maignan, mān'yăn', ALBERT: historical and genre painter; b. at Beaumont, Sarthe, France, Dec. 15, 1844. He was a pupil of Luminais; was awarded a third-class medal at the Salon of 1874; a second-class medal in 1876; a first-class medal in 1879; received the decoration of the Legion of Honor 1883; a first-class medal at the Paris Exposition of 1889. He is a strong draughtsman and an excellent colorist. His *Departure of the Norman Fleet* (1874) and *Dante Meeting the Countess Matilda* (1881) are in the Luxembourg Gallery, Paris; *Assault on Pope Boniface VIII. at Agani* is in the Metropolitan Museum, New York.
WILLIAM A. COFFIN.

Maigre, mā'ger [Fr., liter., lean, slender]: popular name of a fish (*Sciæna aquila*) of the family *Sciænidæ*, inhabiting the Mediterranean Sea and the east Atlantic Ocean. It sometimes attains the length of 6 feet, and is much sought as a food-fish. It emits a groaning sound, which often guides the fishermen to its shoals. The maigre is taken with the net. Its large ear-bones are worn by some as charms against colic. The ear-bones of related American species, being marked with a rude imprint of the letter L, are in some quarters esteemed as "lucky-stones." Revised by D. S. JORDAN.

Mai'kop: a rapidly growing city of Kuban province; in the Caucasus, Russia; 63 miles S. E. of Ekaterinodar; on Bielaya river, an affluent of the Kuban (see map of Russia, ref. 10–E). It is a favorable point for the concentration of troops operating in the Caucasus, is in a rich and fertile district, and has become the chief market of that region. Pop. (1886) 27,945.

Maïkov, mă-ee'kōv, APOLLON NIKOLAEVICH: poet; son of a distinguished painter, and great-grandson of Vasilii Maïkov, a poet of the eighteenth century; b. in Moscow, Russia, May 23, 1821. He studied at the University of St. Petersburg, and turned to literature, publishing in 1842 a small volume of poems that was favorably reviewed by the great critic Belinskiï. In the same year he traveled and spent several months in Italy; and during a stay in Bohemia he became a disciple of Panslavism. Since then his life has been that of an author, though he was also for many years in the service of the Government as one of the censors of foreign books. On Apr. 30, 1888, the fiftieth anniversary of his earliest literary production was celebrated. Maïkov probably is the first among living Russian poets. His works, idealistic in tone, are characterized by great perfection of form. He has drawn from classical antiquity many of his subjects, among them those of his two plays, *Tri Smerti* (Three Deaths) and *Dva Mira* (Two Worlds), on which he labored for years. During the Crimean war he composed patriotic pieces, and besides a modern rendering of *The Tale of the Troop of Igor* and other excellent translations, he has written fine poems of divers sorts. A number of them have been put into German (H. Roskoschny, Leipzig), and a few not very successfully into English. See E. T. Wilson, *Russian Lyrics* (1887), and J. Pollen, *Rhymes from the Russian* (1891). His complete works were published in St. Petersburg in 1884 (3 vols., 4th ed.). A. C. COOLIDGE.

Maïkov, LEONTIÏ NIKOLAEVICH: editor and author; brother of Apollon Maïkov, poet; b. in 1839. After studying at the University of St. Petersburg he entered the service of the Government, and in time was appointed vice-director of the Imperial Library. He has also been editor of *The Journal of Public Instruction* as well as president of the ethnographical section of the Imperial Geographical Society. He has contributed valuable articles to journals and reviews on such subjects as geography, ethnography, and folk-lore, besides studies of Russian authors. In 1885–87 he edited with excellent notes and biography the works of the poet Batiushkov. A. C. COOLIDGE.

Maimaichin, mī'mī'cheen' (literally, buy-sell-mart): a Chinese commercial station on the frontier of Mongolia; situated immediately opposite the Siberian frontier trading-post, Kiakhta, from which it is separated by a neutral strip 650 feet in width. It is clean and well kept and has a population of 3,000. Since the treaty of Peking (1860), which opened the whole Russian-Chinese frontier to commerce, it has lost much of its importance.

Maimbourg, măn'boor', LOUIS: Church historian; b. at Nancy in 1610; entered the Society of Jesus in 1626, and was for some years Professor of Rhetoric at Rome. He enjoyed a great reputation as a Church historian, and his *Histoire de l'Arianisme*, *Histoire des Iconoclastes*, *Histoire du Calvinisme*, etc., were much read in their time; but he wrote with one eye fixed upon his friends and the other upon his foes, totally blind to truth, and having incautiously entered into the contest between Louis XIV. and the pope, and taken the side of the king in his *Traité historique sur les prérogatives de l'Église de Rome*, 1682, he was expelled from his order on demand of the pope (1682). He retired, protected by the king, who gave him a pension, to the abbey of St. Victor in Paris, where he died Aug. 13, 1686.

Maimene: khanate and town now in Northwest Afghanistan and tributary to its ameer. The town is 190 miles N. E. of Herat, lat. 35° 49′ N., lon. 64° 33′ E., on the Sanghalyk or Nari river, which loses itself in the sandy deserts to the N. The town has an important strategic position in case of a war between Great Britain and Russia. It was an important commercial place, with a population estimated at as high as 60,000 down to the year 1874, when it was subjected to a siege of six months, terminated by a massacre of 18,000 persons. It is now a small town of about 2,500 inhabitants. The khanate covers the surrounding territory, and has a population estimated at 100,000, mostly Uzbek Tartars. See Grodekov, *From Samarcand to Herat* (translated from the Russian, 1880). MARK W. HARRINGTON.

Maimensingh', or **Mymensingh**: a district of the Dacca division, Bengal, British India; between the Jamuna (the

continuation of the Brahmaputra) and the Meghna, and S. of the Garo hills of Assam. It is crossed obliquely by the Old Brahmaputra and many other streams between the Jamuna and Meghna. It is a large, marshy, but fertile plain, hilly toward the S., with many great, insalubrious jungles. Rice and jute, the best in Bengal, are the principal crops. Area, 6,287 sq. miles. Pop. 3,100,000. There are 7,600 villages, but only five with a population of over 6,500. The capital is Nasirabad, on the Old Brahmaputra. Pop. 10,500.

MARK W. HARRINGTON.

Maimon'ides (in Heb., *Moses ben Maimon*; in Arab., *Abu Imram Musa ibn Maimūn ibn Abdallah*): the most important figure in mediæval Jewish literature; b. in Cordova, Mar. 30, 1135. He is also known as *Rambam*, a word formed from the initial letters of his names. Among Christian authors of his time he is known as *R. Moyses*. He came of a family well and honorably known in the Jewish community. Under his father's guidance he was at an early age initiated into the study not only of the Bible and Talmud, but also of mathematics, astronomy, and medicine. When he was thirteen years old the Moravid dynasty in Spain gave way before the Almohid (Unitarian) invaders from Africa. Their chief, Almu'min, took possession of Cordova and immediately instituted a reign of religious persecution. Those who refused to change their religion were exiled. It has been asserted that the family of Maimonides did, for a time, outwardly profess Islam; but decisive proof for this statement is wanting, and the authorities differ in opinion. (See a *résumé* by S. M. Simmons, *Jewish Chronicle*, London, Jan. 27, 1882.) A few years later we find them exiled from their native country. In 1159 they were in Fez, in 1165 in St. Jean d'Aere. Moses traveled still farther, and settled in Fostāt (Cairo). At first he earned his livelihood as a jeweler; but the Jewish community recognized his worth as a scholar, and soon looked upon him as their spiritual head. He came to be widely known also as a physician, and in this capacity entered into the service of the reigning sultan and of his vizier, al Fadhil. D. Dec. 13, 1204.

Maimonides was a prolific writer, but, at the same time, he was careful and systematic. His works, written in Arabic with one exception, were very soon translated into Hebrew, notably by members of the Tibbon family. They may be divided into three classes: Talmudic, philosophical, and scientific works.

I. TALMUDIC. *a. Commentary to the Mishnāh*; or, according to its Arabic title, *Al Sirāj* (The Luminary).—In writing this commentary Maimonides wished to spare those who studied the Mishnāh the trouble of wading through the endless discussions of the Gemara. (See TALMUD.) He has therefore carefully noted only the decisions reached by the rabbis. He gives his own explanations only where no rule of practice is concerned. At times he goes into long philosophical or religious discussions; e. g. attached to his notes on the treatise *Sanhedrin* we find the so-called *Thirteen Articles of Faith*, which, though not intended by Maimonides as authoritative and binding, have found their way into the orthodox Jewish prayer-book. (See the literature in Schechter, *The Dogmas of Judaism*, *Jew. Quart. Rev.*, i., pp. 60, *sq.*). This work, which occupied its author for ten years, was soon translated into Hebrew, and is found (since 1523) in the ordinary editions of the Talmud. On the editions of the Arabic text see Steinschneider, *Die Hebraeischen Uebersetzungen des Mittelalters* (Berlin, 1893), § 554, p. 922. A Latin translation of the introduction was given by POCOCKE (*q. v.*), *Porta Mosis* (Oxford, 1655); a Latin translation of the whole by Surenhus (1698–1703). Extracts in German may be found in Winter and Wünsche, *Die Jüdische Literatur* (1892, ii., pp. 385, *sq.*).

b. Book of the Commandments (Arabic, *Kitāb Ashariya*; Hebrew, *Sefer Hammitswōth*) contains a list of the 613 precepts deduced by the rabbis from the Pentateuch. In his love of order Maimonides classifies the principles upon which these laws are deduced under fourteen heads. See M. Peritz, *Das Buch der Gesetze* (Breslau, 1881); M. Bloch, *Le Livre des Précepts* (Paris, 1888). On the discussion aroused by this work, see Jellinek, *Kontres Taryag* (Wien, 1878). This compilation was simply an introduction to

c. The Repetition of the Law (*Mishnāh Thorah*, or *Yad Hachazākāh*), in which Maimonides has gathered all the Halachōt (legal and religious decisions) which are to be found in the whole Talmudic literature, as well as in the works of the Gaonim. It was his intention that this should be a civil, religious, and moral guide for the Jew who wished to live according to the Law, as understood by rabbinical Judaism. Several similar works were compiled during the Middle Ages. (See JEWISH LITERATURE.) The *Mishnāh Thorah* is written in pure Hebrew, and is arranged, not according to the treatises of the *Mishnāh*, but according to certain philosophical principles which Maimonides has laid down in his *Guide of the Perplexed*, iii., chap. xxxv.

d. Several smaller works, for example, *Treatise on Compulsory Conversion*, in which the author attempts to show that, "according to Talmudic teaching, the acknowledgment of Mohammed as prophet is permissible"; and that in certain cases a Jew may outwardly profess Islam. (See the eds. of A. Geiger, 1850, and H. Edelmann, *Chemdāh Genūzāh*, 1851.) *The Epistle to the Jews in Yemen* (Iggereth Tēman, ed. by D. Halub, Vienna, 1874) treats of a pseudo-Messiah who had appeared in that part of Arabia. (See also *Jüd. Literatur Blatt*, 1893, No. 40.) For the literature of Maimonides's correspondence, see Steinschneider, *Hebr. Uebersetz.*, ii., pp. 930, *sq.*

II. It is, however, as a philosophical writer that Maimonides has exerted the greatest influence upon Judaism. His *Guide of the Perplexed* (Arabic, *Dalālat al Hāirīn*; Hebrew, *Mōrēh Nebhūchīm*), finished in 1190 and dedicated to his pupil Joseph ibn Aknin, is the most comprehensive attempt made to combine Aristotelian philosophy in its Neoplatonic form with orthodox Jewish theology. His admiration for Aristotle was unbounded. He studied his works with the aid of the commentaries of Alexander of Apodisia, Themistius, and Averroës. Maimonides may be considered, in general, to be a rationalist. Where he forsakes philosophy, he does so knowingly, and in order to satisfy the demands of the religious feeling.

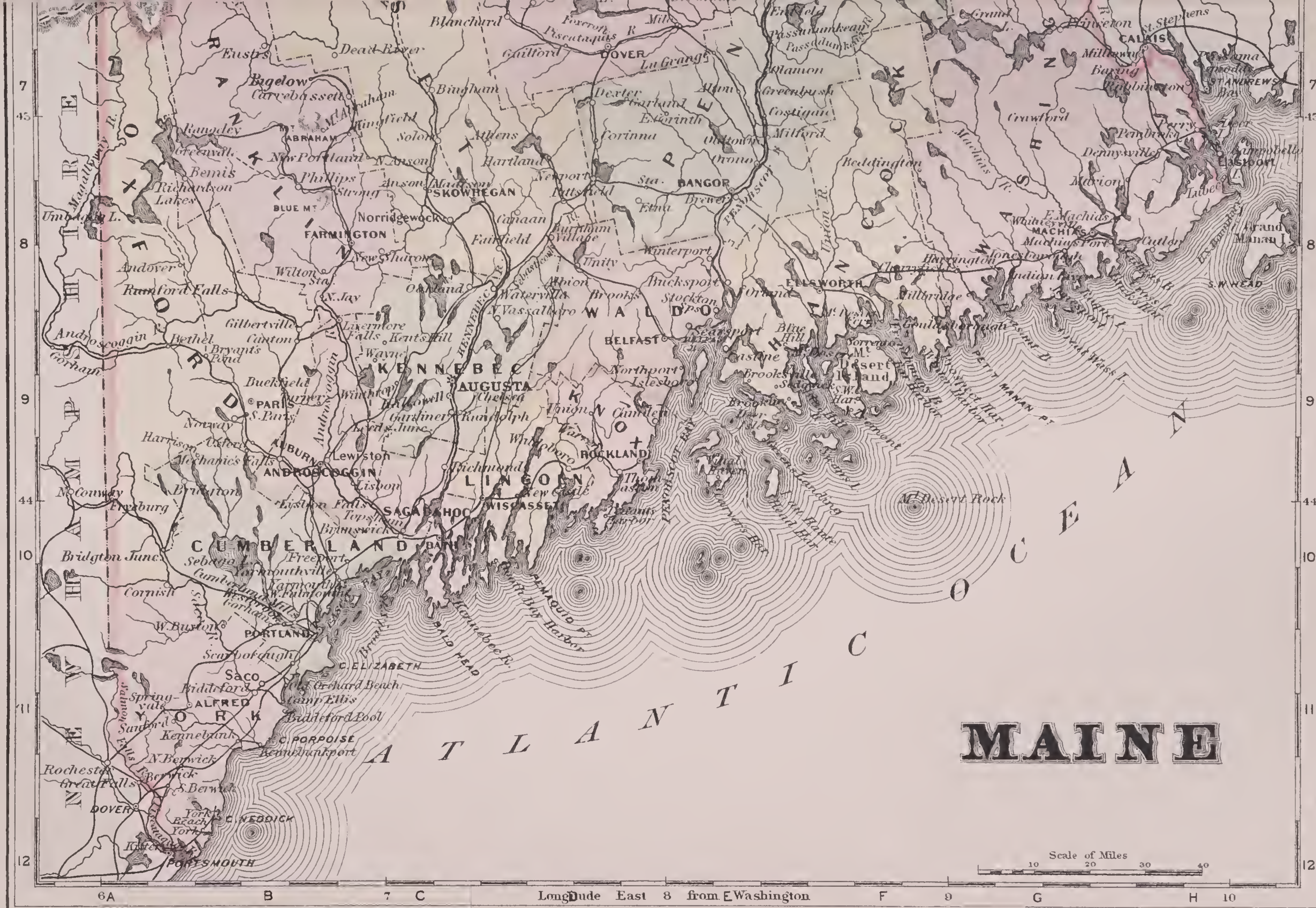
According to Maimonides, "the study of philosophy is the highest degree of divine worship," and Scripture must be brought into harmony with it. He explains numerous expressions as figures, homonyms, and hybrid terms. From a misunderstanding of such terms has resulted the apparent conflict between religion and science. All the attributes of God mentioned in the Bible are thus explained away. They would be a limitation of the Deity as the Primal Cause or Ever-active Intellect. The Mohammedan *Kalām* he declares to be unphilosophical.

In the second part Maimonides endeavors to prove the existence of an infinite, incorporeal, eternal Primal Cause. He divides the spheres into four groups, each sphere having a soul of its own. These are a descending series from the Primal Cause, and through them emanations are transmitted to the Active Intellect. This is to a certain extent Aristotelian; but Maimonides holds that the spheres are created. He teaches also the doctrine of the *Creatio in nihilo*, contrary to Aristotle. He holds that it can be proved as well by philosophical reasoning as from Scripture. The universe can be destroyed again only by a fiat of the divine will. Miracles do not really exist, for the laws once laid down by the Creator can not be changed. Prophecy, likewise, is explained as a purely natural phenomenon—an emanation from the active intellect upon the intellect and imagination of such persons whose mental and moral powers predispose them to such a reception. That which was potential is brought into actuality.

The third part opens with an exposition of the first chapter of Ezekiel, which had always formed a subject of speculation among the Jews. According to Maimonides, it contains an exposition of the sublunary world, of the spheres, and of the intelligences. The rest of the book treats of theological and ethical matters. Evil is simply the negation of good, and arises through the material elements which are in man. The purpose and end of the world can not be ascertained; they are determined purely by the will of God. Maimonides is a firm upholder of the doctrine of free will, though he is ready to confess "this theory is not established by demonstrative proof; it is based upon the authority of the Bible." The same is the case with his belief in the resurrection of the body.

The *Mōrēh Nebhūchīm* has been twice translated into Hebrew—by Samuel ibn Tibbon (twelfth century) and by Juda Charisi (1216). It has been many times commented upon. The Arabic text, with French translation, was published by S. Munk, *Le Guide des Égarés* (Paris, 1850–66). A Latin translation was done by J. Buxtorf, *Doctor Perplexorum* (Basel, 1629); a German one by Fürstenthal (part i., Krotoschin, 1839); M. Stern (part ii., Vienna, 1864); and S. Scheyer (part iii., Frankfort-on-the-Main, 1838). An Italian rendering was made by D. J. Maroni, *Guida degli*


Longitude West 69 from E Greenwich
NEW BRUNSWICK
QUEBEC
AROOSTOOK
PISCATAQUIS
PENOBSCOT
SOMERSET
RIV. ST. LAWRENCE
Kamouraska
St. Paul's Bay
L'Islet
Chateau Richer
Orleans I.
St. Thomas
St. Michel
Pt. Levi
St. Henri Junc.
Chaudière R.
Beauce Junc.
St. Joseph
St. Francis
Tring Junc.
St. Francis L.
Megantic
Moose River
Jackman
Madawaska L.
Madawaska R.
Edmundston
Madawaska
RIV. ST. JOHN
Ft. Kent
Connors
Mouth of St. Francis
St. Francis R.
Fish R.
Eagle
Lakes
Van Buren
Hamlin
Grand Falls
Limestone
Fort Fairfield
Portage
Aroostook R.
Aroostook
Plaster Rock
Perth
Tobique R.
Presque Isle
Ashland
Masardis
Mars Hill
Blaine
Bridgewater
Monticello
HOULTON
Ashland Junc.
Island Falls
Patten
Sherman Mills
Haynesville
Benedicta
Patten Junc.
MT. KATAHDIN
Seboois R.
Wallastook or R. St. John
Allagash R.
Churchill L.
Heron L.
Allagash L.
Chamberlain L.
Chesuncook L.
Penobscot R.
Rail-Portage
MT. KINEO
MOOSEHEAD LAKE
Moosehead
Greenville
Katahdin Iron Works
Mattawamkeag R.
Mattawamkeag
Kingman
Lincoln
Springfield
Eaton
Danforth
Tomah
Vanceboro
Schoodic or Grand L.
St. Croix R.
Newburg
Woodstock
Debec Junc.
Gibson
FREDERICTON
McAdam Junc.
Watt Junc.


MAINE
ATLANTIC OCEAN
Scale of Miles
10 20 30 40
Longitude East 8 from Washington
PORTLAND
AUGUSTA
BANGOR
BELFAST
ELLSWORTH
ROCKLAND
SKOWHEGAN
FARMINGTON
CALAIS
EASTPORT
MACHIAS
DOVER
PORTSMOUTH
ALFRED
AUBURN
CUMBERLAND
YORK
KENNEBEC
WALDO
LINCOLN
SAGADAHOC
ANDROSCOGGIN
OXFORD
FRANKLIN
HANCOCK
WASHINGTON
PENOBSCOT
KNOX

Smtarriti (Florence, 1870); a Hungarian by M. Klein (Budapest, 1880–89); and an English one by M. Friedländer, *The Guide of the Perplexed* (3 vols., London, 1885).

The position assigned by Maimonides to philosophy appeared to many to be dangerous to Jewish doctrine, and a fierce controversy arose between Maimonists and anti-Maimonists which lasted for many years, and ended in a victory for the followers of the philosopher. See Friedländer, *Guide* (vol. iii., pp. xxiv., *sq.*); Geiger, *Wissent. Zeitschrift* (v., pp. 98, *sq.*); Grätz, *Geschichte der Juden* (vii., pp. 31, *sq.*); *Jew. Quart. Rev.* (i., pp. 60, *sq.*).

Several smaller treatises were also written by Maimonides, such as the *Letter on the Resurrection* (1291); *Logical Terminology* (about 1160); *Treatise on the Unity of God*, etc. See Steinschneider, *Hebr. Uebers.* (i., pp. 341. *sq.*).

III. While living in Fostāt a great part of Maimonides's time was taken up with his duties as a physician. His interest in the study of medicine is seen in the eight treatises which he wrote. They exist, still in MS., in many of the European libraries. A complete account may be found in Steinschneider, *Hebr. Uebers.* (i., § 481, pp. 762, *sq.*).

Authorities.—In addition to those mentioned above, Steinschneider, *Catalogus Librorum Hebræcorum in Bibliotheca Bodleiana* (Berlin, 1852) col. 1860; Grätz, *Geschichte der Juden* (vi., pp. 363, *sq.*); S. B. Scheyer, *Das psychol. System des Maimonides* (Frankfort-on-the-Main, 1845); Geiger, *Moses Ben Maimon* (Breslau, 1850); M. Joel, *Die Religionsphilosophie des Moses ben Maimon* (Breslau, 1859); *Albertus Magnus und sein Verhältniss zu Maimonides* (Breslau, 1863); S. Rubin, *Spinoza und Maimonides* (Vienna, 1868); Ad. Jaraczewsky, *Zeitschr. f. Philos. und Philos. Kritik* (vol. xlvi., pp. 5–24, Halle, 1865); M. Eisler, *Vorlesungen über die Jüdische Philosophen* (ii., Vienna, 1870); D. Rosin, *Die Ethik des Maimonides* (Breslau, 1876); D. Kaufmann, *Gesch. der Attributenlehre* (pp. 363, *sq.*, Gotha, 1877); I. Münz, *Die Religionsphilosophie des Maimonides* (Berlin. 1887); Steinschneider, *Mōrēh Mekōm Hammōrēh* (Berlin, 1885).

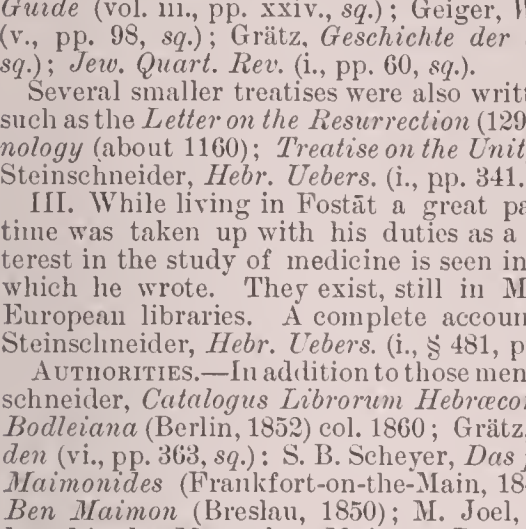
Richard Gottheil.

Main, mīn: a river of Germany which rises in the Fichtelgebirge, flows westward with a tortuous course for a distance of 300 miles, and joins the Rhine opposite Mayence. It is navigable nearly 200 miles, and is connected with the Danube by the Ludwig's canal. The principal cities on its banks are Würzburg, Offenbach, and Frankfort.

Main, Hubert Platt: See the Appendix.

Maine: an ancient province of France, lying S. of Normandy, and comprising the present departments of Mayenne and Sarthe, and parts of Eure and Orne.

Maine: one of the U. S. of North America (North Atlantic group); the most northeasterly of the U. S., and the largest of the New England States; name used by early explorers to designate the mainland as distinct from the numerous islands which skirt the coast.



Seal of Maine.

Situation and Area.—It lies between 43° 04′ and 47° 27′ N. lat., and between 66° 56′ and 71° 06′ W. lon., and is bounded on the N. W. by the province of Quebec, on the N. by Quebec and New Brunswick, on the E. by New Brunswick, on the S. E. and S. by the Atlantic Ocean, and on the W. by New Hampshire. Its extreme length is 302 miles; extreme width, 285 miles. The gross area is 33,040 sq. miles, of which 3,145 are water surface. By the census of 1900 Maine ranked thirtieth among the States in population.

Topography.—The surface is disposed in two great slopes. The northern or St. John slope, drained by the St. John river, is 117 miles in length and about 90 miles in breadth, and has an area of 7,400 sq. miles. The divide which separates this from the southern slope is in general quite flat, and in many instances lakes and swamps near it have outlets in both directions. The region is a great monotonous plain, abounding in swamps, with but few mountain peaks, and some low rolling highlands. The average fall per mile toward the N. and E. is from 2 to 3 feet. The southern slope has an area of 24,100 sq. miles, with an average width of 140 miles. The elevation above the sea of the northern border varies from nearly 2,000 feet on the W., to less than 1,000 feet on the E. The average slope per mile is 7 feet.

Mountains.—The main mountain region crosses the State northeastwardly in a nearly straight line from the White Mountains, past Mt. Abraham and Mt. Katahdin, to Mars Hill near the St. John river. Mt. Katahdin, in the center of the State, is 5,385 feet high.

Rivers.—The rivers rise high among the mountain peaks—the Saco at an altitude of 1,890 feet, the Kennebec at 2,000, the Penobscot at 2,500, the Androscoggin at 3,000—and flow swiftly, with frequent falls and rapids, to the sea. Large lakes at their sources give abundant opportunity for storage, and the location of many of the best falls at the head of tide-water gives them an exceptional value. The available water-power of the State has been estimated at 2,656,200 horse-power.

Lakes.—Maine has more than 1,500 lakes situated at the head of the river systems and at the bases of the scattered mountain peaks. Together with the rivers they cover an area of 3,145 sq. miles, or one-eleventh of the area of the State. Moosehead Lake, the largest in the State, is 35 miles long, 10 miles wide, and 1,023 feet above the level of the sea, and Rangely Lake is 1,511 feet above it.

Seacoast.—Although the coast-line measured direct is only about 225 miles long, yet such is its irregularity and indentation that Maine has 2,486 miles of seacoast. In the western portion of the State the seacoast for 10 or 20 miles inland is flat, low, sandy, and at some points marshy. The only exception is Mt. Agamenticus in the extreme southwest. E. of the Kennebec, in the Camden Hills and the peaks of Mt. Desert island and vicinity, the shore rises abruptly from the sea to a height of from 1,000 to 2,800 feet.

Geology.—The rocks are highly crystalline and much disturbed. Metamorphosis has been carried to such an extent that only in a few cases are they fossiliferous. Consequently, the geological age of large areas is conjectural, and admits of no absolute statement except the general one that they are very old. The Devonian areas in the northern part of the State and in the vicinity of Perry and Pembroke, and the Silurian area at North Haven on Penobscot Bay, have been established beyond question. The entire surface, including Katahdin, is glaciated. Striæ and bowlders are found in all parts of the State. There are thirty-one systems of kames, having a general northerly and southerly direction. Through the southern part of the State are finely stratified fossiliferous clays of the Champlain period.

Soil and Products.—Maine presents a great variety of soils—clay, clayey loam, sandy loam, mountain interval, river bottom, salt marsh, and fresh meadows. The soil in the river valleys, and between the Penobscot and the Kennebec, and in the cultivated portions of Aroostook County, is of good quality. In the mountainous districts and along the seacoast it is sterile, and does not repay cultivation. Farms of alluvial soil, on the Androscoggin, Sandy, and Kennebec rivers, are the best for the cereals; the uplands for grazing and orchards; and the clay loam for hay. The forests are a great source of wealth. In the northern part of the State they are composed chiefly of pine, spruce, hemlock, and fir. Farther south there is an admixture of white and red oak, maple, beech, birch, and ash. There are cedar swamps in the northeast. In the south are found poplar, elm, basswood, dogwood, sassafras, juniper, buttonwood, alder, and willow. Butternut and hickory are found, but are not abundant; chestnut is found only on the southwest border. The apple is the leading fruit-tree. The plum, cherry, and pear are native. The blackberry, strawberry, raspberry, and blueberry grow in great profusion.

The moose, deer, caribou, bear, wolf, catamount, wolverine, wild-cat, fox, beaver, raccoon, marten, sable, weasel, mink, woodchuck, porcupine, rabbit, and squirrel inhabit the forests. Seals are found in many of the bays. Wild geese, ducks, brant, and teal inhabit the lakes and ponds. Gulls and fish-hawks are found on the coast. Eagles, hawks, owls, crows, partridges, pigeons, quails, robins, king-fishers, plover, woodcock, blackbirds, orioles, bobolinks, bluebirds, yellowbirds, humming-birds, swallows, and sparrows are common. Salmon, salmon-trout, trout, sturgeon, bass, and pickerel abound in the streams and lakes; and the cun-

ner, flounder, rock-cod and sculpin, the cod, pollack, haddock, hake, herring, menhaden, mackerel, porgy, and halibut are found in great numbers along the coast. Clams, mussels, and lobsters are abundant.

The minerals of chief economic value are granite, limestone, and slate. In 1899 the State ranked second in granite, the production being valued at $1,321,082, and Dix island (solid rock) and Hallowell being the principal sources; sixth in limestone, with production, chiefly burned into lime, valued at $1,028,375; and fourth in slate, with product of 24,676 squares of roofing slate, valued at $121,640, and other State products, $60,126. Other valuable minerals worked are iron, copper, gold, silver, lead, zinc, tin, manganese, arsenic, antimony, pyrites, freestone, marble, quartz for glass, brick clay, feldspar, garnet, beryl, and tourmaline.

The following from the U. S. census reports of 1880 and 1890 shows the extent of farming operations in the State:

FARMS, ETC.	1880.	1890.	Per cent.*
Total number of farms	64,309	62,013	3·6
Number of acres in farms	6,552,578	6,179,925	5·7
Value of farms, including buildings and fences	$102,357,615	$98,567,730	3·7

* Decrease.

The following table shows the acreage, yield, and value of the principal crops in 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	12,229	440,244 bush.	$242,134
Wheat	2,090	40,755 "	36,680
Oats	140,203	5,257,612 "	1,997,893
Barley	11,508	315,319 "	195,498
Rye	993	17,080 "	14,006
Buckwheat	23,992	719,760 "	352,682
Potatoes	49,208	6,200,208 "	3,038,102
Hay	937,774	843,997 tons	10,929,761
Totals	1,177,997	.....	$16,806,756

The farm animals on Jan. 1, 1900, comprised 109,747 horses, value $6,432,826; 203,814 milch cows, value $5,890,225; 112,723 oxen and other cattle, value $2,973,863; 254,027 sheep, value $787,484; and about 80,000 swine, estimated value $695,000; total value $16,779,398.

Two leading industries, though not directly agricultural, are of great benefit to the farmers of the State. The cutting of ice gives employment to a large number of men and teams at a time when they otherwise would be idle, and the development of the coast and lake regions as summer resorts gives a market for garden products. The canning of vegetables has recently grown to be an important and valuable industry. The value of the output of the 175 canneries in operation in 1900 was $5,000,000. In ordinary years $350,000 is paid to farmers for sweet corn alone.

Climate.—The climate, though severe and subject to great extremes, is moderately uniform during each season, and is favorable to health. Snow lies on the ground from three and a half to five months. Excellent drainage and winds from sea, mountain, and forest render the State almost free from malarial disease. The following table, compiled from reports by the U. S. Weather Bureau at Portland on the basis of observations made in that city, is fairly representative of the temperature and rainfall during 1893 in the thickly settled portions of the State. A considerable difference is shown by observations in the northern section, caused by conditions of its own:

MONTHS.	Highest temperature.	Mean temperature.	Rainfall, inches.
January	48° F.	15° F.	2·19
February	53	20	4·51
March	52	29	3·58
April	61	39	3·71
May	83	52	7·59
June	88	60	3·62
July	93	68	0·96
August	90	67	2·74
September	74	56	2·33
October	75	51	5·13
November	58	38·5	1·83
December	46	22	5·42

Divisions.—For administrative purposes Maine is divided into sixteen counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Androscoggin	9-B	48,968	54,242	Auburn	12,951
Aroostook	3-E	49,589	60,744	Houlton	4,686
Cumberland	10-B	90,949	100,689	Portland	50,145
Franklin	7-B	17,053	18,444	Farmington	1,251
Hancock	8-E	37,312	37,241	Ellsworth	4,297
Kennebec	9-C	57,012	59,117	Augusta	11,683
Knox	9-D	31,473	30,406	Rockland	8,150
Lincoln	10-D	21,996	19,669	Wiscasset	1,273
Oxford	8-A	30,586	32,238	Paris	3,225
Penobscot	6-E	72,865	76,246	Bangor	21,850
Piscataquis	5-D	16,134	16,949	Dover	1,889
Sagadahoc	10-C	19,452	20,330	Bath	10,477
Somerset	6-C	32,627	33,849	Skowhegan	4,266
Waldo	9-D	27,759	24,185	Belfast	4,615
Washington	7-G	44,482	45,232	Calais Machias	7,655 2,082
York	11-A	62,829	64,885	Alfred	937
Totals	.....	661,086	694,466		

* Reference for location of counties, see map of Maine.

Principal Cities and Towns, with Population for 1900.—Portland, 50,145; Lewiston, 23,761; Bangor, 21,850; Biddeford, 16,145; Auburn, 12,951; Augusta (capital), 11,683; Bath, 10,477; Waterville, 9,477; Rockland, 8,150; Calais, 7,655; Westbrook, 7,283; Brunswick, 6,806; South Portland, 6,287; Saco, 6,122; Oldtown, 5,763; Gardiner, 5,501; Eastport, 5,311; Brewer, 4,835; Belfast, 4,615; Ellsworth, 4,297; and Skowhegan, 4,266.

Population and Races.—In 1850, 583,169; 1860, 628,279; 1870, 626,915; 1880, 648,936; 1890, 661,086 (native, 582,125; foreign, 78,961; males, 332,590; females, 328,496; white, 659,263; colored, 1,190, including 73 Chinese, 1 Japanese, and 559 civilized Indians); 1900, 694,466. The majority of the foreign population are French-Canadians. There is an important Swedish settlement at New Sweden. Maine has the largest proportion (more than three-quarters) of purely native stock among the New England States.

Industries and Business Interests.—The following table gives a summary of the manufacturing and mechanical industries of the State, as reported by the census of 1890:

INDUSTRIES.	Year.	Number of establishments.	Capital.	AVERAGE NUMBER OF EMPLOYEES AND TOTAL WAGES PAID.		Cost of materials used.	Value of products.
				Employees.	Wages.		
Total for the State	1890	5,010	$80,419,809	75,780	$26,526,217	$51,509,678	$95,690,760
	1880	4,481	49,988,171	52,954	13,623,318	51,120,708	79,829,793
Increase	.....	529	$30,431,638	22,826	$12,902,899	$388,970	$15,860,967
Totals for selected industries:							
Woolen goods	1890	82	$9,484,925	5,453	$1,991,676	.....	$8,814,256
Cotton goods	"	23	20,850,754	13,992	4,372,473	.....	15,316,909
Boots and shoes, custom-work and repairing	"	136	54,080	198	85,639	$55,098	167,034
Boots and shoes, factory product	"	53	4,804,946	6,597	3,078,466	5,800,682	10,335,342
Lumber, planing-mill products, including sash, doors, and blinds	"	67	962,940	660	332,412	563,973	1,085,692
Lumber and other mill products from logs or bolts	"	831	11,883,447	8,932	2,519,609	5,950,780	10,907,438
Ship-building	"	85	1,027,756	1,539	843,715	1,423,175	2,818,565
Paper	"	6	1,578,327	775	371,980	1,062,628	1,762,440
Pulp, wood	"	11	2,695,498	793	366,257	610,659	1,518,611
Leather, tanned and curried	"	51	2,231,702	911	411,791	2,307,343	3,363,672
Flour and grist mill products	"	210	1,194,900	463	186,420	2,806,869	3,254,690
Foundry and machine-shop products	"	82	3,024,473	1,903	1,041,663	1,139,070	2,628,572
Fish, canning and preserving	"	35	527,420	2,391	471,643	900,674	1,660,881
Fruits and vegetables, canning and preserving	"	44	1,014,980	2,133	215,620	700,719	1,192,689

Ship-building.—The close proximity of ocean and forest, the deep-water inland harbors, the skilled labor the result of generations of ship-builders, combine to make ship-building a leading interest of the State. At Bath alone since 1781 there have been built more than 4,000 vessels, having a total tonnage not far from 1,500,000. In 1899 about 50,000 tons of new shipping were launched, Bath furnishing 40,009 tons. Bath has a yard large enough to allow the construction of eight or ten large wooden ships at once, and a very large yard for iron ship-building.

Quarries.—The roofing-slate produced from the quarries of Piscataquis County is almost free from impurities, perfectly granulated, and consequently is flexible and not easily broken. Its remarkable cleavage renders its capable of being split into very thin plates, and its color is a deep black, unchangeable by exposure to weather. Maine stands first among the States in the amount of capital invested and persons employed in granite quarries, and second in amount and value of product. The New York State Capitol at Albany and the Metropolitan Museum of Art, New York, are constructed of Hallowell, Kennebec co., granite. Maine heads the list of States in the value of lime produced. In Knox County large quarries of very pure limestone are operated exclusively for the purpose of burning the product into lime.

The following is a summary of the quarrying industry of the State according to the census of 1890:

CLASSIFICATION.	No. of quarries.	Capital.	Persons employed.	Wages paid.	Value of product.
Lime	60	$1,120,500	1,063	$679,825	$1,523,499
Slate	4	641,000	309	160,300	214,000
Granite	153	3,192,317	3,737	1,517,026	2,225,839
Totals	217	$4,953,817	5,109	$2,357,151	$3,963,338

Fisheries.—In 1898 239 men and 300 boats were employed in mackerel fishing; number of pounds of fish sold fresh, 814,130; value $47,125; number of barrels salted, 665; value, $9,450; canned, 6,591. The total capital invested in seashad fishing was $2,363,374; the number caught in 1898, 1,152; value $23,720. In the herring fisheries 1,470 men were employed, and the amount received from the herring sold was $730,058. Sardine packing gave employment to 5,839 persons; wages received for labor, $811,775; value of the 178,694 cases put up, $2,727,781; of the oil, $4,635; of the fertilizer produced, $6,820. The number of men employed in lobster fishing was 3,103; number of lobsters handled, 8,178,332; number of seed lobsters furnished to the U. S. hatchery in 1897, 21,365; eggs resulting, 25,207,000; fry hatched, 22,875,000; number planted in Maine, about 21,875,000. In the menhaden industry 869 men were engaged and 83 steamers, at an expense of $105,000 paid employees; number of tons of pomace procured as fertilizer, 9,120 tons. In digging clams and scallops 550 men were employed; product of the canneries, 40,933 cases; in the shell, 1,109,936 bushels. The catch of smelts was 1,156,684 pounds; persons engaged, 1,095. In ground fishing, 819 boats and 1,291 men were employed; fish taken, 32,952,619 pounds, value $565,271.

The following is a summary of the fisheries of the State, according to the census of 1890:

DESIGNATION.	Number.	Value.
Persons employed	12,537	.....
Fishermen	10,944	.....
Shoremen	1,593	.....
Capital invested	.....	$2,562,709
Vessels	422	591,520
Boats	9,397	295,320
Minor apparatus	.....	597,344
Other capital, including shore property	.....	1,078,525
Products	.....	3,046,989
General fisheries	.....	3,024,686
Menhaden-fishery	.....	14,053
Oyster-fishery	.....	8,250

Commerce.—Maine has twelve U. S. customs districts and ports of entry—Aroostook, Bangor, Bath, Belfast, Castine, Frenchman Bay, Kennebunk, Machias, Passamaquoddy, Portland and Falmouth, Waldoboro and Wiscasset. For the 9 months ending March, 1901, the imports of merchandise at these ports (excepting Frenchman Bay) amounted to $1,928,553, and the exports to $13,005,282. The domestic traffic of the State by rail and water is very large.

Finance.—The total assessed valuation in 1880 was $235,978,716; in 1890, $309,129,101. The total valuation of real and personal property Jan. 1, 1900, was $287,691,790; the bonded indebtedness $2,203,300. The tax-rate is about 2¾ mills on each dollar of valuation. The receipts for the two years ending Dec. 31, 1900, were $3,798,923.03; the disbursements, $3,754,767.75. On Jan. 1, 1901, the bonded indebtedness of the State was $2,103,000, and the outstanding temporary loans $350,000. The payments on the public debt in 1899 and 1900 aggregated $100,000, and the reduction since 1890 $516,300.

Banking.—Sept. 5, 1900, there were 82 national banks in the State, with combined capital of $10,846,000, individual deposits of $21,833,792.67, and surplus and profits of $4,838,480.71. June 30, 1900, 51 savings-banks, which together had 183,103 depositors, $66,132,677 in individual deposits, and $3,577,578 in surplus and profits; and 17 loan and trust companies with a capital of $1,601,700, individual deposits of $9,058,640, and surplus and profits of $729,907.

Means of Communication.—There were 1,905·25 miles of railroads in operation Nov. 30, 1899, of which 154·17 miles were narrow gauge. The gross earnings of the steam roads were $8,723,218.62, and the number of passengers carried 4,908,971; amount of freight carried 6,539,200 tons. They employed 7,036 persons at wages aggregating $3,242,411.31. There were 240·20 miles of street railways June 30, 1899, employing 864 persons at wages aggregating $390,250.50 and carrying 18,496,374 passengers. The gross earnings for the year were $1,090,417.69 and the operating expenses $686,419.96.

Churches.—The census of 1890 gave the following statistics of the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	88	89	57,548	$597,550
Methodist Episcopal	355	337	22,996	1,152,875
Congregational	240	277	21,523	1,512,030
Baptist	232	242	18,492	915,550
Free-will Baptist	280	273	16,294	584,750
Universalist	86	84	3,750	542,900
Christians	60	36	3,451	76,380
Protestant Episcopal	38	37	3,291	406,590
Spiritualist	21	21	2,562	15,650
Unitarian	22	25	2,421	216,700
Advent Christian	65	62	2,317	38,100
Friends	23	23	1,430	35,975

To prevent excessive multiplication of feeble churches in small towns, and to promote comity between denominations in missionary work, an interdenominational commission was formed in 1892, composed of representatives of the Baptist, Free Baptist, Methodist Episcopal, Congregational, and Christian denominations, who agreed to hold consultations before beginning Christian work which might affect each other's interests, and to refer all cases of friction to the executive committee of the commission.

Schools.—Children between the ages of nine and fifteen years are required to attend school twelve weeks in each year. Every city and town is required to raise and expend for schools a sum not less than 80 cents per annum for each inhabitant. The State, from the income of a permanent school fund, from a tax of one mill per dollar of valuation on property in the State, and from a tax of 1 per cent. on the annual average deposits in savings-banks, distributes school money in proportion to the number of children of school age in each town. The total revenue for school purposes in 1899 was $1,507,345; the total expenditure $1,513,125. There were 3,966 school-houses, the estimated value of school property being $4,222,395. The total number of teachers employed during the year was 6,447—1,020 males and 5,427 females. The average monthly salary of a male teacher was $39.03, of a female teacher $27.20. The number of children of school-age in the State was 210,192, of whom 131,588 were enrolled in the public schools, with an average daily attendance of 97,706. School was held an average of 126 days during the year. The average expenditure per pupil, based on the average daily attendance, was $15.48. The schools are supplied with free text-books, at an annual cost of about $200,000. The district system, by which weak and inefficient schools under a management divided between the town committee and the district agent were maintained at disproportionate expense, has prevented the progress of education in the rural regions. The system was abolished by the Legislature in 1893. A system of free high schools was established in 1878, by which the State contributes $250 to each town which raises a sum not less than $250 for the support of a free high school. As the

support of the high schools is voluntary on the part of the towns, the constant and uniform increase in the number of such schools is a gratifying indication of increased interest in education.

Since the establishment of free high schools in all the principal towns the academies, which were important factors in the education of the State during the earlier portion of its history, have relatively declined, as they can not draw enough pupils to support them by tuition. In 1891 the State came to the temporary relief of several of these academies by the appropriation of $500 annually for ten years. There are five State normal schools: at Farmington, with an attendance in 1898–99 of 244 students; Castine, with 360; Gorham, with 276; Springfield, with 122; and Fort Kent, with 112.

The following table shows the condition of the institutions of higher education in the school year 1898–99:

NAME.	Founded.	Location.	Instructors.	Male students.	Female students.	Total students.
Bowdoin College	1802	Brunswick	35	360	0	360
Colby University	1818	Waterville	16	127	68	195
Bates College	1863	Lewiston	24	187	120	207
State College	1865	Orono	46	329	0	329
Bangor Theological Seminary	1816	Bangor	6	23	0	23
Cobb Divinity School	1840	Lewiston	7	36	4	40
Medical School of Maine	1821	Brunswick	16	126	0	126

Charitable, Reformatory, and Penal Institutions.—These comprise a State prison, at Thomaston, in which the prisoners are employed in various industries, and are given instruction in reading, writing, spelling, book-keeping, arithmetic, geography, and history; a State reform school, at Cape Elizabeth, which has a farm of 184 acres, a mechanical school, a library, reading-room, and an entertainment-hall (where the cottage system has been introduced); a State Industrial School for girls, at Hallowell, which is not a house of correction, but a refuge for girls between the ages of seven and fifteen years who are in danger of falling into vice and immorality, where they are taught to become self-supporting; a State insane asylum, at Augusta, which is inadequate to meet the needs of the State; a military and naval orphan asylum, at Bath; the Maine General Hospital, at Portland; the Maine Eye and Ear Infirmary, at Portland; and Good Will Farm, at East Fairfield, where boys of good character and promise are given homes in attractive cottages and trained for lives of usefulness.

Post-offices and Periodicals.—On Jan. 1, 1901, there were 1,262 post-offices in the State, of which 69 were presidential (3 first-class, 15 second-class, 51 third-class) and 1,193 fourth-class. There were 545 money-order offices and 8 money-order stations. Of periodicals, there were 16 daily, 6 semi-weekly, 101 weekly, 2 semi-monthly, 33 monthly, and 1 quarterly; total, 159.

Libraries.—A U. S. Government report on public libraries of 1,000 volumes and upward each, in 1891, showed for Maine a total of 93 libraries, which contained 448,598 bound volumes and 90,562 pamphlets. The libraries were classified as follows: General, 44; school, 14, college, 6; law, 5; theological, 3; medical, 1; government, 1; public institution, 3; Y. M. C. A., 1; State, 1; social, 10; scientific, 2; historical, 1; and garrison, 1.

Political Organization.—The legislative power is vested in a House of Representatives of 151 members representing the towns, and a Senate of 31 members representing the 16 counties. The supreme executive power resides in a Governor, elected by a plurality vote of the people, and a council of seven members, representing as many districts, elected, as are also the treasurer and secretary of State, by joint ballot of the two houses. The judicial power is vested in a supreme judicial court of eight members, and superior courts in such counties as require them. State elections and sessions of the Legislature are biennial. Every male citizen of the U. S. of the age of twenty-one years and upward, excepting paupers, persons under guardianship, and Indians not taxed, having his residence established in the State for the term of three months next preceding any election, who is able to read the Constitution in the English language and write his name, is allowed to vote. The voluntary militia consists of 93 commissioned officers and 1,165 non-commissioned officers, privates, etc., all in the infantry arm of the service. Total authorized strength, 2,051; total liable to military service, 110,000.

History.—Maine was probably visited by Northmen about the year 1000 A. D., and was seen by the Cabots during their voyages in 1497 and 1498. In 1524 Verrazano named the whole coast New France. The voyages of Gosnold in 1602, Pring in 1603, and Weymouth in 1605 brought this region to the attention of the English. In 1603 Henry IV. of France granted a charter, embracing all North America between 40° and 46° N. lat., to de Monts, a French Protestant. In 1606 James I. of England granted the territory between 34° and 45° N. lat. to a company of Englishmen. Thus the whole coast of Maine was subject to a double grant, and became the scene of a prolonged contest between the English and French settlers; the French occupying the vicinity of the St. Croix and the Penobscot, the English occupying the vicinity of the Saco and the Kennebec, and each taking every opportunity to encroach upon the other. The first English settlement in New England, with the single exception of the slight and speedily abandoned attempt of Gosnold at Cuttyhunk, was made by a colony under the leadership of George Popham and Gilbert Raleigh at the mouth of the Kennebec in 1607, thirteen years in advance of the Pilgrims, and twenty-one years before the Puritans of Massachusetts Bay. Here they initiated what has since been the leading industry of Maine by building a 30-ton vessel, which they named the Virginia of Sagadahoc. The colony lacked a sound basis in family life and diversified industry; and after a winter of hardship, privation, and misfortune, the settlement was abandoned.

In 1620 the charter of New England was granted to forty noblemen, knights, and gentlemen. Two years later a patent under this charter gave to Sir Ferdinando Gorges and Captain John Mason the country between the Merrimac and the Kennebec for 60 miles inland. By a division in 1629 Gorges received the portion between the Piscataqua and the Kennebec. The Plymouth council, eager to settle the country, made numerous small grants inconsistent with previous grants, introducing much confusion and giving rise to protracted litigation. When the council surrendered their charter in 1635 Gorges retained what he had already possessed, and Sir William Alexander, the Earl of Stirling, received the region between the Kennebec and the St. Croix. In 1639 Gorges received a new charter, confirming the old boundaries on the coast, extending his territory twice as far inland, giving it to him as the province of Maine, under the feudal tenure of a county palatine, and investing him with vice-regal powers. In 1641 he established his government, under a kinsman, at Georgiana, now York, which in the following year became the first chartered city in America. Gorges died in 1647. Massachusetts laid claim to more and more extended jurisdiction in Maine; and finally, her claims being disallowed, in 1677 she purchased the entire Gorges interest for £1,250.

In 1691 the charter of William and Mary included Maine in the province of the Massachusetts Bay. This relation existed for the following 130 years. During the French and Indian war Maine suffered severely, both in loss of property and drain upon population, but contributed her share of men and means to the maintenance of the English cause. The period from the capture of Quebec in 1759 to the outbreak of the Revolution in 1775 was one of rapid growth for Maine. Deserted towns along the coast were repeopled, and new towns were established along the Saco, the Androscoggin, the Kennebec, and the Penobscot.

Maine bore an honorable part with Massachusetts in the war of the Revolution, suffering again severely in the devastation of the towns along the coast. The close of the war was followed by a large accession to the population. Many of the discharged soldiers came to take up the new eastern lands. From a population of 96,540 in 1789 Maine had grown to 151,719 in 1800, to 228,694 in 1810, and to 298,334 in 1820. The growth between 1810 and 1820 was greatly retarded by the Embargo Act, passed in 1807, and the war of 1812, which together with a succession of severe winters, almost destroyed the industries of the State. In 1815 and 1816 more than 15,000 people emigrated to Ohio. In 1820 Maine became a separate State. Politically Maine was an Anti-Federalist, or, as it was later called, a Democratic State, with but one or two exceptions, from 1810 to 1853; but the Democratic party lost control of the State first through its advocacy of prohibiting the liquor traffic in 1853; and again in 1855 when Anson P. Morrill carried the State as a representative of the advocates of the prohibitory law, and of the Knownothing party. In 1856 the Democratic and Anti-Maine Law candidate was chosen by the Legislature. The year 1856 marks the rearrangement of

parties with reference to the question of slavery. On this issue the State became strongly Republican, and for twenty-two years elected Republican governors. In 1879 Dr. Alonzo Garcelon, the Democratic candidate, was chosen by the union of the Democratic and Greenback members of the Legislature. The election in the fall of 1879 resulted, as in the previous year, in no election by the people, and it again devolved upon the Legislature to elect the Governor. Gov. Garcelon and his council, acting as the returning board, refused certificates of election to several Republican members on the ground of informality in the returns, without giving the customary opportunity for the public correction of such informalities; thus giving the Democratic and Greenback members a majority of the Legislature. The situation was complicated by charges of bribery brought against Republicans. Rival legislatures were organized, and rival candidates claimed the governorship. Gen. Joshua L. Chamberlain, as commander of the militia, preserved order and protected the property of the State; and by his firmness and impartiality brought about a peaceful settlement of the contest. In accordance with a decision of the Supreme Court of the State, a Republican Governor was inaugurated. In the following year a Fusion Governor was elected by a slender plurality. Since 1883 the Republicans have carried the State continuously by large majorities.

Soon after the treaty of 1783 with Great Britain there arose a dispute about the northeastern boundary of Maine, which was carried on with increasing bitterness until in 1842 the boundary was settled by the Ashburton Treaty. At this time Maine lost 5,500 sq. miles of territory, for which she received but a meager compensation from the national Government.

Maine has been a pioneer in the prohibition of the liquor traffic. In 1846 an ineffectual attempt was made to restrict the selling of liquor to sales for medicinal and mechanical purposes. In 1851 the first effective prohibitory law was enacted. Since that time the law has been frequently amended and strengthened. In 1884, by popular vote, prohibition was embodied in the constitution of the State. In 1891 the law was still further strengthened by making the penalty for keeping a drinking-house or tippling-shop $100 and costs, and in addition imprisonment for sixty days; and by making the payment of a U. S. special tax as a liquor-seller *prima facie* evidence that the person paying this tax is a seller of intoxicating liquor. In some sections of the State, under some officers and at some times, the law has been fairly successful in preventing the sale of intoxicating liquor. At other times and places, under other officers, the violation of the law has been open and flagrant. While during the greater portion of the time both political parties have been nominally in favor of prohibition, neither of them has given the law that consistent and persistent support which is necessary for its complete success. The prohibitory law has in great measure made it impossible for the liquor-dealers to control political parties. It has not, however, prevented political parties, when in power, from seeking to control the liquor-dealers in their own political interests. Prohibition in Maine has been neither a perfect success nor a complete failure.

In the civil war Maine met every call of the general Government promptly and generously, and furnished to the Union army 70,107 men, of whom 9,398 died during the war.

In 1891 Maine adopted a form of the Australian ballot system.

GOVERNORS OF MAINE.

Wm. King (resigned)	1820-21	Israel Washburn, Jr.	1861-63
W. D. Williamson (acting)	1821-22	Abner Coburn	1863-64
Albion K. Parris	1822-27	Samuel Cony	1864-67
Enoch Lincoln (died)	1827-29	J. L. Chamberlain	1867-71
Nathan Cutler (acting)	1829-30	Sidney Perham	1871-74
Jonathan D. Hunton	1830-31	Nelson Dingley, Jr.	1874-76
Samuel E. Smith	1831-34	Selden Connor	1876-79
Robert P. Dunlap	1834-38	Alonzo Garcelon	1879-80
Edward Kent	1838-39	Daniel F. Davis	1880-81
John Fairfield	1839-40	Harris M. Plaisted	1881-83
Edward Kent	1840-41	Frederick Robie	1883-87
John Fairfield	1841-43	Joseph R. Bodwell	1887
E. Kavanagh (acting)	1843-44	Sebastian S. Marble	1887-89
Hugh J. Anderson	1844-47	Edwin C. Burleigh	1889-93
John W. Dana	1847-50	Henry B. Cleaves	1893-97
John Hubbard	1850-53	Llewellyn Powers	1897-1901
W. G. Crosby	1853-55	John F. Hill	1901-
Anson P. Morrill	1855-56		
Samuel Wells	1856-57		
H. Hamlin (resigned)	1857		
J. H. Williams (acting)	1857-58		
Lot M. Morrill	1858-61		

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WILLIAM DE WITT HYDE and GEORGE J. HAGAR.

Maine, Sir HENRY JAMES SUMNER, LL. D., K. C. S. I., F. R. S.: jurist; b. Aug. 15, 1822; educated at Pembroke College, Cambridge, graduated 1844, and received a fellowship; was Regius Professor of Civil Law at Cambridge 1847–54; reader on Jurisprudence at the Middle Temple 1854–62; was engaged in India on the great legislative reform 1862–69; became in 1870 Corpus Professor of Jurisprudence at Oxford, and in 1871 entered the council of the Secretary of State for India; in 1877 was elected master of Trinity Hall, Cambridge, and in 1887 Professor of International Law; wrote an essay on *Roman Law* (1856); *Ancient Law* (1861); *Modern Theories of Succession to Property after Death, and the Corrections of them suggested by recent Researches*, and *Village Communities in the East and West*, six lectures delivered at Oxford in 1871; *Early History of Institutions* (1875); *Early Law and Custom* (1883); *Popular Government* (1885); and *International Law* (1888). D. at Cannes, Feb. 3, 1888.

Maine de Biran, mān′de-bēĕ-rāăn′, MARIE FRANÇOIS PIERRE GONTHIER: philosopher; b. near Bergerac, France, Nov. 29, 1766; served in the French army in the reign of Louis XVI. In 1803 his memoir *Influence de l'habitude sur la faculté de penser* won a prize from the French Institute. His *Sur la décomposition de la pensée* (1805), *Essai sur les fondements de la psychologie, Nouveaux essais d'anthropologie, Examen des Leçons de M. de Laromiguière* are all important contributions to philosophy. During his own lifetime only a few of his minor essays were printed. After his death, which occurred July 16, 1824, Cousin obtained access to his papers and published *Nouvelles considerations sur les rapports du physique et du moral de l'homme* (1834) and *Œuvres philosophiques de Maine de Biran* (3 vols., 1841). A complete edition of his works did not exist, however, until the *Œuvres inédites* appeared (1846–59, 3 vols.), edited by E. Naville. See Merten, *Étude critique sur Maine de Biran* (1865); E. Naville, *Maine de Biran, sa vie et ses pensées* (2d ed. 1874); Gérard, *Maine de Biran, essai sur sa philosophie* (1870). Maine de Biran is considered the founder of modern French Spiritualism, his works having inaugurated the reaction against the sensationalism of Condillac. He held that mental activity is a matter of immediate consciousness. Revised by J. MARK BALDWIN.

Maine-et-Loire, mān′ā-lwăăr′: western department of France; on the Mayenne and Loire, the second of which traverses the department from E. to W. by a valley varying in breadth from a mile to 5 miles. The bed of the Loire is here very wide, but the river is very shallow and crowded with islands. Area, 2,749 sq. miles. The surface is undulating and hilly, and the soil very fertile. The wine, of which the department annually produces 11,000,000 gal., is much esteemed, especially the white kinds. Large crops of wheat and excellent fruits are raised, and iron and coal are mined. Many cattle, sheep, and pigs are brought from the adjacent department for fattening. Horticulture is highly developed, and the fruits and vegetables of Saumur and Angers are much prized. The manufactures produce linen cloth, flannel, and cotton goods, worsted and cotton thread. Pop. (1896) 514,870. Capital, Angers.

Maine State College: an institution established by an act of the Legislature in 1865; located at Orono, on the

Penobscot river, 8 miles N. of Bangor. It is the easternmost college in the U. S. The college is a school of science and technology. It offers eight courses of study: the scientific, the civil, mechanical and electrical engineering, the chemical, the agricultural, the preparatory medical, and the pharmacy. Short courses, summer course, and extension courses are offered. Military drill is required of all male students. The college is supported chiefly by the State and the general Government. The endowment is $220,000. The income is $93,631. Tuition and rooms are free. There are eighteen buildings, of which the most important are Oak Hall, a dormitory, Wingate Hall for engineering, the laboratory for chemistry, Machinery Hall for mechanic arts, and Coburn Hall for biology. In 1900 the faculty numbered 46 and the students 329. The president is A. W. Harris. A. W. Harris.

Mai'notes (in Gr. Μανιάται): the people of Maina (Mani; ἡ Μάνη); a mountain district of Laconia, in the Peloponnesus, between the Messenian and Laconian gulfs, so called since the reign of Constantine Porphyrogennetus (944–959 A. D.). They boast of their descent from the ancient Spartans, although some consider them Slavic. They remained pagan until the reign of Basil (867–886 A. D.). They were virtually independent for many years before the rest of modern Greece. They are handsome, warlike, superstitious, and were formerly notorious robbers. Their number is about 60,000. See Walpole, *Memoirs relating to European and Asiatic Turkey* (London, 1817, pp. 33–63); Leake, *Peloponnesiaca* (London, 1846, pp. 138, note, 335 ff.); Curtius, *Peloponnesos* (Gotha, 1851), consult the index; Bartholdy, *Bruchstücke* (i., 246); Gell, *Journey* (246); Schafarik, *Slavische Alterthümer* (Leipzig, 1844, ii., 229); Leake, *Researches in Greece* (p. 416); Fallmerayer, *Geschichte der Halbinsel Morea* (i., 294); Ross, *Königsreisen* (ii., 223); Ῥαγκάβης, τὰ Ἑλληνικά (ii., 401 ff.); also see the histories of Finlay and Hertzberg. Revised by J. R. S. Sterrett.

Mainpuri: the capital of the district of Mainpuri, which forms part of the Northwestern Provinces, India (see map of N. India, ref. 6–E). It stands in lat. 27° 14′ N., lon. 79° 3′ E., and consists of two parts—the old town which dates back to the time of the Mahâbhârata, and the new town which was founded in the beginning of the nineteenth century. It carries on a considerable trade in cotton, indigo seed, opium, iron, etc. Pop. 23,000. The district is a part of the monotonous plain of the Doab, but is well-watered by rivers and canals. It is noted for its cereals, cotton, and sugar-cane. Area, 1,697 sq. miles. Pop. 820,000. M. W. H.

Maintenance [O. Fr. *maintenance*, deriv. of *maintenir*, to hold by the hand < Lat. *ma'nus*, hand + *tene're*, hold]: as defined by Lord Coke, is "a taking in hand, bearing up or upholding of a quarrel or side, to the disturbance or hindrance of common right." It was a common-law offense, although also made the subject of legislative prohibition and punishment as early as 1275. (3 Ed. I., c. 28). During the next three centuries many rigorous statutes were enacted for the suppression of this evil, which was felt to be a serious one. Its origin and the state of society which fostered it, are graphically described in Stubbs's *Constitutional History of England*, vol. iii., chap. xxi. "A man who wished to maintain his own right, or to attack his neighbor's," sought "to secure the advocacy of a baron, who could and would maintain his cause for him, on the understanding that he had the rights of a patron over his client." So great was the danger of the oppression of the poor and the weak by the barons and their retainers during several centuries, that the courts felt forced to hold many acts to be maintenance that are considered perfectly harmless now. If a person attempted "to persuade a lawyer to act as counsel for another gratis," or went with the other "to inquire for a person learned in the law," or testified as a witness without being subpœnaed, he was guilty of maintenance. Some authorities declare that an assignment of a chose in action was not permitted by the common law because it amounted to maintenance, but the statement is incorrect. (Pollock *On Contracts*, p. 207.) As the power of the barons diminished, and the various classes attained more nearly to equality before the law, the tendency of judicial decision was reversed, and the limits of this offense were narrowed. Persons who had a pecuniary interest in the subject of litigation, or were closely related to one of the parties, were allowed "to take a hand" in the controversy. The same exemption was made in favor of persons sustaining the relations of master and servant, or of landlord and tenant. Even a rich man could give assistance to a poor litigant as a matter of charity; and in such a case, if the aid is given in good faith, it does not matter that the rich man is unreasonably duped, or that he acts thoughtlessly and inconsiderately. *Harris* vs. *Brisco*, 17 Queen's Bench Division 504.

Because of the changes in social conditions and of the judicial reaction against the stringent rules of the early law, maintenance as a crime has become practically obsolete in Great Britain. That it is still a subject of importance, however, as a tort, is shown by the case of *Bradlaugh* vs. *Newdegate*, 11 Queen's Bench Division 1, decided in 1883. Bradlaugh having sat and voted in the House of Commons without taking the oath required by statute, was subject to a penalty of £500. Newdegate, a member of Parliament, supposing he could not bring a suit in his own name, requested one Clark to institute an action for the penalty, and gave him a bond of indemnity against all costs and expenses he might incur. Clark was defeated, on the ground that he had no right to sue for the penalty. As he was unable to pay the costs of the action, Bradlaugh sued Newdegate for maintenance, and recovered as damages all the costs and expenses of the Clark suit. Chief Justice Coleridge, in rendering the decision, spoke of the action as of the rarest in modern times, but declared he had no wish to abolish an action which might be in some cases the only way of redressing a cruel wrong. According to this case, maintenance consists in inducing or assisting another to bring or prosecute an illegal action.

In most of the U. S. maintenance, both as a crime and as a tort, has been abolished, or has never existed. (*Schomp* vs. *Schenck*, 40 N. J. L. 195; *Richardson* vs. *Rowland*, 40 Conn. 565.) Even in those States where it still maintains a foothold, a corrupt motive, or the hindrance or perversion of justice, is believed to be an essential element of the offense. Wherever maintenance is illegal, a contract involving it is void. See Stephen's *History of the Criminal Law*, vol. iii., ch. xxxi. Francis M. Burdick.

Maintenance of Way: the department of a railway organization which has charge of the repairs and renewals of the road-bed, track, bridges, and buildings. The field operations of this department are usually under the charge of civil engineers called roadmasters, who subdivide their divisions into sections, on which gangs of men are continually at work. The expenses of the maintenance of way of the railways of the U. S. is, including taxes, about 30 per cent. of the total expenses. See Rails and Railways. Also Parsons's *Track* (New York, 1886). M. Merriman.

Maintenon, măñt'nōn', Françoise d'Aubigné, Marquise de: wife of Louis XIV.; born of noble Protestant parentage in the prison of Niort, France, Nov. 27, 1635; went in 1639 with her parents to Martinique, her father not being allowed to remain in France on account of his alleged treason. She returned in 1646; was sent by her relatives to be educated at an Ursuline convent. Under its influences she became a Roman Catholic after a long resistance. She was (1651–60) the wife of Scarron, a comic poet of inferior position; and in 1669 she became governess to Louis XIV.'s children by Madame de Montespan, whom she supplanted in the king's affections. She acquired and long maintained a powerful influence over the king, but it is not believed that she was ever his mistress. In fact, it is stated that she persistently refused to listen to his solicitations, and used her influences to reform his character so that his life might no longer be a public scandal. His affection for her continued to the end of his life, but in the later years of the reign she seems to have grown utterly weary of court life, and in her impatience to be off to St.-Cyr she deserted the bedside of the dying king. In 1683 the king married her in private, but she was never publicly acknowledged as his wife. Her religious influence was largely responsible for his increasing zeal for persecution, and especially for the Revocation of the Edict of Nantes; but she was probably not in sympathy with the violent measures that followed that unfortunate act. D. Apr. 15, 1719. She had considerable literary talent, and her *Letters* (9 vols., 1759; improved ed. 1865) are valuable. Revised by F. M. Colby.

Mainz: See Mentz.

Maiolica, or **Majolica**: enameled earthenware decorated in colors, and made in Italy. It is *faïence* (see Keramics), that is, it has a coarse earthenware body and an opaque smooth enamel, which covers and conceals the body, and upon which the painting is applied. In Italy the term is applied to all such wares, or to all except the coarsest and plainest; but it is used by collectors and students of keramic art in two special senses: first, by some writers for those

wares which are decorated with metallic luster, and for those only; second, for all the richly decorated wares of the fifteenth and sixteenth centuries and since that time, of which the lustered wares are only a portion. This last is the sense in which the word is most commonly used in English. Della Robbia ware (see Robbia) is not classed among majolica, because it has a far more solid and hard body. Some modern English wares of hard terra-cotta, covered with colored opaque or partially opaque glazes, are called *majolica*, in which case the term is rather a trade-name than one fixed by common usage. The term *mezza-maiolica*, that is, half or half-way maiolica, is applied to certain Italian wares of less beauty and importance than the fine pieces, and especially to those which are covered, not with real tin-glaze, but with *slip*, or potter's clay made very thin and liquid, or in some cases with lead-glaze.

The towns in which the famous and beautiful maiolica was made are situated in the northeastern part of Italy, with few exceptions. The most famous are as follows: Faenza, in the Marches, near Ravenna; Urbino, Pesaro, Gubbio, and Castel Durante (now Urbania), in the ancient duchy of Urbino, now in the province of the Marches; Caffagiolo, in Tuscany, on the old road from Florence to Bologna; Deruta near Perugia. A score of towns dispute the palm of excellence with these, and their wares all have merit and beauty. Castelli, in the Abruzzi, is remarkable for having kept its fine work going to a much later date than the northern towns.

The pieces most commonly decorated in an elaborate way are drug-pots, made for the dispensing establishments of convents and princely residences; plates and round platters, some having the rim or marly very broad, and a small, deeply sunken center, and others nearly flat, slightly concave or saucer-shaped; bowls, vases, pitchers of various forms, and some few special and unique pieces, such as an object like a large tortoise-shell, a pilgrim bottle or flask with rings to hold a cord, a plaque so richly painted as to be a picture on pottery instead of canvas or paper. These portable objects, with square tiles for floors and walls, make up the chief part of the finer wares. Some of these are of light ground, covered with arabesques and grotesques in dark green, dull red, dull yellow, and similar colors; the wares of Urbino are often of this character. Others have a dark-blue ground, upon which are relieved grotesque figures, masks, and scrolls in densely crowded patterns, very rich and strong in color. Others are painted in white on a white ground, the two tints differing slightly. Others are covered with splendid compositions of figures, with architectural or landscape backgrounds, all in full color. No pottery is more beautiful or more worthy of study than fine maiolica. Fine ancient pieces bring enormous prices. Many of them have been copied with some success in Italy in the latter half of the nineteenth century. Russell Sturgis.

Maiorescu, mă̆a-yō-res'koo, Titu: statesman and writer; b. at Krajova, Roumania, in 1840; studied at Vienna, Berlin, and Paris; became in 1862 Professor of Philosophy at Jassy; was chosen a representative in 1871; was Minister of Public Instruction 1874–76, and in 1876 envoy to Berlin. He holds a prominent position as a critic in recent Roumanian literature. Among his writings are *Einiges Philosophische in gemeinfasslicher Form* (in German, 1861); *Poesia rumână* (1867); *Observări polemice* (1869); *Despre scrierea limbei române* (1874); *Critice* (1874); *Logica* (2d ed. 1886); translations from Schopenhauer (1890). E. S. Sheldon.

Maipo, or **Maipu**, mī'poo, often written and pronounced **Maipú**, mī-poo': a river of Chili, rising in the Andes, and flowing W. to the Pacific, which it reaches in lat. 33° 39′ S. On its banks, about 8 miles S. of Santiago, was fought the decisive battle of Maipo, which secured the independence of Chili, and, more remotely, opened the way to the invasion of Peru and the final defeat of the Spaniards. After the defeat of Cancha Rayada (Mar. 19, 1818), San Martin concentrated the patriot force of 5,000 men on a plain to the N. of the Maipo. The Spanish general Osorio, advancing from the S. with 5,500 men, encountered him Apr. 5, 1818, and was defeated. Osorio fled, but Ordoñez, whom he left in command, surrendered with nearly all the principal officers and 2,200 men, 1,000 having been killed. The entire patriot loss in killed and wounded was about 1,000.

Maisch, John Michael: See the Appendix.

Maistre, mātr, Joseph, Count de: political and philosophical writer; b. at Chambéry, in Savoy, then a part of the kingdom of Sardinia, Apr. 1, 1754. His family was of French extraction, but had become thoroughly attached to the house of Savoy. Completing his law studies at the University of Turin, he entered the civil service of Savoy, was advanced rapidly, and in 1788 became senator. When under the Revolution Savoy was united to France he joined the emigrating nobility, and took up his residence at Lausanne (1792). There he wrote the *Considérations sur la France* (1796), which clearly foreshadows his later political thinking, and views the Revolution as a providential chatisement, to be followed by the restored and re-enforced authority of monarchy and the Church. In 1799 he was called by Charles Emmanuel IV. to Turin to be chancellor of the kingdom of Sardinia, and withdrew with him to Sardinia when the revolutionary movement took away his territory upon the mainland. In 1802 he was minister plenipotentiary to Russia, and represented the almost vanished kingdom of Sardinia at St. Petersburg throughout the Napoleonic era till 1817. He then returned to Savoy, and in 1819 was again called to Turin to his old post, with the title of Minister of State. D. Feb. 26, 1821. His principal works were written at St. Petersburg, though most were not published till after his return, some not till after his death. They are *Essai sur les principes générateurs des constitutions politiques* (1810), upholding the theory of absolute monarchy; *Du Pape* (2 vols., 1819), maintaining the necessity for the absolute supremacy of the pope; *Les soirées de Saint-Pétersbourg* (2 vols., 1821), philosophical conversations on the divine order in the world; and *De l'Église gallicane* (1821). They are all directed to upholding his conception of society as a divine order to be realized by an absolute authority. What he presents as of supreme importance is not individual liberty, but social order and unity, and this demands a single and unrestricted governor. This order and unity to be complete must be universal, and in this sense are to be realized by the supremacy and infallibility of the pope. This conception is defended with great power, learning, and polemical vigor. His intellectual force and his eminent qualities of style, which for brilliancy and fervor recalls that of Jean Jacques Rousseau, make him the most important of the apologists of traditional authority who attacked the ideas of the Revolution. Besides the works already mentioned, we have from him an *Examen de la philosophie de Bacon* (2 vols., 1836); *Lettres et opuscules inédits* (2 vols., 1851); *Correspondance diplomatique* (2 vols., 1860). There is an edition of *Œuvres complètes* (4 vols., Lyons, 1864) and *Œuvres posthumes* (Lyons, 1864). Cf. S. Rocheblave, *Joseph de Maistre* (Paris, 1893); Fr. Paulhan, *Joseph de Maistre et sa philosophie* (Paris, 1893); G. Cogordan, *Joseph de Maistre* (Paris, 1894). A. G. Canfield.

Maistre, Xavier, Count de: author; b. at Chambéry in 1763; entered the military service of Sardinia; emigrated to Russia after the conquest of Sardinia by the French; participated in the campaigns against Persia. D. in St. Petersburg, June 12, 1852. In 1794 he published at Turin *Voyage autour de ma chambre*, a very pleasant and original book, which in 1825 was followed by *Expédition nocturne autour de ma chambre*. He also wrote *Le Lépreux de la cité d'Aoste* (1811); *Les Prisonniers du Caucase* (1825); and *Prascovie, ou la Jeune Sibérienne* (1825).

Revised by A. G. Canfield.

Mait: Egyptian deity. See Mat.

Mait'land: town of New South Wales, Australia; on the navigable river Hunter, which divides it into East and West Maitland (see map of Australia, ref. 6–I). It is a prosperous place, has extensive manufactures of tobacco, active trade in wool, and rich coal mines in the vicinity. Pop. (1891) 9,907.

Maitland, Sir Richard, Lord Lethington: poet and lawyer; b. in Scotland in 1496; was educated at St. Andrews and in Paris; became a distinguished lawyer; and was successively employed in public affairs by James V., the regent Arran, and Mary Stuart. He became blind in 1560, but in spite of his infirmity was sworn a member of the privy council, and in Dec., 1562, nominated keeper of the great seal. D. in Edinburgh, Mar. 20, 1586. He made a MS. collection of early Scottish poetry, and wrote original poems of considerable merit, his *Satire on Town Ladies* being among the best known. The Maitland Club, established in Glasgow in 1828, published his poems in 1830. He also wrote a *Chronicle and Historie of the House and Surname of Seaton*, etc., and his MS. collection of ancient poetry is preserved in the Pepysian Library, Magdalene College, Cambridge. Revised by F. M. Colby.

Maitland, Samuel Roffey, D. D.: historian; b. in London, England, in 1792; was educated at Trinity College, Cambridge; was called to the bar in 1816; took orders in the Church of England in 1821; was perpetual curate of Christ church, Gloucester, 1823–29, and became in 1838 keeper of MSS. at Lambeth and librarian to the Archbishop of Canterbury; he retained both posts until his death at Lambeth Palace, Jan. 19, 1866. He wrote several works on propheey, on the eataeombs, on the history of the Albigenses and Waldenses, on the state of religion and literature in the Middle Ages, and on English eeclesiastieal history. A new edition of his valuable treatise on *The Dark Ages*, edited by Prof. Frederiek Stokes, M. A., was published in 1889. Revised by W. S. Perry.

Maitland, William, of Lethington, known as Secretary Lethington: statesman; eldest son of Sir Richard Maitland; b. in Scotland about 1528; was edueated at St. Andrews and on the Continent; beeame a eonvert to the doctrines of the Reformation about 1555; was in the serviee of the queen regent, Mary of Lorraine, 1554–59, when he joined the "Lords of the Congregation"; was one of the commissioners who met the Duke of Norfolk at Berwick 1559; was Seeretary of State of the queen regent; was made an extraordinary lord of session 1561; opposed the ratifieation of the *Book of Discipline*, and conducted the prosecution of Knox for treason 1563; had a debate with Knox on the independence of the Chureh 1564; was at least eognizant of the conspiracy against Rizzio; was exiled in consequenee, but soon recalled; was present at the eoronation of James VI. 1567; fought against Mary at Langside 1568; attended the conferences at York in the same year; was arrested, but soon liberated, and joined Kirkcaldy of Grange in support of the queen 1569; assisted in the defense of Edinburgh Castle 1572–73; surrendered May 29; died in prison at Leith, June 9, 1573. See J. Skelton's *Maitland of Lethington, and the Scotland of Mary Stuart: a History* (2 vols., London, 1887–88).

Maitreya [Sanskr., full of love toward all beings]: the coming Buddha, the fifth of the present age. He now lives in Tushita, the fourth Deva-loka (*q. v.*), where Gautama Sakyamuni is said to have met him and appointed him his suecessor. He will not appear until 5,000 years after the enlightenment of Gautama, when Buddhism has deeayed, and its preeepts are no longer obeyed. He is the only one of all the Bodhisattvas who is worshiped by Buddhists everywhere. R. L.

Maize, or **Indian Corn** [*maize* is from Span. *maíz*, from Haitian *mahiz*, maize]: the most important grain raised in North America; belonging to the tribe *Phalaridæ* of the natural order *Gramineæ*, or grasses. Its seientifie name is *Zea mays* (Linn.). It is indigenous to America, where it has always formed the ehief food of the Indian races, and from this eireumstanee its common name is derived. Its eultivation was introdueed from America into Southern Europe and Asia, and into Northern Afriea, where it spread with great rapidity. Indian eorn properly is a sub-tropieal grain, probably a native of the table-lands of Mexico or Peru, the great height of which gives them a distinet eharaeter from the lowlands in the same latitude. It thrives best under a hot summer sun, and its rapid growth and ripening give it a peculiar value for high northern latitudes, where the summer heat is as intense as the winter eold. In Great Britain the summer heat is not sufficiently intense to favor its produetion, and maize is very little grown in any part of Europe. Not only does maize require a high summer temperature, but it is a rapid and gross feeder and needs a large amount of moisture; it therefore flourishes best in a loose, fertile, well-eultivated, thoroughly drained soil, for though it requires a large amount of water in its growth, it will not thrive in a heavy, sodden, wet soil. It is grown both for its grain and the forage in its leaves and stalks. The grain is used for human consumption and as a food for animals. Large quantities of the grain are also used in the manufacture of distilled liquors, in the manufacture of starch, and of glucose-sugar.

Cultivation.—In order that the largest amount of grain may be produeed, it is necessary that abundant room be given to the individual plants for eomplete and full development. For this reason it is usually grown in hills of three or four plants each, 3 to 4 feet apart each way according to the size of the variety, or in drills 3 to 3½ feet apart, with single plants a foot to a foot and a half apart in the row. Maize can use to advantage a large amount of erude fertilizing material (coarse farm-yard manure), whieh is usually applied during the winter or early spring to the land. As soon as the land is well settled in the spring the manure is turned under to a moderate depth, and the land brought into a fine condition of eultivation by means of the harrow, eultivator, and roller. Planting is not done until the ground has become somewhat warm—usually in the maize belt from May 15 to 25, or even June 1. The old rule was that "maize should not be planted until the white-oak leaves were of the size of a squirrel's ear." In modern times scientific agriculture has changed this rule to "sueh a time as the soil has attained at one inch in depth a temperature of 50° at 7 o'eloek A. M." The young maize is carefully cultivated, the ground being kept loose and free from weeds until the plants have taken complete possession of the soil. After this cultivation is often continued in order to prevent loss of moisture by evaporation. In those portions of the U. S. where the stalks and leaves are of value as food for animals the crop is eut and gathered into stooks when the kernels are well glazed. When the stalks have cured the grain is removed from its husk and the fodder preserved in barns or stacks. All of the operations of eultivating maize, including even cutting the stalks and husking the grain, are now done successfully on a large scale by horse-power, so that the cost of labor in produeing a bushel of eorn has been much redueed. In the great maize-growing regions the grain is stripped from the standing stalks, little attempt being made to utilize the fodder exeept to turn it into the ground as manure.

Where maize is grown wholly for forage formerly it was the custom to plant it mueh thicker than is the case where it is grown for grain, the result being a larger amount of somewhat finer material with no grain, and of somewhat reduced feeding value. With the advaneement of the practice of preserving maize in pits or silos (see Ensilage) the system of growing maize for fodder has been very mueh changed, and now it is the eustom by the more advaneed growers to raise fodder-eorn for preserving in silos in practically the same way as if it were to be raised for grain, and when the plant has arrived at its full development the whole mass, grain, stalks, and leaves, is put into the silo.

Composition of Maize.—While maize has always been largely used as an artiele of human food in North America, it has never been made use of to any extent in Europe, and the exportation of maize from North America has been very small. Sinee 1890 the U. S. Department of Agrieulture has taken especial pains to bring the value of maize as a human food to the attention of the various European countries with considerable success, and the exportation of maize has been greatly inereased in consequenee. Maize does not differ greatly from the other eereals in the proportion of its food eonstituents, and it contains large amounts of the more important nutrients in a state of easy digestibility and availability. Below are given analyses of maize, wheat, oats, and barley, taken from the latest eompilation of analyses of American feeding-stuffs by Jenkins and Winton:

CONSTITUENTS.	Maize.	Wheat.	Oats.	Barley.
Water	10·9	10·5	11·0	10·9
Ash	1·5	1·8	3·0	2·4
Protein (albuminoids)	10·5	11·9	11·8	12·4
Crude fiber	2·1	1·8	9·5	2·7
Nitrogen-free extract (starch, sugar, etc.)	69·6	71·9	59·7	69·8
Ether extract (crude fat)	5·4	2·1	5·0	1·8

It will thus be seen that the ehief difference between maize and the other cereals is in its smaller proportion of ash and albuminoids, and in its larger proportion of fats. Sinee maize is so eheaply and so readily grown, not only the grain but the stalks and leaves form a most important source of fodder material for domestie animals. Maize fodder, i. e. stalks and leaves, is considerably laeking in its proportion of albuminoids or flesh-making materials, but in this respect it is not more so than timothy hay, as will be seen from the analyses appended, taken from the source already quoted:

CONSTITUENTS.	Maize fodder.	Maize stover.	Maize silage.	Timothy.
Water	42·2	40·1	79·1	13·2
Ash	2·7	3·4	1·4	4·4
Protein (albuminoids)	4·5	3·8	1·7	5·9
Crude fiber	14·3	19·7	6·0	29·0
Nitrogen-free extract (starch, sugar, etc.)	34·7	31·9	11·1	45·0
Ether extract (crude fat)	1·6	1·1	0·8	2·5

The maize-plant is an extremely variable one, and during its long period of cultivation it has sported into a large number of varieties. These varieties can be classified in a general way into five well-marked groups or races, as follows: Soft-corn, pop-corn, sweet-corn, flint-corn, and dent-corn. Probably the original maize was furnished with a husk about the kernel as well as about the ear, and it is thus occasionally grown in gardens as a curiosity, but it is of no practical value. The kernel of maize is made up of an outer corneous or horny portion, an inner softer or starchy portion, and the germ or cotyledon at the base. The distinction between the races is founded mainly upon the difference in the proportion of the corneous and starchy portions of the kernels. In one race the whole interior of the kernel is made up of starchy matter, to the exclusion of the corneous. This race is called soft-corn, and the best known variety of it is the Tuscarora. It is the kind most commonly used by Indian tribes at present, and probably it is one of the first variations from the original type.

In pop-corn the whole of the kernel is made up of corneous material with little or no starchy material. The peculiar quality of this class of varieties is that when heated rather quickly the kernel explodes with considerable force, and the corneous matter becomes expanded into a white floury mass. The sweet-corns also have a kernel largely made up of corneous matter, but when dry they present a much shrunken and wrinkled appearance. They contain a much larger per cent. of fat, and the kernels remain green for a much longer period than the other classes of corn. While in the green state they are much esteemed as a table vegetable. In flint-corn the corneous portion makes up from one-half to two-thirds of the whole bulk of the kernel enveloping on the outside the starchy material. Dent-corn differs from flint-corn in that at the top of the kernel there is a characteristic depression, and the starchy material reaches to the outside. Flint-corn and dent-corn are the two kinds most grown for market. Below are given the averages of all the analyses of the different varieties, taken from the same source as that previously mentioned. It will be seen that the main difference between the races comes in the larger proportion of fat in the sweet-corns:

CONSTITUENTS.	Dent-corn.	Flint-corn.	Sweet-corn.	Pop-corn.	Soft-corn.
Water	10·6	11·3	8·8	10·7	9·3
Ash	1·5	1·4	1·9	1·5	1·6
Protein (albuminoids)	10·3	10·5	11·6	11·2	11·4
Crude fiber	2·2	1·7	2·8	1·8	2·0
Nitrogen-free extract (starch, sugar, etc.)	70·4	70·1	66·8	69·6	70·2
Ether extract (crude fat)	5·0	5·0	8·1	5·2	5·5

Variation and Distribution.—While the varieties are easily classified into these well-marked races, hybridization easily takes place, not only among varieties of the same class, but between the classes as well, and new varieties are constantly being formed. The varieties vary in the height of the stalk and the size of the ears and kernels. In general, the dent-corns are the largest growing varieties, and the pop-corns the smallest. The flint varieties are grown largely in the northern and eastern portion of the U. S. and are considerably smaller than the dents. The dents are grown almost universally in the Southern and Western States. The corn that is grown in the extreme northern localities is usually of the soft type, notably the variety grown by the Mandan Indians in Northern Dakota, Minnesota, and Manitoba.

While maize is more generally cultivated over the whole area of the U. S. than any of the other cereals, still the great bulk of the crop is produced in a comparatively few States. In the States of the Central West, N. of the 36th parallel, maize finds soil and climate best adapted to its needs, and it is in these localities that it is mostly grown. The total yield of maize in the U. S. in 1900 was 2,105,102,516 bush., raised on 83,320,872 acres of land. Of this amount the State of Iowa produced 305,859,948 bush.; Illinois, 264,176,226 bush.; Nebraska, 210,430,064 bush.; Missouri, 180,710,404 bush.; Kansas, 163,870,630 bush.; Indiana, 153,200,800 bush.; and Ohio, 106,890,188 bush.; or all these States together produced about 70 per cent. of the whole. None of the other States produced so much as 100,000,000 bush. While the great bulk of the crop is produced in these few States, it is not in these States that the largest yields per acre are usually found. In small areas in fertile localities and with thorough cultivation, in the Eastern and Middle States, are usually found the largest yields per acre. The average yield per acre, as reported in the Year Book of the Dept. of Agriculture for 1900, varied from 7 in S. Carolina to 40 bush. in Wisconsin and Vermont. In the States S. of the 36th parallel the average yield is less than in those N. of that parallel. Though the highest average is given as 40 bush. per acre, this does not indicate the yield under favorable conditions of soil, climate, and good cultivation. Yields of over 100 bush. of shelled corn per acre are occasionally reported, and a yield of 60 to 80 bush. is common. See MAIZE in the Appendix. HENRY H. WING.

Majesty [from O. Fr. *majeste* > Fr. *majesté* < Lat. *majestas*, greatness, dignity, splendor, majesty]: a title which, as applied to royalty, is a reminiscence of the *majestas* claimed by the Roman emperors—a peculiar dignity, or literally *greatness*, which was held to have directly descended to the Emperors of Germany. Henry VIII. was the first English king to assume the style of His Majesty. The French kings after Louis XI. were by papal bull authorized to take the title of Most Christian Majesty; those of Spain, after Ferdinand and Isabella, Most Catholic Majesty; the Kings of Hungary, His Apostolic Majesty; the Kings of Portugal, Most Faithful Majesty. The monarch of Austria-Hungary is called His Imperial Royal Majesty.

Majolica: See MAIOLICA.

Major [from Lat. *ma'jor*, greater, compar. of *mag'nus*, great]: in music, a term used to designate any mode, interval, or key which is in certain respects *greater* than others. The major mode is that in which the third above the tonic is major, as from C to E, G to B, or D to F♯. On analysis, this interval of a major third will be found to embrace four semitones, whereas in a minor third there are only three. From this arises the distinction of greater and lesser, i. e. major and minor. Several of the intervals are thus variable in their contents, viz., the third, sixth, seventh, and ninth, not comprising in all cases the same number of semitones, and hence needing the discriminating names of major, minor, diminished, etc. The major intervals always contain one semitone more than the minor. See INTERVAL.

Major, properly **Meier**, GEORG, D. D.: theologian; b. at Nuremberg, Germany, Apr. 25, 1502; studied theology under Luther and Melanchthon; became rector at Magdeburg 1529, pastor at Eisleben 1535, Professor of Theology and court preacher at Wittenberg 1536; was a representative of the Protestants in the colloquy at Regensburg 1541; was for a few months in 1547, during the Smalcaldic war, superintendent and court preacher at Merchburg; returned to his post at Wittenberg 1548, became superintendent of the Mansfeld churches 1552; again returned to Wittenberg; d. there Nov. 28, 1574. By the active support he gave to the Leipzig Interim (Dec. 22, 1548), which asserted that good works are necessary to salvation, he separated from the strict Lutherans, and became involved in a controversy with Amsdorf (1552), who declared good works prejudicial to salvation, and his doctrine was rejected by the Formula of Concord (1580). In his later years he was involved in the Crypto-Calvinistic controversy, and was forced to sign the Torgau Articles. His principal works, being homilies and commentaries on the New Testament, were printed at Wittenberg (1569). The "Majoristic controversy" gave rise to the formation of a theological circle called Majorists.
Revised by S. M. JACKSON.

Major, RICHARD HENRY: geographer and historian; b. in London, England, Oct. 3, 1818. In 1844 he was appointed assistant in the British Museum in charge of the maps and charts, and from 1867 to 1880 was keeper of the department of printed maps and plans. From 1849 to 1858 he was honorary secretary of the Hakluyt Society, editing for it the *Select Letters of Christopher Columbus* (1847) and several other works. His best-known work, *Life of Prince Henry of Portugal, surnamed The Navigator*, appeared in 1868, and was followed by *The Discoveries of Prince Henry, the Navigator, and their Results* (1877). *The Bibliography of the First Letter of Columbus* was published in 1872. Major was vice-president of the Royal Geographical Society. His discoveries in relation to early Portuguese and Italian navigators were rewarded by decorations from the sovereigns of Portugal, Italy, and Brazil. D. at Kensington, June 25, 1891. HERBERT H. SMITH.

Major, or **Mair**, JOHN: theologian and historical writer; b. at Cleghorn, near North Berwick, Scotland, about 1470; was educated at the University of Paris, where he subsequently lectured, and gained for himself a great reputation

as a teacher. He taught at the University of Glasgow from 1518 to 1523, and at St. Andrews from 1523 to 1525. After spending several years in Paris, he returned to St. Andrews and was appointed provost of Salvator's College, an office which he held till his death in 1550. Among his pupils at Glasgow and St. Andrews, respectively, were John Knox and George Buchanan, who are thought to have derived some of their radical political ideas from their master. Major set himself against the Reformation and the spirit of the Renaissance, but he wrote on behalf of the liberties of the people against absolutism, whether in Church or state, and he is considered by some the foremost literary Scotchman of his time. His *History* has been translated by the Scottish Historical Society (1891). Among his other works are *In Librum Sententiarum Commentarius* (Paris, 1509–19) and *In Quatuor Evangelia Expositiones Luculentæ* (Paris, 1529). F. M. Colby.

Major'ca [Span. *Mallorca*; from Lat. *ma'jor*, greater, the greater. Cf. Minorca]: an island of the Mediterranean, belonging to Spain, and forming the largest of the Balearic group. Area, 1,310 sq. miles. Pop. (1877) 230,396 (with three small islands). The northern part of the island is mountainous, Silla de Torellas rising 4,596 feet. The southern and western parts are lower, and afford several good harbors. The soil is very fertile, and the climate a perpetual spring. All the products of Southern Spain, more especially of the province of Valencia, are raised here to perfection. Capital, Palma. Two volumes of Archduke Ludwig Salvator's *Die Baltaren in Wort und Bild* (1869–80) are devoted to Majorca. Revised by M. W. Harrington.

Major-general: See General Officer.

Majorists: See Major, Georg.

Major Scale: in music, with a major third and seventh. See Mode and Scale.

Makal'lah: town of the Hadramaut, Southern Arabia; situated on its southern coast, in lat. 14° 31′ N., lon. 49° 12′ E. (see map of Persia and Arabia, ref. 10–G). It has a good harbor, and many vessels visit it to take in provisions. It has a large trade, and is the market for the fertile valleys and numerous villages around it. The temperature is very high, and the climate trying to Europeans. Pop. estimated at 18,000, comprising besides Arabs, Somalis, Abyssinians, Negroes, Zanzibarites, and Hindus. M. W. H.

Makart', Hans: figure-painter; b. at Salzburg, Austria, May 29, 1840. He was a pupil of the Vienna Academy and of Piloty in Munich; traveled and painted in Italy, France, and England 1865–69, and in 1869 settled permanently in Vienna at the request of the Emperor Francis Joseph; became professor in the Vienna Academy 1879; honorary member of Munich and Berlin academies; was awarded gold medals at Vienna in 1857 and 1882; medal of honor, Paris Exposition, 1878; was made an officer of the Legion of Honor 1884. He became insane in Aug., 1884, and died in Vienna, Oct. 3, the same year. His compositions, several of which are executed on very large canvases, are notable for florid and striking color schemes. He possessed a fine sense of decorative possibilities in painting, and his works are good in general aspect. *Caterina Cornaro* (1873) was exhibited at the Centennial Exhibition, Philadelphia, 1876, and is now in the National Gallery, Berlin. His *Diana's Hunting Party* (1880) is in the Metropolitan Museum, New York, and *The Five Senses* (1879) and *Abundantia* have been shown in New York and elsewhere. His most successful work is *The Entry of Charles V. into Antwerp*, which he painted in 1875–78, and is now in the Kunsthalle, Hamburg. William A. Coffin.

Makau: See Chimakuan Indians.

Makrîzî, or **Makree'zee**, Ahmed Al: b. in 1360 at Makreczee, near Baalbee, in Syria; lived most of his life in Cairo, and died there in 1442. He wrote in Arabic several works on the history and topography of Egypt from the time of the Mohammedan conquest down to 1327 A. D., parts of which, as well as his essay on Egyptian weights and measures, have been translated into French by Quatremère and Sylvestre Sacy. He drew largely from Elmacinus, a Christian writer, who preceded him. He left unfinished a large work on the important persons who had visited Egypt. The original manuscript of the first volume is in the National Library in Paris.

Malabar': district of British India; in the province of Madras; extending from lat. 10° 15′ to 12° 18′ N., along the Arabian Sea; comprising an area of 5,765 sq. miles, with a population of 2,500,000. The principal products of the district are timber, especially teak, and pepper. The teak-tree grows on the plateau formed by the Western Ghats at an elevation of 5,000 feet. The pepper is cultivated on the coast-land. The name *Malabar* is often applied to the whole western coast of the peninsula.

Malac'ca: an old geographical name still used occasionally for the Malay Peninsula (*q. v.*).

Malacca: a small territory on the west coast of the Malay Peninsula; a part of the British Straits Settlements, formerly a part of the confederation of Negri-Sembilian, 100 to 150 miles N. W. of Singapore. Area, 640 sq. miles. Pop. 92,170, of whom 40 are whites, 1,647 natives of India, 18,161 are Chinese, and 70,325 Malays. The country is flat on the coast, rising to mountains in the interior. The eastern mountains afford some gold and large quantities of tin. The climate is hot and unhealthful. The principal crops are rice, pepper, and sago. M. W. H.

Malacca: a city; capital of the British territory of Malacca; lat. 2° 11′ N., lon. 102° 5′ E.; on the west coast of the Malay Peninsula (see map of East Indies, ref. 6–B). It is a picturesque place, formerly a very important port, but now in decadence in consequence of the rivalry of Singapore and Penang. It is a very ancient city, and was frequented by Arabian and Persian merchants as early as the eighth century. It fell into the hands of the Portuguese in 1511, into those of the Dutch in 1641, and, definitely, into those of the British in 1824, who received it in exchange for their rights in Sumatra. Pop. 20,000. M. W. H.

Malacca, Strait of: a channel which separates the Malay Peninsula from the island of Sumatra. It is 500 miles in length; its breadth varies from 35 to 180 miles.

Mal'achi [from Heb. *Mal'ākhī*, liter., my messenger, but supposed by some to be contracted from *Mal'ākhiyyāh*, messenger of Jehovah, whence Gr. Μαλαχίας]: the latest prophetic book of the Old Testament. The scene is laid during the second administration of Nehemiah, later than 433 B. C. (See Neh. xii. 27–xiii.) The people have neglected to provide for the support of the priests and the temple, and the priests have in turn become negligent, both in their care of the worship and in allowing illegal sacrifices from others (i. 6–ii. 9; iii. 7–12). The nation, in the person of its leading citizens, and even of its priests, is intermarrying with foreigners (ii. 10–16), and is committing this offense "a second time" (ii. 13). Especially in view of these offenses, the prophecy insists upon the promise made to Israel in the wilderness, "Behold I send my Angel" (Mal. iii. 1; cf. Ex. xxiii. 20, 23; xxxii. 34; xxxiii. 2), and applies this to existing and future conditions. It depends upon the men to whom he comes whether Jehovah's covenant Angel will be a blessed helper (Ex. xxiii. 20) or a relentless judge (Ex. xxiii. 21). Whether the name Malachi (My Angel) is that of the prophet who wrote the book or simply that of the book itself, in either case it connects itself with this most prominent idea in the book. Mal. iii. 1, or rather the Exodus text referred to in Mal. iii. 1, is cited in the Gospels in connection with John the Baptist and Christ; and Mal. iv. 5 is applied directly to John the Baptist. Willis J. Beecher.

Malachite [from Gr. μαλάχη, mallow, from its resemblance to the green color of the mallow-leaf]: a natural green carbonate of copper, occurring at many places, sometimes so abundantly as to be a valuable ore of copper. It differs only slightly in composition from Azurite (*q. v.*). Its brilliant color made it a favorite ornamental stone, though now little in use; it is rarely employed as a gem. The finest specimens come from Arizona, Australia, and Russia, where the celebrated Demidoff mines in Nijni Tagilsk, in the Urals, have yielded nearly all the malachite used in the arts for the nineteenth century. It is chiefly wrought in Russia, where it is used for inlaid work, ornaments of various kinds, and even paneling, as in some of the apartments in the Winter Palace and the Church of St. Isaac in St. Petersburg. G. F. Kunz.

Malachite Green: See Aniline Colors.

Mal'achy, Saint O'Morgair: archbishop and papal legate; b. at Armagh in 1094; became in youth a rigid ascetic, and when twenty-five became a priest; restored the monastery of Bangor; became in 1124 Bishop of Connor; in 1134 Archbishop of Armagh, Primate of all Ireland, and labored with much zeal to bring the Irish Church, thus far independent, under the papal sway. In 1137 he resigned the

primacy to its legal possessors (for that see was then a family possession), and became Bishop of Down. He soon afterward made a journey to Rome, visiting Bernard of Clairvaux on the way, and was named legate for Ireland by the pope. He brought back with him some Cistercian monks, with whom he established a monastery of that order in Ireland. In 1148 he induced the synod of Inis Padrig to request the pope to bestow the pallium upon the Irish bishops. D. at Clairvaux, Nov. 2, 1148, in the arms of St. Bernard, his biographer and friend. He was one of the most learned, eloquent, and influential men of his time.

Malacol'ogy [Gr. *μαλακός*, soft + *-logy*, science, from Gr. *λόγος*, discourse, reason]: a term given to the study of the molluscs. See MOLLUSCA.

Malacos'traca [Mod. Lat., from Gr. *μαλακός*, soft + *ὄστρακον*, shell of a testacean]: a name given to the higher CRUSTACEA (*q. v.*), embracing the lobsters, shrimps, crabs, beach-fleas, sow-bugs, and the like. These forms agree in having a body composed of twenty segments, all of which except the last are usually provided with appendages. Frequently more or fewer of the anterior somites are united with the head to form a cephalothorax. The Malacostraca are subdivided into the TETRADECAPODA, STOMAPODA, SCHIZOPODA, and DECAPODA (*qq. v.*). J. S. KINGSLEY.

Mal'aga: province of Spain, bordering on the Mediterranean, and bounded by the provinces of Cadiz, Seville, Cordova, and Granada. Area, 2,824 sq. miles. Pop. (1887) 519,377. It produces excellent and abundant wine, grain, and fruit, and is rich in metals and mineral springs.

Malaga: the capital of the province of Malaga, Spain; on the Mediterranean; 65 miles N. E. of Gibraltar (see map of Spain, ref. 19–E); is beautifully situated at the foot of a lofty mountain range, whose highest peak is crowned with the old Moorish castle Gibralfaro, and whose undulating sides are covered with vines producing the famous Malaga wine. The climate of Malaga is remarkably dry, sunny, and equable. It is an old city, founded by the Carthaginians, having lived through long periods of Roman and Moorish dominion. Many of its streets are narrow, crooked, and quaint, but the newer part, extending along the harbor and the beautiful *alameda*, has a thoroughly modern appearance. It has a cathedral, two fine theaters, and an immense amphitheater for bull-fights. Its harbor is spacious and safe, lined with quays, and provided with excellent dockyards. Its trade in wine, oil, figs, almonds, raisins, and grapes is extensive, and its manufactures of cloth, silk, ropes, and leather are prosperous; besides, it has several large iron-foundries, breweries, and distilleries. Pop. (1887) 134,016.

Malakans: a religious sect in Russia. See RASKOLNIKS.

Malakoff: one of the principal works of the fortress of SEVASTOPOL (*q. v.*), taken, with the Redan, by the united British and French armies Sept. 8, 1855.

Malan, măă'lăăn', CÉSAR HENRI ABRAHAM, D. D.: clergyman and author; b. at Geneva, Switzerland, July 7, 1787, of French Protestant descent; was bred a Socinian, and ordained in 1810; became a Trinitarian under the guidance of Robert Haldane and of Rev. Dr. John M. Mason, of New York, and was (1820–63) the pastor of an independent church at Geneva. His sect were called *Mômiers* (comedians) by the people. He was the author of many religious works. His hymns, *Les Chants des Sion* (1826; with original music 1841) and *Les Grains de Sénevé* (1846), are noteworthy. Many of his works have been translated into English. D. in Geneva, May 18, 1864. See his *Life* by his son, César (Geneva, 1869). Revised by S. M. JACKSON.

Malan, SOLOMON CÆSAR, D. D.: son of César Malan; b. in Geneva, Apr. 22, 1812; educated at St. Edmund Hall, Oxford, where he graduated with honors in 1837; senior classical professor in the Bishop's College, Calcutta, 1838–40; returned to England; was ordained priest 1843; vicar of Broadwindsor, Dorset, 1845–85; and in 1870 became a prebendary of Sarum, but resigned in 1875. He has written several original books on ecclesiastical subjects, ornithology, travels, etc., composed sacred and other music, designed illustrations for his own and other's works, and translated from Eastern and other literatures many books, mostly religious, including *The Gospel of St. John* in translations from the Syriac, Armenian, Geez, Georgian, Slavonic, Memphitic, Gothic, Sahidic, Anglo-Saxon, Persian, and Arabic. Among his most interesting translations are *The Conflicts of the Holy Apostles* and *The Book of Adam and Eve*, both from the Ethiopic. D. Nov. 25, 1895. Revised by S. M. JACKSON.

Malaria and **Malarial Fever**: See INTERMITTENT FEVER, MIASMA, REMITTENT FEVER, and CHILL.

Mä'larn, or **Mälar**: the most beautiful and one of the largest of the lakes of Sweden. With breadth of from 2 to 20 miles, it stretches 70 miles inland from the Baltic Sea, with which it is connected by a small but deep channel. It contains over 1,260 islands, fertile and well cultivated, or covered with forests of pine and birch. Stockholm is situated on both sides of the channel and on a number of islands in the Mälar lake, and several other towns are on its shores or on its islands.

Malayalam Language: See DRAVIDIAN LANGUAGES.

Malay Archipelago: See EASTERN ARCHIPELAGO.

Malay Peninsula, or **Malacca** [anc. *Aurea Chersonesus*]: the long peninsula extending southward from Indo-China. It begins properly about the latitude of Bangkok (13° 30′ N.), but the name is usually applied only to the peninsula beyond the Isthmus of Kra, about lat. 10° 30′ N. It ends in Cape Romania, lat. 1° 22′ N. Thus limited it is about 850 miles long, 210 miles broad at its broadest part, contains an area of 82,000 sq. miles, and a population of 1,400,000. The coast is flat, unhealthful, flanked with many islands, and has few good harbors. The interior is but little known. At the Isthmus of Kra it is low, but farther S. there are one or more ranges of mountains, parallel to the axis of the peninsula, and many isolated peaks. The greatest elevation known is about 9,000 feet. The rivers have a strong tendency to parallelism with the coast, and thus attain a greater length than seems consistent with the breadth of the peninsula. The climate is hot, humid, and unhealthful. The west coast is subject to sudden high winds of short duration, called sumatra, from the point whence they seem to come; the east coast is sometimes affected by the typhoons of the Gulf of Siam.

The mountains are rich in tin, which has been mined from time immemorial. Silver is common, especially on the west coast, and the peninsula has had a reputation for gold from the earliest times. Mt. Ophir, N. E. of the city of Malacca, received its name from the reputation for gold in its vicinity. The vegetation is very luxuriant; the forest growth of the mountains is one of the greatest in the world, and includes a great number of species of trees, such as teak, sandalwood, areca, ebony, camphor, and gutta-percha trees. Rice, sugar-cane, cotton, pepper, tobacco, tea, and coffee are among the cultivated plants. The fauna is very rich, especially in monkeys.

The human races represented are: (1) The Negritos, existing in small numbers in the mountains. (2) The Siamese, especially N. of the parallel of 7° N. (3) The civilized Malays, occupying the territory S. of 7° N., except the mountains of the interior, and savage tribes of Malays found in the latter localities with the negritos. (4) Among the immigrants the Chinese occupy the first place. Then come in order the Hindus, Arabs, Armenians, Jews, and Europeans.

Politically the territory is divided as follows:

STATES AND SETTLEMENTS.	Area, sq. m.	Pop. 1891.
I. SIAMESE TRIBUTARY STATES:		
Legor and Sengora	17,000	150,000
Keddah	3,600	30,000
Patani	5,000	30,000
Kelantan	7,000	20,000
Tringanu, etc	6,000	50,000
Totals	38,600	280,000
II. STRAITS SETTLEMENTS (British):		
Singapore	206	184,554
Penang and Wellesley	270	235,618
Malacca	640	92,170
Dingdings	210	2,000
Totals	1,326	514,342
III. STATES PROTECTED BY THE BRITISH:		
Perak	10,000	214,254
Selangor	3,000	81,592
Sungei Ujong	660	23,602
Negri Sembilan	2,000	41,617
Pahang	10,000	57,462
Johore	9,000	100,000
Totals	34,660	518,527

There is, besides, a considerable space sparsely occupied by wild tribes.

See STRAITS SETTLEMENTS, SINGAPORE, PENANG, MALACCA, KRA, etc. See also for a complete list of works published on

the Malay Peninsula, Dennys, *A Contribution to Malayan Bibliography*, in the *Journal* of the Straits Branch of the Royal Asiatic Society (Singapore, 1880 and 1881). Also Isabella Bird, *The Golden Chersonese* (1883); Keane, *Eastern Geography* (1887); Skinner, *The Eastern Geography, a Geography of the Malay Peninsula and Surrounding Countries* (1884); Godinho de Eredia, *Malacca, l'Inde méridionale et le Cathay* (manuscript reproduced and translated by Janssen, 1882). MARK W. HARRINGTON.

Malay Race [called by themselves *Malayu*]: the dominant race of Malacca (the Malay Peninsula) and the East Indian islands (Malay Archipelago). In a larger sense, the inhabitants of the greater part of the islands of Polynesia are said to be of Malay race, since physically and in language they are kindred, and the Malay traditions assume an insular origin for their people. Some ethnologists have made the Malays the type of a fifth or brown race of mankind, but others regard them as essentially Mongolian. They are of a brown color, have black and often curled hair, and prominent facial bones, are short of stature, and as a rule courageous, but unstable and subject to fits of uncontrolable rage. They are treacherous and unforgiving enemies and inconstant friends, idle and revengeful, but are active and useful sailors. Gambling, cock-fighting, and intoxication are the national vices. The Malays are inveterate liars. Some observers, however, give the Malays a much better character than the one here drawn. It is probable that intercourse with unscrupulous Europeans and Chinese has degraded them, as it has most other rude peoples, and the injustice and cheating of traders have done much to make them treacherous and deceitful. Fortunately, the Malays have a patriarchal system of living which has prevented them from becoming an aggressive and far-conquering race. In religion they are Mohammedans. Fondness for music and disregard of death are almost universal. Their so-called civilization is small. There are manufactures of weapons, of ornamental gold and filigree work, and of fast-sailing but small vessels of peculiar construction. The people are largely engaged in agriculture and trade. The standard Malay language, which belongs to the Malayo-Polynesian family, is written in the Arabic character. It is the commercial language of the East, and has been called, for its euphony, the Italian of Asia. The literature is abundant, and bears strong marks of Sanskrit and Arabian influence. See the *Dictionary* of Marsden (1812); Crawfurd, *Malay Grammar and Dictionary* (1852); Wallace, *The Malay Archipelago* (2 vols., 1869).

Malcolm: the name of four kings of Scotland. MALCOLM I.'s reign (943–54) is noteworthy for the cession of Cumbria by the Anglo-Saxon king Edmund to the King of the Scots. The latter was killed while trying to suppress a revolt in the north of Scotland.—MALCOLM II. (1005–34) successfully resisted the attempts of the Danes to conquer Scotland, and secured possession of Lothian.—MALCOLM III. (1059–93), surnamed Canmore, was reared at the court of Edward the Confessor. After the Norman conquest Edgar Atheling, the Anglo-Saxon claimant to the throne of England, sought refuge with his family at the court of Malcolm. The latter received him hospitably and married his sister Margaret, an alliance which involved the Scottish king in a quarrel with the Normans. After an unsuccessful invasion of England Malcolm was forced to acknowledge William the Conqueror as his suzerain. The war broke out anew in 1093, and the Scottish king crossed the border, but was slain near Alnwick.—MALCOLM IV. (1154–65) had to contend with many insurrections. Somerled, the Scots of Galloway, and the men of Moray successively revolted, but were subdued. After the suppression of a second rebellion of Somerled, the king died in the twenty-fourth year of his age.

Malcolm, Sir GEORGE: See the Appendix.

Malcolm, Sir JOHN: soldier and diplomatist; b. at Burnfoot, near Langholm, Dumfriesshire, Scotland, May 2, 1769; entered the army at the age of twelve years; became a cadet in the military service of the East India Company, and having familiarized himself with several Oriental languages, successfully performed a political mission to Persia in 1799, and became president of Mysore in 1803, and in the same year accompanied Gen. Arthur Wellesley in the Mahratta campaign, and signed the treaty of peace with Scindia after the latter's defeat at Assaye. During the ensuing years Malcolm was employed in high civil functions under the successive Indian administrations; was again sent as envoy to Persia in 1807 and 1809, but with less diplomatic success than before, and returned to England in 1812. He was knighted, wrote his elaborate *History of Persia* (2 vols., 1815), still an authority, and visited Paris during its occupation by the allied forces. He returned to the East in 1817; engaged in the Mahratta and Pindaree wars in the Deccan as second in command, with the rank of brigadier-general; distinguished himself at the battle of Mehidpur (Dec. 21, 1817), in which he broke the power of the Mahrattas; was governor of Malwa 1818–22; published his *Memoir of Central India* (1823) and his *Political History of India from 1784 to 1823* (1826); was governor of Bombay 1827–30; was member of Parliament for Launceston 1831. D. in London, May 31, 1833. A monument was erected to his memory in Westminster Abbey, and an obelisk 100 feet high at his native place. See his *Life and Correspondence*, by J. W. Kaye, 1856.

Malczewski, mäl-chev'ski, ANTONI: poet; b. at Warsaw, Poland, June 3, 1793. His father, a Polish general, gave his son a French education. He began his military career in 1811, but resigned in 1816; traveled in France, Italy, and Switzerland; studied English literature, and particularly the works of Byron. In 1821 he returned to Warsaw. At that time he had written a number of short stories and poems, a satire entitled *Karnawal Warszawski*, and several scenes of a tragedy, *Helena*. From Warsaw he retired to Wolhynia, where he wrote his celebrated epic, *Marya, powieść ukraińska* (Maria, a Story of the Ukraine, Warsaw, 1825), which he dedicated to Niemcewicz. The public, however, failed to appreciate the beauties of the poem, no one would buy his books, and Malczewski died in poverty, May 2, 1826, at Warsaw. His productions were original throughout, but his talent was not recognized until after his death. *Marya* has since been repeatedly edited, and translated into English (London, 1836), French, German, and Bohemian. Though occasional reminiscences of Byron may be found in his works, Malczewski differs from the English poet in the deep religious spirit which pervades his poems. J. J. KRÁL.

Maldah': town; in the province of Bengal, British India; on the Mahanadi, an affluent of the Ganges (see map of N. India, ref. 7–I). It is poorly built, with narrow and filthy streets lined with decaying houses. Its weaving-factories, once very active, have fallen into decadence since 1810, being transferred to English Bazar, 3 miles S. The surrounding districts, which in the rainy season are completely inundated, lie uncultivated. Pop. 5,000.

Mal'deghem: town; in the province of East Flanders, Belgium; 12 miles by rail E. of Bruges (see map of Holland and Belgium, ref. 9–C); with celebrated lace-manufactures. Pop. 8,600.

Malden, mawl'den: city; Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Malden river, and the Boston and Maine Railroad; 4 miles N. of Boston. The census returns of 1890 showed that 627 manufacturing establishments (representing 47 industries) reported. These had a combined capital of $7,050,416; employed 4,415 persons; paid $2,161,650 for wages and $5,428,785 for materials; and had products valued at $8,694,807. The principal industries were the manufacture of rubber boots and shoes, various kinds of leather goods, carpets and rugs, cotton goods, boot and shoe lasts, and sand and emery paper. In 1890 the city had 13 public-school buildings, and school property valued at over $362,800, and expended $80,867 for public education. There are 4 libraries (Bazar, Ladies' Exchange, High School, and Public), with over 25,000 volumes; a national bank, capital of $100,000; a savings-bank (deposits, $1,800,000); and 2 daily and 2 weekly newspapers. Pop. (1880) 12,017; (1890) 23,031; (1900) 33,664.

Malden Island: a solitary coral island of the South Pacific, in lat. 4° S., lon. about 155° W.; area, 35 sq. miles. It is without population or fresh water. It has supplied a large amount of guano. Great Britain took possession of it in 1866.

Maldive (măl'dīv) **Islands**: the larger part of a remarkable line of coral islands extending from off the Malabar coast southward for 20° of latitude, and consisting of the Laccadives, Minikoi, the Maldives, and the Chagos Archipelago. The Maldives extend from 7° 7′ N. to 0° 42′ S. lat., between the meridians 72° 27′ and 73° 50′ E. The Maldives form a double series of large atolls (nineteen in number), arranged like a closed chain hung on a peg. The whole group is thus one great compound atoll. The lagoons of the atolls

are dotted and margined by small islands, each one being a minute atoll. The total number of islets is popularly estimated at 12,000. There are 600 charted on the maps and 200 are inhabited. The islets rise in no case more than 6 feet above high water. At low water about 2,000 sq. miles of area are exposed, but at high water this is reduced to 350 sq. miles. The population is estimated at 20,000 to 30,000.

The larger islands are covered with wood, the cocoa-palm being the characteristic tree. Land animals are very scarce, but turtles and fish are common. There is no running water, but fresh water can be easily obtained by digging. The climate is temperate for the latitude, but is very unhealthful to immigrants because of the numerous lagoons and swamps. Violent fevers, the dropsical *beri-beri*, and dangerous dysenteries are sure to attack the newcomers.

The people are like the Singhalese, and speak a Singhalese dialect, but they have some characteristics in common with the people of Malabar, and also betray some African intermixture. They are short, dark copper-colored, gentle, hospitable, cleanly, domestic, and affectionate. They are divided into six classes or castes.

These islands were apparently known to Ptolemy and Ammianus. They have formed a little kingdom from the earliest times, and are now governed by a sultan of ancient lineage. They were converted to Islam about 1200 A. D. They have since been in Portuguese, French, and Dutch hands, and now form a nominal dependency of Ceylon. The people depend for food chiefly on fish and rice, the latter imported. The chief exports are coir, cocoanuts, and copra, cowry-shells, and dried bonito-fish. The sultan lives on the island of Mali, near the center of the group, a mile long by half a mile broad. Pop. 2,000. See *Voyages d'Ibn Batoutah* (trans. by Dufréméry and Sanguinetti, iv., 1858); *Voyage de François Pyrard de la Val* (1679); Bell, *The Maldive Islands* (1883). MARK W. HARRINGTON.

Maldon, mawl'dŭn: town; in the county of Essex, England; at the confluence of the Chelmer and the Blackwater; 38 miles N. E. of London (see map of England, ref. 12–K). It has manufactures of salt and silk, and breweries and iron-foundries. Pop. (1891) 5,397.

Maldonado, maăl-dō-naa'dō: a department of Uruguay, on the mouth of the Rio de la Plata; E. of Montevideo. Area, 1,610 sq. miles. Pop. (1891) 20,600. The capital, Maldonado, is a port-town, on a bay protected from E. winds by a projecting point, but open to the S. (see map of South America, ref. 8–E). Founded in 1762. It was formerly of considerable importance, but is now little used except for local trade and as a harbor of refuge. Pop. about 1,500. H. H. S.

Malebranche, maăl'braăńsh', NICOLAS: philosopher; b. in Paris, Aug. 6, 1638, of a rich and respectable family; was prevented by a feeble constitution from attending any public school as a youth; when older studied theology at the Sorbonne, and entered in 1660 the congregation of the Oratory. The incidental perusal, in 1664, of Descartes's *Traité de l'Homme* filled him with such an enthusiasm that henceforth he devoted himself exclusively to philosophy, and after ten years' preparation he produced his principal work, *De la Recherche de la Vérité* (1674), which contains the substance of his entire system of thought. His health was still very precarious, but by his quiet and cautious manner of living he reached a good old age. The study of philosophy he alternated with that of mathematics, in order to sharpen his powers without burdening his memory. As he was a man of genuine piety, it was to him a most serious task to demonstrate the true relation between the metaphysical ideas set forth in his first book and the doctrines of Christianity, and all his subsequent writings reveal more or less directly the same tendency: *Conversations Chrétiennes* (1677); *De la Nature et de la Grace* (1680); *Méditations Chrétiennes et Métaphysiques* (1683); *Traité de Morale* (1684); *Entretiens sur la Métaphysique et sur la Religion* (1688); *Traité de l'Amour de Dieu* (1697); *Entretiens d'un Philosophe Chrétien et d'un Philosophe Chinois sur l'Existence de Dieu* (1708), etc. On this point, however, he met with much censure and opposition from Arnauld, Régis, and even from Bossuet; but in spite of the fierceness of the controversy, he himself remained calm and benign to the last. D. in Paris, Oct. 13, 1715, after a protracted sickness and much suffering. The system of Malebranche is a further development of the doctrines of Descartes and especially of occasionalism. With Descartes he assumed a difference between matter and mind so absolute that no transition from one to the other, no influence of one on the other, is possible. The question then became: How is the striking harmony between the material and spiritual phenomena which pervades the whole world to be explained when there is no causal connection between the two spheres? To this Malebranche answered: All that exists, matter and mind, and the movements going on in their respective spheres, rests on God as its sole and immediate cause; and as God is one and the same, there must be a certain consistency between the phenomena of the various spheres, even though that which takes place in one sphere is only a *causa occasionalis*, and not a *causa efficiens* for that which occurs in another. Bodies are explained in his *Search after Truth* as modifications of infinite extension which belongs to God. In chap. vi. of book iii. he develops his famous principle that "We see all things in God." We see in God the archetypes of the corporeal world, and thus come to know bodies indirectly. Mind is so different from matter that it could not know it directly. This is his theory of occasionalism, while Leibnitz adopts pre-established harmony, and Spinoza the theory that mind and matter are two phases of one reality. See his *Œuvres Complètes* (11 vols., Paris, 1712); *Œuvres choisies de Malebranche* (2 vols., Paris, 1846); English translations of the *Search after Truth* and of *Nature and Grace*, by T. Taylor (London, 1694).

Revised by W. T. HARRIS.

Malecki, maăl-et'ski, ANTONI: poet and philologist; b. at Obiezerz, near Posen, Poland, in 1821; educated privately, at Posen, and at Berlin; won in 1844 the degree of Ph. D. by his dissertation *De Academia vetere* (The Ancient Academy); lectured on Philology at Posen (1845–50), Cracow (1850–54), Innsbruck (1854–56), and finally became Professor of the Polish Language and Literature at the University of Lwów (Lemberg), 1856–73. In 1881 he was appointed member of the Austrian House of Lords. He wrote a number of literary essays; *List żelazny* (An Iron Letter, Posen, 1854), a drama depicting the life of seventeenth century serfs; *Grochowy wieniec* (A Wreath of Peaflowers, Posen, 1855), a comedy; *Jadwiga* (Lemberg, 1860), a tragedy; translated Sophocles's *Elektra* and *Antigone* (Cracow, 1854); and published specimens of ancient Polish oratory in *Wybor mów staropolskich*, etc. (Cracow, 1860). *Juliusz Slowacki, jego życie i dziela* (Jul. Slowacki, his Life and Works, 2 vols., Lemberg, 1866–67) is highly valued by literary historians. His greatest works are two epoch-making Polish grammars, comparative and historical: *Gramatyka języka polskiego* (Lemberg, 1863), and *Gramatyka historyczno-porównawcza*, etc. (2 vols., Lemberg, 1879). J. J. KRÁL.

Malesherbes, maăl'zãrb', CHRÉTIEN GUILLAUME DE LAMOIGNON, de: statesman; b. in Paris, Dec. 6, 1721, of a rich and influential family; was educated by the Jesuits; studied law and entered very early the civil service, in which he occupied with great honor the most responsible positions. From 1750 to 1771 he was censor of the press and president of the court of aids. In the former office he gained the esteem of all literary men by his liberality and courage; without him probably the *Encyclopédie* would never have been printed. In the latter he attained still greater popularity by the firmness with which he opposed all arbitrary measures of the Government and all extortions of the tax-farmers. In 1770, when Louis XV. dissolved the Parliament because they would not register his tax-edicts, Malesherbes presented a memoir to His Majesty, advising the convocation of the States-General, for which action he was banished from Paris. On the accession of Louis XVI. he was recalled to the court in 1774, and as he was now one of the most popular men in France, he was made Minister of the Interior in the cabinet of Turgot. He could do nothing, however, against the follies, prejudices, and intrigues of the court; and when he left the ministry in 1776, together with Turgot, he had lost much of his popularity. He then spent many years in travels in foreign countries and on his estates, always occupied by some plans of public usefulness; and when in 1792 Louis XVI. was arraigned before the National Convention, he undertook his defense, and, speaking with admirable courage, succeeded in making some impression. The immediate result, however, of this noble act was his own arraignment in Dec., 1793, and on Apr. 22, 1794, he was guillotined, together with several members of his family. He wrote several essays and pamphlets, mostly on subjects relating to political economy and finances. His *Œuvres Choisies* were published in 1809.

Malet, măă'lā', Claude François, de: conspirator; b. June 28, 1754, at Dôle, in the department of Jura, France; entered the army in 1771; was brigadier-general in 1799, and commanded in Italy in 1804 under Prince Eugene, but was dismissed from the army in 1807, and confined in La Force, suspected and in a measure convicted of having intrigued against the emperor. While in La Force he plotted a new conspiracy, but was again discovered, and Napoleon now ordered him to be shut up in a state prison. This order was either disobeyed or forgotten, and in 1812 he was allowed to take up his residence for the sake of his health in the house of a physician in Paris, one Dubuisson. Here he found the associates he needed, and planned with great shrewdness and circumspection a *coup d'état*, which he executed in the night between Oct. 22 and 23 with an astonishing audacity and admirable skill. The first rumor of the disastrous retreat from Moscow had just reached Paris. At midnight Malet appeared in the barracks, announced that the emperor had been killed in Russia, represented himself as an emissary from the provisory government, and at the head of a few companies of soldiers arrested the chiefs of the police and the postal department, whom he replaced with his own accomplices, and was just about taking possession of the military command of Paris when Laborde, chief of the military police, recognized him, disarmed and arrested him, and disclosed his fraud to the soldiers. He was shot Oct. 29, 1812. See the exhaustive representations by Lafon and Dourille, both entitled *Histoire de la Conspiration de Malet*—the former 1814, the latter 1840.

Malherbe, măă'lārb', François, de: poet and critic; b. at Caen, Normandy, in 1555. He enjoyed unusual advantages of education, studying at home and at Paris, Heidelberg, and Basel. He entered the service of the governor of Provence, after whose death (1586) he was for a time without employment. He sought the favor of Henry III., and a poem dedicated to the latter brought him 500 crowns. In 1600 he won the attention of Marie de Médicis by an ode welcoming her to France, and in 1605 was given a position at court by Henry IV., whose poetical commissions he executed. During the rest of his life he continued to be a court poet, addressing flattering verses to Louis XIII. and Richelieu, and came to be the great authority of the world of letters. D. Oct. 16, 1628. His work is small in amount, consisting of a few translations from Livy and Seneca, some letters, and one volume of *Stances, Odes, Sonnets, Épigrammes*, and *Chansons*. It owes its importance not to poetic feeling and imagination, but to the purity and appropriateness of its language and the harmony and polish of its versification. In these respects Malherbe led a reform. The sixteenth century had enriched both language and literature with a vast amount of new materials, but, aside from implanting in all minds an enthusiastic admiration for the literatures of antiquity, it had left free scope to individual caprice. There was absence of unity and authority. Malherbe made the French of Paris the standard, proscribed provincialisms, and sought to decide hesitating usage in accordance with logic. In versification he condemned hiatus and overflow, violent inversions, and too easy rhymes, and demanded that the end of the line and the cæsura in the alexandrine be marked by a pause in the sense. He exercised on his own productions the same criticism that he applied to others, and attained a purity, clearness, and simplicity of language and a smoothness, harmony, and elegance of versification that were unknown before him and that at once became models. Thus he was very influential in impressing upon French literature the tendency it was to follow for two hundred years, and has since been generally regarded as the inaugurator of French classicism. His works were first collected and published in 1630, then with a commentary by Ménage in 1666. The best edition is in the Édition des Grands Écrivains, by Lalanne (Paris, 1860–65). Cf. Allain, *Malherbe et la poésie française à la fin du XVI^e siècle* (Paris, 1892); Ferd. Brunot, *La doctrine de Malherbe, d'après son commentaire sur Desportes* (Paris, 1891).

A. G. Canfield.

Malheur (măă-loor') **River**: a river which rises by several head-streams in the southeastern part of Oregon; flows in a northeasterly direction, and empties into the Snake river, on the boundary between Oregon and Idaho.

Malibran, măă'lĕĕ'brăăn', Maria Felicità: opera-singer; b. in Paris, Mar. 24, 1808; a daughter of the celebrated singer and singing-master, Manuel Garcia; made her *début* June 7, 1825, as Rosina in *The Barber of Seville* in London; entered in the same year on an artistic tour through the U. S.; married (Mar. 25, 1826) M. Malibran, a French banker of New York. After he had become a bankrupt she separated from him, and returned the next year alone to Europe. She appeared for the first time in Paris Jan. 14, 1828, as Semiramis; sang for several years alternately in London and Paris, with occasional excursions to Italy and Belgium; married after the dissolution of her first marriage the famous violinist de Bériot, Mar. 29, 1836. D. in Manchester, England, Sept. 23, 1836, in consequence of a fall from her horse. Her voice, a mezzo-soprano, beautiful by nature, was developed to perfection, and to these musical advantages were added a considerable dramatic talent, much natural grace, a rich imagination, and an astonishing audacity in following up her momentary inspirations.

Ma'lic Acid [*malic* is from Lat. *ma'lum*, apple]: a crystallized substance that is found widely distributed in the juices of plants. It was discovered by Scheele in unripe apples. It is also found in the berries of the mountain-ash, in cherries, gooseberries, strawberries, etc. It is obtained most easily from the berries of the mountain ash which have not quite reached ripeness. The berries are pressed and boiled with milk of lime, when the acid passes into solution as the calcium salt from which it is set free and purified. Tartaric and malic acids are related substances, and both are related to succinic acid. By chemical methods it is possible to convert succinic acid into malic acid and this into tartaric acid; and starting with tartaric acid, both malic acid and succinic acid can be made from it. The relations between the three substances are shown by the following formulas:

$CH_2.CO_2H$	$CH(OH).CO_2H$	$CH(OH).CO_2H$
$CH_2.CO_2H$	$CH_2.CO_2H$	$CH(OH).CO_2H$
Succinic acid.	Malic or hydroxy-succinic acid.	Tartaric or dihydroxysuccinic acid.

Malic acid is known in three forms. The natural variety is optically active, turning the plane of polarization to the right or to the left, according to the concentration of the solution. That variety which is made artificially is optically inactive. The optically inactive variety can be split into two optically active varieties, one of which is identical with the natural acid, while the other turns the plane of polarization in the opposite direction under the same conditions. When subjected to dry distillation malic acid is converted into maleïc and fumaric acids and maleïc anhydride.

Ira Remsen.

Malice [from Lat. *mali'tia*, evilness, malice, deriv. of *ma'lus*, bad]: in law, denotes (1) simply the absence of legal excuse, (2) "any corrupt motive, any wrong motive, any departure from duty." In the first case it is called "malice in law," in the second "express malice." In either sense it is a vague term, and eminent judges have not hesitated to declare it unfortunate. It is the chameleon of legal nomenclature, taking a different hue from each topic with which it is connected. Its varying shades of meaning are described in the numerous articles on particular crimes and torts.

Malicious Exercise of Rights.—The present article will be confined to the inquiry whether the performance of an act which one has a right to do with a good motive is tortious if actuated by malice. Undoubtedly the Roman law answered this question in the affirmative. If a landowner dug a well in his field and thereby drained his neighbor's well, his act was legal if done to improve his own property, but illegal if done to injure his neighbor's. This is understood to be the rule in Scotland; and German jurists declare that "the exercise of a right is not rendered unlawful by the fact that another is damaged thereby; it is only unlawful to exercise a right solely in order to injure another."

The common law gives no such clear and decisive answer. In the language of Lord Justice Bowen, it "presents us with no scientific analysis of the degree to which the intent to harm, or, in the language of the civil law, the *animus vicino nocendi*, may enter into or affect the conception of a personal wrong." In the case of digging or building on one's land, the weight of authority seems to be opposed to the Roman doctrine, and is in favor of permitting a landowner to do maliciously whatever he may do in good faith. (*Rideout* vs. *Knox*, 148 Mass. 368.) Accordingly, he may build a fence or wall on his land for the sole purpose of obstructing his neighbor's light or air; he may dig in his land with no other object than to drain his neighbor's well; he may cover his premises with shanties and let them to objectionable ten-

ants, for the mere sake of spiting the adjoining occupant of a fashionable mansion, without committing a tort.

A man has the right to engage freely in trade. He may exercise this right without incurring legal liability to another trader, though his motive is to spite that other by cutting off his gains, and not to benefit himself; but he must not damage the other by fraud or misrepresentation; and he must abstain from any intimidation, obstruction, molestation, or intentional procurement of a violation of the other's rights, without just cause or excuse. *Mogul Steamship Co.* vs. *McGregor*, 23 Queen's Bench Division 598; (1892) Appeal Cases 25.

A mortgagee has the right to foreclose his mortgage and a creditor to collect his claim as soon as they mature. "The law will not inquire into the motives of the party exercising such right, however unfriendly and selfish." *Randall* vs. *Hazelton*, 12 Allen (Mass.) 412.

As a rule, a person is free to contract with any one; but if A knows that B and C are parties to a contract, his right to contract with either of them becomes a qualified one. Should he, having such knowledge, persuade either to break his contract with the other and contract with himself, intending thereby to injure that other, or to benefit himself at the other's expense, and such injury follow, his act would be wrongful in law and fact and would subject him to a suit for damages. (*Bowen* vs. *Hall*, 6 Queen's Bench Division 333.) Lord Coleridge in this case strongly dissented from the doctrine that the same person, for doing the same thing, under the same circumstances, with the same result, is subject to an action or not, according to whether his inward motive was selfish or unselfish, declaring, "I think the inquiries to which this view of the law would lead are dangerous and inexpedient inquiries for courts of justice; judges are not fit for them, and juries are very unfit." His view has been accepted in a number of jurisdictions, but the decision in *Bowen* vs. *Hall* has been generally followed in the U. S. (see *Angle* vs. *Chicago, etc., Railway*, 151 U. S. 1; 14 U. S. Supreme Court Reporter 240, 1894): but it is submitted that even under this doctrine it is not the malicious exercise of the actor's right that is actionable, but the malicious invasion of another's right.

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Malicious Mischief: in law, injuring the property of another out of a spirit of wanton cruelty or wicked revenge. It seems not to have been an offense at English common law, but was made punishable by the statute of Westminster, 13 Ed. I., st. 1., c. 46, and a number of later acts of Parliament. (Stephen's *History of Criminal Law*, vol. iii., p. 188.) In most of the U. S. it has been considered by the courts an offense at common law; but in nearly all of them it is now, as in England, a statutory crime, embracing nearly every form of physical injury inflicted with malicious intent upon any kind of property of another, and in some States upon one's own property. In the absence of a statutory provision on the subject, malice means actual ill will against the owner of the property, or wanton cruelty provocative of a breach of the peace. See Wharton's *Criminal Law*, bk. 2, ch. xvi.; Bishop *On Statutory Crimes*, bk. 4, ch. xix., § 4.

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Malicious Prosecution: in law, the infliction of legal injury upon another, by prosecuting him from an evil motive and without probable cause. The plaintiff who brings an action for this wrong must prove (1) that the prosecution of which he complains has been terminated in his favor; (2) that there was a want of probable cause for the prosecution; (3) that it was undertaken in a malicious spirit; and (4) that it caused him legal damage. If he fails to establish either of these positions, he can not recover.

Termination of Former Suit.—The plaintiff is required to show that the previous action has terminated in his favor, in order to prevent his trying the same issue twice. Were such double litigation permitted, the plaintiff "might recover in this action, and yet be afterward convicted on the original prosecution." If the proceeding complained of does not permit the prosecuted party an opportunity to controvert the charge of the prosecutor, as in the case of an *ex parte* attachment or a warrant to keep the peace, this requirement has no application, and the party wronged may bring his suit for malicious prosecution at once (*Hyde* vs. *Greuch*, 62 Md. 577); but if the proceeding is one in which the defendant has the right to a hearing and thus an opportunity to obtain a favorable decision, it does not matter that the law denies to him the right of appeal from the decision. The proceeding is terminated when it has been so disposed of that the prosecutor must begin anew. Hence the refusal of a grand jury to find an indictment; the discharge from bail or imprisonment by a committing magistrate; the verdict of not guilty upon a criminal trial; the voluntary abandonment of a civil action without any compromise on the part of the defendant therein are instances of terminated proceedings. Whether a *nolle prosequi* amounts to a final disposition of a criminal prosecution is a question upon which the courts are at variance. As it ends the indictment and compels the prosecution to begin anew, it ought to be treated as a final determination unless entered by the procurement of the one prosecuted, and is in the nature of a compromise. *Brown* vs. *Randall*, 36 Conn. 56.

Want of Probable Cause.—A person is said to have probable cause for proceeding against another when he believes, on grounds that would warrant a reasonable man in believing, that the other is legally liable to such prosecution. If the facts which are depended upon by the defendant, in a suit for malicious prosecution, to show that he had probable cause for the original proceeding, are in dispute, the jury are to ascertain the facts and the judge is to decide whether those facts constitute such cause. Where the facts are undisputed the question is solely for the judge. If a party lays all the facts of his case fairly before reputable counsel, and acts in good faith upon the honest opinion thus obtained, though it may be erroneous, he acts with probable cause. He must, however, state the facts fully and fairly, and there must be no dishonest collusion between him and his counsel in the matter, and he must believe in the legal liability of the one against whom he proceeds. A judgment in favor of the original prosecutor, unless obtained by fraud, is generally held to be conclusive evidence that he acted upon probable cause, although it was subsequently reversed (*Crescent City, etc.*, vs. *Butchers' Union*, 120 U. S. 141); but a judgment against him is at most but *prima facie* evidence of the absence of probable cause. The holding by a committing magistrate of a person charged with crime, for the grand jury, or the finding of an indictment by a grand jury, is *prima facie* evidence that the complaining party acted with probable cause. If, however, it is shown that the complainant suppressed or misrepresented any material facts, or that he assumed to state as facts what he did not know to be such, and about which he had not taken reasonable care in informing himself, or, if it appears that he did not honestly believe in the charge that he preferred, his *prima facie* case is destroyed; but it must be borne in mind that the plaintiff in a suit for malicious prosecution has the burden of proving a want of probable cause, although this is a negative averment, and the facts relating thereto are peculiarly within the knowledge of the defendant.

Malice.—The prosecutor must have acted from an indirect and improper motive, and not in the furtherance of justice. It is not essential, however, that he was inspired by hatred against the individual prosecuted. Whether his conduct was malicious, in this sense, is a question of fact for the jury. They may infer malice from the same circumstances that establish a want of probable cause, but they are not bound to do so. The prosecution may have been instituted without probable cause, and to that extent improperly, and yet the prosecutor may have been free from actual malice; and it is malice in fact which the present plaintiff must prove. Such malice is ordinarily established by circumstantial evidence. A jury may infer its existence simply from the zeal and activity displayed by the present defendant in the prosecution complained of. An action for malicious prosecution will lie against a corporation, if the wrongful proceeding was instituted by its authorized agents. Their malice, in such a case, is its malice. *Reed* vs. *Home Savings-bank*, 130 Mass. 443.

Legal Damage.—In the early case of *Savile* vs. *Roberts* (1 Lord Raymond's *Reports* 374), Lord Holt declared that there are three heads of damage which will support an action for malicious prosecution: (*a*) Damage to a man's person, as when he is taken into custody. (*b*) Damage to a man's estate, by putting him to expense. (*c*) Damage to his fair fame and credit. Such is the rule to-day. Accordingly, the malicious institution of bankruptcy or lunacy proceedings, or the malicious seizure of the person or property of another, without probable cause, presents a case of legal damage. Whether it is inflicted by the malicious institution of a civil action, which does not involve scandal to reputation, or the seizure of person or property, is a question upon which the courts differ. According to the English view, which has been adopted in several of the U. S., the bringing of an

ordinary action does not as a "natural or necessary consequence involve any injury to a man's property, for this reason, that the only costs which the law recognizes and for which it will compensate him, are the costs properly incurred in the action itself." (*Quartz Hill Co.* vs. *Eyre*, 11 Queen's Bench Division, p. 690.) On the other hand, many courts in the U. S. hold that a person may be legally damaged by the malicious institution of a civil suit, because the taxable costs are so small that they may be no adequate compensation for the actual damages to which the groundless and malicious proceeding has subjected him. *Eastin* vs. *Stockton Bank*, 66 California 123.

A person who maliciously instigates another to prosecute a third without probable cause, and to his legal damage, is liable, as he would have been had the proceeding been in his own name.

Unauthorized Action in Another's Name.—If one brings an action against another, in the name of a third, without authority, he is liable in tort to the defendant for the actual damages sustained, even though he acts without malice and with the *bona fide* belief that his act is authorized, or will be ratified. If the suit is groundless and malicious, exemplary or punitive damages may be recovered.

Malicious Abuse of Process.—A person may have obtained legal process against another upon probable cause and in a valid form, and yet commit a tort by employing it for some unlawful purpose; as where he uses a warrant of arrest to extort money, or to compel the execution of a paper, or the surrender of a right. As this wrong consists, not in instituting the original prosecution, but in perverting lawful process to the attainment of an object not within its proper scope, it is immaterial to the maintenance of a suit for its redress, whether the original proceeding has terminated or was instituted with or without probable cause. The malicious abuse of the process and the legal damage to the present plaintiff constitute his cause of action. *Wood* vs. *Graves*, 144 Mass. 365. FRANCIS M. BURDICK.

Malicites: See ALGONQUIAN INDIANS.

Malignant Diseases: See CANCER.

Malignant Pustule: See ANTHRAX.

Malinche, or **Malintzin** (Mountain): See TLASCALA.

Malines: See MECHLIN.

Malingering: See FEIGNED DISEASE.

Mallalieu, WILLARD FRANCIS, A. M., D. D.: bishop; b. at Sutton, Mass., Dec. 11, 1828; educated at East Greenwich Academy, Rhode Island, Wesleyan Academy, Wilbraham, Mass., and Wesleyan University, Middletown, Conn.; joined the New England conference in 1858, and served in the pastorate until 1882; was presiding elder from 1882 till 1884; was elected bishop in 1884. From 1884 to 1892 he resided in New Orleans. A. O.

Mal'lard, or Greenhead: a very common wild-duck in North America and Europe; known to science as *Anas boschas*. It is the original from which have sprung almost all the varieties of the domestic duck, excepting some which are bred in China and Japan. The male is nearly 2 feet long, and has a grass-green neck and head, with a tint of violet; a white ring around the neck, brownish chestnut below. The speculum is a violet purple. The female is smaller, and her plumage is plain brown. The mallard is strictly monogamous, unlike the common domestic duck. See DUCK. Revised by F. A. LUCAS.

Mallarmé, măă'lăăr'mā', STÉPHANE: poet; b. in Paris, Mar., 1842. His outward life was uneventful, and was chiefly spent as teacher of English in the Lycée Fontanes. As a literary man, however, he was *chef-d'école* of one of the strongest of the innovating groups of French writers—the so-called "Décadents." He wrote much for the organ of the school, *Le Décadent*, and for *Le Parnasse contemporain*, and his often unintelligible style gave rise to the liveliest discussions. In 1876 he published a thin folio volume, illustrated by Manet, containing his curious *L'Après-midi d'un faune*. This was followed by *Petite philologie à l'usage des classes et du monde* (1878); *Les Dieux antiques: nouvelle mythologie* (1880); Beckford's *Vathek*, with an entirely incomprehensible preface (1880); *Poésies* (one *fascicule* only, 4to, 1887); *Poèmes d'Edgar Poe* (translated into French, 1888); *Vers et prose: morceaux choisis* (1893). Several of his pieces are to be found in Paul Verlaine's *Les Poètes Maudits*. See Edmund Gosse, *Questions at Issue* (New York, 1893). D. Sept. 9, 1898.

Malleability: See METALS.

Malleco, măăl-yā'kō: province of Chili; S. of Biobio, between Arauco and the Andes; area, 2,856 sq. miles; estimated population (1891) 63,329. It is crossed by the river Malleco, and the portion lying in the central plain is composed of rich agricultural land. Many of the inhabitants are semi-civilized Araucanian Indians. Wheat-raising and grazing are the principal industries. Angol, the capital, has about 8,000 inhabitants; Traiguen is an important commercial center; and Collipullí and Victoria are thriving towns. HERBERT H. SMITH.

Mallemuck: See MOLLYMAWK.

Mallery, GARRICK: soldier and ethnologist; b. in Wilkesbarre, Pa., Apr. 23, 1831. He graduated at Yale College in 1850; in 1853 was admitted to the bar of Philadelphia, where he practiced law until the civil war, and then entered the Union army; afterward was promoted lieutenant-colonel of volunteers and captain and brevet lieutenant-colonel in the regular army. In the reconstruction period in 1869–70, being on duty in Virginia as judge advocate on the staff of the successive generals commanding, he was appointed secretary of state and adjutant-general of Virginia, with the rank of brigadier-general. In Aug., 1870, he was detailed with the chief signal officer of the army at Washington to carry into effect the legislation initiating the meteorological duties of the signal service, of which he was soon appointed the executive officer, and for long periods was acting chief signal officer. In 1876 he was ordered to the command of Fort Rice in Dakota, and there made investigations into the pictographs and mythologies of the North American Indians; in 1877 joined Maj. J. W. Powell, then in charge of the survey of the Rocky Mountain region, for duty in connection with the ethnology of the North American Indians. In 1879 he retired from active service on account of wounds received in action, and was appointed chief of the bureau of ethnology on its organization at Washington in that year. D. in Washington, D. C., Oct. 24, 1894. Col. Mallery was president of many societies and clubs—e. g. the Anthropological Society, the Cosmos Club, the Philosophical Society, and the Literary Society of Washington, and vice-president of the American Association for the Advancement of Science, and president of the joint commission of the six scientific societies of Washington. His most important works, some of which have been translated, include *A Calendar of the Dakota Nation* (1877); *Introduction to the Study of Sign Language among the North American Indians as Illustrating the Gesture Speech of Mankind* (1880); *A Collection of Gesture Signs and Signals of the North American Indians, with some Comparisons* (1880); *Sign Language among North American Indians Compared with that among other Peoples and Deaf-mutes* (1881); *Pictographs of the North American Indians* (1886); *Israelite and Indian, a Parallel in Planes of Culture* (1889); *Greeting by Gesture* (1891); *Picture-writing of the American Indians* (1893). J. W. P.

Mallet, măă'lā', JULES THEODORE ANATOLE: civil engineer, first designer of compound locomotives; b. in the canton of Geneva, Switzerland, in 1837; studied in France, graduating at the École Centrale in 1858, with the diploma of mechanical engineer. Attached to the works of the Suez Canal, he established the first workshops at Port Said and erected there the first dredges; then became engineer of the general dredging contract for the seaports of the kingdom of Italy. He was specially occupied with steam-engines, both stationary and marine, and afterward studied the application of the compound engine to locomotives. This study, begun in 1873, led to the construction in 1875 of the compound locomotives of two cylinders for the railway from Bayonne to Biarritz, which were the origin of the compound locomotive now generally introduced on the best railways. In 1886 he built the articulated four-cylinder compound locomotive, the first for the Decauville railways (portable narrow gauge), but their use has extended considerably since that time. He has published many memoirs on marine and locomotive engines; has edited the *Chronique* and the *Proceedings* of the Society of Civil Engineers of France since 1880. In 1877 he obtained the Fourneyron prize of the Institute of France (Academy of Sciences) for the application of the compound system of locomotives, and in 1885 the decoration of the Legion of Honor. W. R. HUTTON.

Mal'leus [Mod. Lat. = Lat. *mal'leus*, hammer]: in comparative anatomy, a small bone forming one of the chain of

three bones in the internal ear of mammals, but morphologically answering to the quadrate bone with which the lower jaw articulates in the Ichthyopsida and Sauropsida.

Malleus: a genus of oysters allied to the pearl-oysters, and deriving its name from its shape.

Mallock, William Hurrell: author; b. in Devonshire, England, in 1849. He was educated at Baliol College, Oxford, where in 1871 he gained the Newdigate prize for a poem entitled *The Isthmus of Suez*. He first attracted general attention by *The New Republic* (1877), a clever satire on the confusion and doubt of contemporary thought, in the form of a "symposium" between different leaders of English public opinion, thinly disguised under fictitious names. A key to this was soon after published, and the book passed through numerous editions. Other writings of this author are *The New Paul and Virginia* (1878); *Is Life Worth Living?* (1879); *Poems* (1880); *A Romance of the Nineteenth Century* (1881); *Social Equality* (1882); *Property and Progress* (1884); *The Old Order Changes*, a novel (1886); *In an Enchanted Island*, experiences in Cyprus (1889); *Labour and Popular Welfare* (1894). H. A. Beers.

Mallophaga: See Entomology and Lice.

Mallory, Stephen Russell: civil engineer; b. in Trinidad, West Indies, in 1813; was the son of a shipmaster of Connecticut; settled with his parents at Key West, Fla., in 1820; was educated at Mobile and at Nazareth, Pa.; was admitted to the bar at Key West in 1833; was inspector of customs under Jackson, and became county judge and judge of probate for Taylor co., Fla.; became in 1845 collector of the port of Key West; was U. S. Senator from Florida 1851–61; declined the appointment of minister to Spain in 1858, and in that year removed to Pensacola; became secretary of the Confederate navy. After the war (1865) he was imprisoned, released on parole in 1866, and pardoned in 1867 by President Johnson. He afterward practiced law in Pensacola, where he died Nov. 9, 1873.

Mallow Family: the *Malvaceæ*. A family of dicotyledonous plants, mostly herbs or shrubs (rarely trees) consisting of about 800 species, which are widely distributed, but most abundant in hot climates. Their leaves are simple and alternate; the stamens are indefinite in number and united into a tube; the ovary is superior, and for the most part many-celled. There are about 125 native species in the U. S., besides a dozen or more which have been introduced, many of which are more or less weedy in habit. Some mallows (*Malva*) are grown for ornamental purposes, as are also the rose mallow (*Hibiscus*), hollyhock (*Althæa*), *Callirhoë*, etc. Okra, a species of *Hibiscus*, produces edible pods which are much used, especially in the Southern U. S. By far the most important plants of the family are those which produce cotton, which consists of the long hairs attached to the seeds of *Gossypium*, natives of the warmer portions of the Old World. The common cotton of cultivation, especially in the Southern U. S., is *G. herbaceum*. See Cotton. Charles E. Bessey.

Mallow Hemp: See Fiber.

Malma: See Dolly Varden.

Malmesbury, momz'ber-i, James Harris, First Earl of: diplomatist; b. in Salisbury, England, Apr. 21, 1746; was son of James Harris, the author of *Hermes*; studied at Oxford and Leyden; became secretary of legation at Madrid 1768, and in 1770, as *chargé d'affaires*, foiled the designs of Spain on the Falkland islands; was ambassador in Berlin 1772; in St. Petersburg 1776; at The Hague 1784; supported Fox in the House of Commons; knighted 1780; and was made a baron 1788 in reward for treaties of alliance negotiated with Holland and Prussia. He seceded from the Whigs in 1793, and in the same year, he was again ambassador at Berlin; negotiated the marriage of the Prince of Wales with Caroline of Brunswick 1794; was engaged in unsuccessful negotiations for peace with the French republic 1796–97; was created Earl of Malmesbury and Viscount Fitz-Harris 1800. D. in London, Nov. 20, 1820. His *Diaries and Correspondence* (4 vols., 1844) were edited by his grandson, James Howard Harris, third Earl of Malmesbury (1807–89), who also published *The First Lord Malmesbury, his Family and Friends, a Series of Leiters from 1745 to 1820* (2 vols., 1870).

Revised by F. M. Colby.

Malmesbury, maams'ber-i, **William of**: historian; b. in Somersetshire, England, about 1095; became a monk and librarian of the monastery at Malmesbury, whence he took his name, and wrote in Latin an historical work which, next to the *Saxon Chronicle*, is considered the most valuable authority for Anglo-Saxon times. D. in Malmesbury about 1143. His *History of the Kings of England* and its continuation, the *Modern History*, were published in Latin by Sir Henry Savile (1596) and by T. D. Hardy (1840), and a translation of the former by Rev. John Sharpe appeared in 1815, and again in Bohn's Antiquarian Library (1847).

Malmö: chief city in Southern Sweden; on the Sound opposite Copenhagen (see map of Norway and Sweden, ref. 14–D). It is surrounded by a canal, outside of which are two suburbs. It has four churches (one Roman Catholic), a governor's residence, where Charles XV. died in 1872, and some other public buildings. The palace built in 1434, destroyed by the citizens in 1534, and rebuilt by Christian III., is now used as a prison. The chief industries consist of ship-building and the manufacture of stockings, gloves, soap, and tobacco. It has an extensive trade with Copenhagen and the Baltic ports. The city gave its name to an armistice formed there between Prussia and Denmark in 1848, suspending hostilities for an interval of seven months. Pop. (1889) 47,539. R. B. Anderson.

Malmsey, maăm'zĕe [M. Eng. *malvesie*, from Fr. *malvesie*, from Ital. *malvasia*, from Mod. Gr. Μονεμβασία, the original place of manufacture]: originally a sweet white or red wine from Monembasia (or Napoli di Malvasia). The name afterward came to be applied to other sweet Levantine wines, and still later to any other very sweet wines. It is at present applied especially to "malmsey madeira," which is much weaker than standard madeira wine. It is understood that all wines of this class are from over-ripe and partly dried grapes. They have a peculiar bouquet.

Malm'ström, Bernhard Elis, Ph. D.: poet; b. in Sweden in 1816; studied at Upsala, where he graduated 1842, and in 1856 was appointed Professor of Æsthetics and History of Literature. In 1849 he was elected a member of the Swedish Academy. Among his poems may be mentioned the epos *Ariadne* (1838), one of his earliest efforts, and the idyl *Fiskarflickan vid Tynnelsö* (The Fisherman's Daughter, 1839). The elegy *Angelika* (1840) was awarded the grand prize of the Swedish Academy, and is considered one of the gems of Swedish poetry. About the same time he published the dramatized poem *Julianus*, by which he reached the zenith of his poetic productions. Two collections of his poems, *Dikter*, appeared 1845 and 1847. His prose writings on literary subjects were mostly published for the first time in newspapers and periodicals, and afterward collected under the titles *Litteratur historiska Studier* (1860–61) and *Tal och esthetiska afhandlingar* (Speeches and Æsthetic Essays). His complete writings, *Samlade Skrifter*, in eight volumes (1866–69), five of which were dedicated to academic lectures on the subject of the history of Swedish literature, were published after his death by K. F. Bergstedt. D. 1865. P. Groth.

Malmström, Karl Gustaf, Ph. D.: historian; b. in Sweden in 1822; brother of Bernhard E. Malmström, poet; studied at Upsala, where he graduated in 1848, and was in 1858 appointed Professor of History and Statistics. In 1878 he was called to a seat in the cabinet, and from 1878 to 1880 was chief of the ecclesiastical department. Since 1882 he has been keeper of the state archives. He was elected a member of the Swedish Academy 1878. Among his writings are *Sveriges politiska historia från Carl XII.'s död til Statshvälfningen 1772* (The Political History of Sweden from the Death of Charles XII. to 1772, in 6 parts, 1855–77); *Sveriges statskunskap i kort sammandrag* (Short Handbook of Swedish Political Institutions, 1863, many editions); and diverse essays in periodicals treating subjects of Swedish history. P. Groth.

Malone, ma-lōn': village; capital of Franklin co., N. Y. (for location of county, see map of New York, ref. 1–I); on the Salmon river, and the Cent. Vt. and the N. Y. Cent. and Hudson R. railways; 60 miles N. E. of Ogdensburg, midway between that city and Rouse's Point. It is in an agricultural region, with valuable timber and mining sections tributary to it, and has manufactories of woolen goods, paper, flour, tanned leather, men's clothing, doors, sash and blinds, and foundry and machine-shop products. Other important interests are dairying and hay, hop, and potato raising. There are four weekly newspapers. Pop. (1880) 4,193; (1890) 4,986; (1900) 5,935. Editor of "Farmer."

Malone, Edmond: Shakspearean scholar; b. in Dublin, Ireland, Oct. 4, 1741; studied at Trinity College 1756; was called to the bar 1767; inherited a considerable fortune soon after, and thenceforth devoted himself to literary pursuits in London. He wrote on the Rowley poems (1782), edited the works of Sir Joshua Reynolds (1797), of Dryden (1800), and of W. G. Hamilton (1808). in each instance accompanied by a memoir, and published a *History of the English Stage* (1790), but is chiefly known by his exposure of Ireland's Shakspearean forgeries (1796), and by his critical edition of Shakspeare (11 vols., 1790). The material for another edition of Shakspeare was edited by James Boswell, the younger, and was published in 1821 (21 vols.). It is known as the *Variorum Shakspeare*. Hallam characterizes him as a dull commentator, but laborious and truth-loving. D. in London, May 25, 1812. See *Life* by Sir James Prior (1860). Revised by H. A. Beers.

Malory, or **Maleore** (trisyllabic), Sir Thomas, Knight: English prose-writer of the fifteenth century. All that is known of Malory is that he was a knight, and that he finished his *Morte d'Arthur* in the ninth year of the reign of Edward IV., in 1469 or 1470. This information is derived from the closing words of the book itself. It has been thought that he was a priest, but, though "Sir" could be a parson's title, "Knight" is decisive against this conjecture. The statement that he was a Welshman, made by Bale, perhaps on the authority of Leland, is antecedently improbable to the last degree, nor are Bale and Leland so careful in their biographies of literary men that much weight need be attached to their testimony. The author of the *Morte d'Arthur* is most likely the Warwickshire Thomas Malory, Knight, who died Mar. 14, 1470, aged apparently about 70. The name Malory (variously spelled but doubtless always trisyllabic) was of long standing in the adjacent counties of Warwick, Leicester, and Northampton, and occurs rather frequently elsewhere. Prof. Rhŷs's conjecture that it is the Welsh *Maelor* (*Maelawr*) is easy to refute. The *Morte d'Arthur* is a prose compendium of what is called the "Matter of Britain," i. e., of the romantic material concerning King Arthur and the Knights of the Round Table. The full title as it appears in the first edition (printed by Caxton in 1485) describes the contents of the work with sufficient fullness, *The noble and joyous book entytled Le Morte Darthur notwythstondyng it treateth of the Byrth, Lyf, and Actes of the sayd Kyng Arthur, of his noble Knyghtes of the Rounde Table, theyr mervayllous Enquestes and Adventures, th' Achyevyng of the Sangreal, and in th'ende the dolorous Death and Departyng out of thys World of them al.* Beginning with an account of Arthur's parentage, it contains not only an account of his reign and his death, but also pretty complete biographies of the most distinguished of his knights. The purpose of the compilation was to reduce into order and compass the various cycles of the Round Table Romances (Arthur, Merlin, Lancelot, Tristan, etc.), and to make them accessible in English. Caxton expressly states that Malory's sources were "certain books of French." So far as the French books in question can be identified, they prove to be various prose romances, later than the Old French verse romances of Chrestien de Troyes and others, and containing many alterations and expansions of older romantic material. Dr. Sommer finds that Malory used the prose Merlin, the prose Lancelot, and the prose Tristan. He also thinks that he derived much material from the Middle English metrical romance *La Morte Arthure*, which has been ascribed, on insufficient evidence, to one Huchown. The sources of a considerable portion of the work remain to be discovered. As was to be expected, Malory rambles a good deal, but on the whole he has executed his task with considerable judgment. The sources from which he drew were often poor, and this accounts for the debased form in which some of the episodes appear in his work. The most serious defect of this kind concerns the character of Sir Gawain, which is systematically blackened in the French prose romances in order to exalt Lancelot. It is of course impossible to tell how far Caxton changed Malory's English or his matter, but probably the alterations he made were trifling. The success of the *Morte d'Arthur* was immediate. Caxton's edition (1485) was followed by six others in black letter, the last appearing in 1634. During all this time the work, which had become the standard version of the Arthur story in England, exercised a powerful influence on our literature. From 1634 it was not reprinted till the nineteenth century. In 1816 two editions came out, and since then there have been several others, of which the most important are that called Southey's (1817), Thomas Wright's (1856), Dr. H. Oskar Sommer's (London, 1890–91), and Dent's (1893), which has a preface by Prof. Rhŷs. In 1868 Sir Edward Strachey published a judiciously modernized and retrenched version, intended primarily for boys. The standard edition is Sommer's, which has an accurate text, very valuable studies on the sources, a glossary, full indexes, etc., besides an essay by Andrew Lang on Malory's style. It will be observed that the popularity of Malory's book was great in the Elizabethan age, and that the revival of interest in it was contemporaneous with the romantic revival in our literature. Its republication in 1816 put a large body of thoroughly romantic material within the reach of everybody. The effect was enormous. Modern English ideas of Arthurian story are, except for specialists, derived almost entirely from the *Morte d'Arthur* either directly or through Tennyson's *Idylls of the King*, for which Malory was a main source. Malory's importance in this respect, as well as his significance as an early writer of modern English prose, can hardly be exaggerated. Apart from these considerations, his merits as a story-teller are significant, though they have been much exaggerated. He is usually clear but somewhat monotonous; only occasionally does he rise to such heights as he reaches in the famous lament over Lancelot (in the closing chapter). His style is simple, and at times picturesque. For his language, see C. S. Baldwin, *Inflections and Syntax of the Morte d'Arthur* (Boston, 1894).

G. L. Kittredge.

Malot, măă'lō', Hector: novelist; b. at La Bouille, near Rouen, France, May 20, 1830. His father, a notary, educated him for the law, but he never practiced. He served a literary apprenticeship on Didot's *Biographie générale*, the *Journal pour tous*, and in collaborating on dramatic works. He gravitated surely toward the novel, and since his *début* in 1859 with *Les Amants*, first part of *Les victimes d'amour*, has been a prolific writer in that field, having written about fifty volumes. His works show a keen observation, the field of which is mainly French life under the second empire, an interest in the moral aspects of society, and an occasional tendency to sensation. His sympathy with children is quick, and his most widely read book is a story of children, *Sans Famille* (1878, known in English as No Relations). Among his works are *Un beau-frère* (1869); *Une bonne affaire* (1870); *L'Auberge du Monde* (1875–76); *L'Héritage d'Arthur* (1876); *Le docteur Claude* (1879); *Conscience* (1889); *Complices* (1893). A. G. Canfield.

Malpighi, măăl-pee'gĕe, Marcello: anatomist; b. at Crevalcuore, near Bologna, Italy, Mar. 10, 1628; held the chair of Medicine successively at Pisa, Messina, and Bologna; was called to Rome in 1691 by Innocent XII. as his chief physician; died there Nov. 29, 1694. He was the first to apply the newly invented microscope in the study of anatomy, and showed himself a sagacious observer. His principal discovery was that of the transition of the blood from the arteries to the veins, described in his *De Pulmonibus* (1661). In medical science various parts of the epidermis, spleen, and kidneys still bear his name.

Malplaquet, măăl'plăă'kā': a village in the department of Le Nord, France; 10 miles S. of Mons, in Belgium (see map of France, ref. 2–G); famous for the battle which took place here (Sept. 11, 1709) between the French under Villars and the allied British, Dutch, and Austrians under Marlborough and Eugene, resulting in favor of the allies and in the capture of Mons.

Malpractice: See Jurisprudence, Medical.

Malt [O. Eng. *mealt*: Germ. *malz*, malt; connected with the root of Eng. verb *melt*]: barley which has been allowed to pass through the earlier stages of germination, and then dried to destroy its vitality and prevent further change. See Beer and Adulteration.

Mal'ta: an island in the Mediterranean, belonging to Great Britain; situated in lat. 35° 53′ N. and lon. 14° 31′ E., 58 miles from Sicily and 180 from Africa. It is the principal island of the Maltese group, which, besides Malta, comprises Gozo, Comino, Cominotto, and Tilfla. Area of the whole group, 117 sq. miles; of Malta, 95. Pop. in 1890, 165,662. The surface is elevated and rocky and has only a shallow layer of soil, but it is well cultivated, and produces wheat, cotton, figs, oranges, and grapes in abundance. Many potatoes are raised for the English market. The climate is

hot, but healthful. Snow is unknown, though hail-storms occur. The *sirocco*, a hot wind from the African desert, on its way across the Mediterranean becoming loaded with salty moisture, is almost unbearable, but occurs only in August and September, and blows for only a few hours at a time. Excellent marble is quarried. The chief importance, however, the island derives from its position as a station on the route from Great Britain viâ Egypt to India, and its most remarkable features are the immensely strong fortifications which the British have built around the capital, Valetta, the foundations of which were laid by the Knights of St. John. Malta was known to the Greeks under the name of Ogygia. It was the residence of the nymph Calypso, whose grotto is still shown. The Phœnicians and Carthaginians colonized the island in turn, but at the close of the second Punic war it became a Roman possession. In 56 A. D. St. Paul was shipwrecked here, and the legend tells us that he founded the first Christian congregation here. After the fall of the Eastern Roman empire the island was conquered by the Vandals in 454, the Goths in 494, the Byzantines in 533, the Arabs in 870, and the Normans in 1090, who united it to Sicily. In 1530 Charles V. gave it to the Knights of the Order of St. John of Jerusalem, who shortly before had been driven by the Turks from Rhodes. Here, too, they were besieged by the Turks in 1557 and in 1565, but at the latter siege Sultan Solyman was compelled to re-embark with a loss of over 25,000 of his best troops. In 1798 Bonaparte took the island by treachery. In 1800 it was taken by the British, and they have held it since. The island is ruled by a governor, assisted by an executive council of ten members, and by a legislative council of six official and fourteen elective members. See VALETTA. Revised by W. B. SHAW.

Malte-Brun, Fr. pron. maalt'brŭn', rightly MALTHE CONRAD BRUUN: geographer; b. at Thisted, Jutland, Aug. 12, 1775. He was destined for the Church, but preferred literature, theatricals, and politics, and very early in his life became the favorite in all literary circles in Copenhagen. The boldness, however, with which he advocated the principles of the French Revolution, and the rather unprincipled violence with which he attacked the state of affairs in Denmark, caused considerable excitement, and after several conflicts with the Government he was exiled. He went to Paris, where he applied himself with zeal to the study of geography and politics. D. Dec. 14, 1826. For some years he was joint editor of the *Journal des Débats*, and several of the papers he wrote for this journal have been collected and republished by Nachet; but his fame rests on his geographical works. From 1803 to 1805 he published, in connection with Mentelle, *Géographie Mathématique, Physique et Politique*, in 16 vols., and from 1810 to 1825 he published his *Précis de Géographie Universelle*. Geography was at the beginning of the nineteenth century something almost unknown, but Napoleon's campaigns called attention to this branch of knowledge, and made geography a necessary element of a man's education; and to this new want Malte-Brun ministered with great talent and earnestness.

Maltese Vulture: See EGYPTIAN VULTURE.

Mal'tha: a word first used by Pliny and applied by him to what he called an inflammable mud from the Euphrates. In modern times the word has been used to designate those forms of bitumen that resemble tar in consistence, and hence are sometimes called mineral tar. It appears to be the product of the gradual metamorphosis of certain forms of petroleum under the influence of atmospheric oxygen, by which the bitumen becomes richer in carbon. Whether or no oxygen is a constituent of maltha is uncertain. It seems to be produced from petroleum at any depth below the surface to which oxygen dissolved in rain-water can penetrate. It is a black viscous fluid, of a specific gravity between ·9 and 1, and usually contains in mechanical admixture 10 to 12 per cent. of water and air. It issues from springs with water and floats on pools of water, when it often entangles insects or birds that touch its sticky surface in their flight. It consists chemically of a very complex mixture of compounds of carbon and hydrogen, often with oxygen and nitrogen in addition. These substances dissolve each other; but their exact relations are not yet clearly understood. (See PETROLEUM.) In many localities maltha is used in its natural state as a coarse lubricator. In South America it is used, after the lighter oils, water, and air are driven off by boiling, to plug the seams of boats. It has been used from time immemorial for similar purposes on the banks of the Tigris and Euphrates. In the construction of Babylon and Nineveh it was used to cement in their places the great sculptured slabs of alabaster that adorned the palaces of those cities. As compared with other forms of bitumen, maltha is not abundant. See BITUMEN.

S. F. PECKHAM.

Malthe'idæ [Mod. Lat., named from *Malthæ'a*, the typical genus, from Gr. μάλθη, a kind of fish, perhaps the angler]: a family of fishes of the order Pediculati, distinguished by the large, depressed anterior part and slender tapering posterior part of the body, which is usually covered with scattered spinous disks or tubercles. The head is covered by the integument in common with the shoulder-girdle, and this combination forms the anterior disk, which is abruptly distinguished from the small posterior region; the mouth is inferior, and the cleft mostly transverse; the teeth are villiform; the branchial apertures are small dorsal slits, and in the upper axillæ of the pectoral limbs; there are five branchiostegal rays; the dorsal fins are peculiarly developed—the first being represented by a tentacle on or under the snout, and the second being a small but true fin (with four rays) on the slender body; the anal is like the dorsal; the pectorals are at the end of the long arms, which appear to have elbows, and are flexed outward and to some extent forward; the ventrals are small but perfect (with a spine and five rays), and far forward on the throat; the skeleton is fibro-cartilaginous, and has seven or eight abdominal and ten or eleven caudal vertebræ; no air-bladder or pyloric appendages are developed. The singular and grotesque fishes belonging to this family are found in warm seas or in deep waters. They are able to progress on the ground by clumsy leaps by means of the arms, which are far behind the ventrals or representatives of the hind legs of land vertebrates. Revised by D. S. JORDAN.

Mal'thus, THOMAS ROBERT: expounder of the principle of population; b. at the Rookery in Albury, County of Surrey, England, in 1766; was admitted at Jesus College, Cambridge, in 1784, and graduated with high honors in 1788. In 1797 he received a fellowship at Cambridge. About the same time he was admitted to holy orders, and took the charge of a small parish in Surrey, dividing his time between parochial duties there and his studies in the university. In 1798 the first edition of his work on population was published anonymously—*An Essay on the Principles of Population as it Affects the Future Improvement of Society, with Remarks on the Speculations of Mr. Godwin, Condorcet, and other Writers* (1 vol. 8vo). This work created a sensation at the time, and gained for Malthus his chief reputation. It went through several editions, the last of which appeared in 1826 under the modified title, *An Essay on the Principles of Population, or a View of its Past and Present Effects on Human Happiness, with an Inquiry into our Prospects respecting the Future Removal or Mitigation of the Evils which it occasions.* Its leading idea is that population unchecked increases in a geometrical ratio, while food can be made to increase at most only in an arithmetical ratio. Hence the inference that, in order to avoid the evils of a population in excess of support, some checks must be applied to the increase of population. Vice and misery, shortening human life, come in as natural checks. That which is most insisted on in the essay is the moral check of abstinence from marriage and sexual intercourse on prudential considerations. (See POLITICAL ECONOMY.) He married in 1805, and the same year received the appointment of Professor of History and Political Economy in the East India College at Haileybury, in which position he continued till his death. The other published writings of Malthus are *Observations on the Effects of the Corn-laws, an Inquiry into the Nature and Progress of Rent* (1815); *Principles of Political Economy* (1820); and *Definitions in Political Economy* (1827). D. at Bath, Dec. 29, 1834.

Revised by A. T. HADLEY.

Malting: See BEER.

Malus, maă'lüs', ÉTIENNE LOUIS: military engineer; b. in Paris, July 23, 1775; studied mathematics and engineering at Mézières, and afterward at the École Polytechnique; was employed in the reconstruction of the fortifications of Antwerp and Kehl; became examiner at the École Polytechnique in 1811. D. in Paris, Feb. 23, 1812. He was the discoverer of the polarization of light by reflection, and his memoir on the subject, entitled *Sur une Propriété de la Lumière réfléchie par les Corps diaphanes*, received a prize from the Academy.

Malvaceæ: See MALLOW FAMILY.

Malvern, maw'vèrn: town; capital of Hot Spring co., Ark. (for location of county, see map of Arkansas, ref. 4–C); on the Hot Springs and the St. L., Iron Mt. and S. railways; 25 miles S. E. of Hot Springs, 40 miles S. W. of Little Rock. It is in a cotton, grain, and fruit growing region, and has two weekly newspapers. Pop. (1890) 1,520; (1900) 1,582.

Malvern: town; Mills co., Ia. (for location of county, see map of Iowa, ref. 7–D); on the Burlington Route, the Omaha and St. L., and the Tabor and N. railways; 28 miles S. E. of Council Bluffs. It is in an agricultural region, producing abundantly corn and other cereals, vegetables, etc., and having large live-stock interests. There are 5 churches, high school, commercial college, water-works, electric lights, 3 banks, and 2 periodicals, and a large cold storage-house, elevators, creamery, and brick and tile works. Pop. (1880) 748; (1890) 1,003; (1900) 1,166. EDITOR OF "LEADER."

Malvern, Great: town; in Worcestershire, England; on the eastern side of the Malvern Hills; 9 miles S. W. of Worcester (see map of England, ref. 10–G); celebrated as a watering-place. It has an interesting church in Gothic style. Pop. (1891) 6,107.

Malvern Hill, Battle of: an engagement which occurred during the civil war in the U. S. Malvern Hill, Va., the scene of the last of the "Seven Days' fight" (July 1, 1862), lies near the James river, about 15 miles S. E. of Richmond. It rises by easy slopes on the N., E., and S. from the low ground of Western Run and Turkey Island creek, but on the W. it falls away by a steep bluff to the meadow-land of a ravine and creek running directly to the James river, through which ravine a properly directed fire from the Union gunboats could flank the western face of the hill. In McClellan's enforced change of base from the Pamunkey to the James his army occupied this position on June 30, repulsing at about 4 P. M. an attack by a part of Holmes's division in a sharp action known as the fight of Turkey Bridge or Malvern Cliff. On the morning of July 1 McClellan was in position and ready to meet the Confederates' attack. He was particularly strong in artillery, having some sixty field and ten siege guns sweeping the ground over which the Confederates must advance. The gunboats assisted with their fire during the action. About 10 A. M. the Confederate skirmishers and artillery began to feel the Union line, and from 1 to 4 P. M. desultory attacks were made, which were repulsed principally by the artillery. At about 5.30 P. M. the main attack was made upon the Union left and center under Morrell and Couch, and was pushed with great vigor, but the magnificent work of the artillery, seconded by the infantry fire which was largely reserved for short range, repulsed all attacks and drove back the Confederates with great slaughter, the Confederate losses being admitted as more than double those of the Union troops. The action ceased at 9 P. M., and the Union troops were immediately put in motion for Harrison's Landing, which they reached during the day (July 2), and took up their position supported by the gunboats and with their communications restored. See *Battles and Leaders of the Civil War*, and *History of the Civil War in America*, by the Comte de Paris.

JAMES MERCUR.

Mamar'oneck: town; Westchester co., N. Y. (for location of county, see map of New York, ref. 8–J); on Long Island Sound, and the N. Y., N. H. and Hart. Railroad; 22 miles N. E. of New York city. It is an attractive place for summer residence, contains the residences of many New York business men, and has 4 churches, 2 union schools, a State bank, a savings-bank, and 2 weekly newspapers. Pop. (1880) 1,863; (1890) 2,385; (1900) 4,722.

Mameli, GOFFREDO: patriot and poet: b. in Genoa in 1826. The son of a Sardinian naval officer, he studied at the university at Genoa, but early turned to poetry and patriotism. In 1843 he wrote four acts of a tragedy on a theme connected with Genoese history. In 1846 he fired his countrymen by his powerful song *L'Alba*, and on Sept. 8 of the same year, when Genoa was doing honor to Pope Pius IX., he produced his patriotic hymn, upon which his fame chiefly rests, beginning

Fratelli d'Italia,
L'Italia s'è desta.

After this he began to be compared with Tyrtæus and Körner. In 1848 he fought as a volunteer against Austria. In 1849 he went to Rome as one of Garibaldi's volunteers, and became aide-de-camp to the great patriot, dying in that city, July 6, 1849, of a wound received a month before in a desperate sortie upon the French besiegers. The best edition of his poems is that of Tortona, 1859; but that issued at Genoa, with an introduction by Mazzini, should be consulted. A. R. MARSH.

Mameluco [= Span. See MAMELUKES]: a Portuguese word, originally the same as the English Mameluke; applied in Brazil to the offspring of a Negro and an Indian. In the seventeenth and eighteenth centuries the Jesuits of Paraguay gave this name in an especial manner to the slave-hunters of São Paulo who raided their missions, and who were generally of mixed race. The so-called Republic of the Mamelucos, described by Jesuit authors, never had any real existence. H. H. S.

Mam'elukes [Fr. *mamelouk*: Span. *mameluco*, from Arab. *mamlūk*, slave (captive or purchased); liter., possessed, owned; perf. partic. of *malaka*, possess]: a former class of slaves in Egypt who became and long remained the dominant people of that country. Early in the thirteenth century the Sultan of Egypt bought of Genghis Khan 12,000 slaves, mostly Tartars and Turks. In 1242 Malek-el-Saleh made some of them his body-guard. In 1250 this body-guard killed his successor, Turan Shah, seized Egypt, and chose for their sovereign not a man, but the Sultana Chagereh-ed-Dorr. She married Ibeg Izzeddin, who founded the Baharite or Tartar-Mameluke dynasty, in its turn overthrown by Circassian slaves in 1382. The new Circassian-Mameluke dynasty reigned till 1517, when Egypt was subdued by Sultan Selim I. Though continuing subjects of the Ottoman empire, the Mamelukes recovered gradually their former power, but were almost destroyed by Napoleon Bonaparte at the battle of the Pyramids (1798). On the evacuation of Egypt by the French they again assumed control, but were treacherously massacred by Mehemet Ali (1811). The few survivors, escaping to New Dongola, were practically exterminated in 1820. The Mamelukes were famous for their courage and skill in horsemanship. Their wives, who were of the same stock as themselves and who were usually obtained by purchase, were almost always childless in the untoward climate of Egypt. Their few children were generally feeble and short lived; hence they kept up their numbers by buying slaves, to whom their property descended instead of from father to son. E. A. GROSVENOR.

Mamiani, maä-meĕ-aa'neĕ, TERENZIO, Count: philosophical writer and educationist; b. at Pesaro, Italy, in 1800; was educated in Rome by the Jesuits, and became in 1831 a member of the revolutionary provisional government of Bologna. Being afterward proscribed, he was captured by an Austrian vessel in the waters of Ancona, was conducted to Venice, where he was kept a prisoner four months, and then allowed to retire to France. He remained in Paris, devoting himself to philosophical and literary studies until 1847. In 1848 Pius IX. named him Minister of the Interior, and after the death of Pelegrino Rossi he assumed temporarily the duties of Minister of Foreign Affairs. Having been elected deputy to the Roman constituent assembly, Mamiani voted against the republic. On the arrival of the French he retired to Genoa, where he founded the Academia di Filosofia Italica. In 1859 he was elected deputy to Parliament, and afterward appointed senator. In 1860 he became Minister of Public Instruction, occupying at the same time the chair of Philosophy and of History in the University of Turin. Afterward he was sent as minister from Italy to Athens. He then presided in Rome over the superior council of public instruction, and edited a philosophical review. D. in Rome, May 21, 1885. His principal writings (besides a volume of poems, in which the sacred hymns are particularly noteworthy) are the following philosophical works: *Rinnovamento della Filosofia Antica Italiana* (Paris, 1834); *Dialoghi di Scienza* (Paris, 1848); *Le Confessioni di un Metafisico* (2d. ed. Florence, 1865); *Le Meditazioni Cartesiane* (Florence); *D'un nuovo Diritto Europeo* (Turin, 1859); *Psicologia di Kant* (Rome, 1877); *La Religione dell' Avvenire* (Milan, 1879); *Critica della Rivelazione* (Milan, 1880); *Questioni sociali* (Rome, 1882).

Mamma'lia: See MAMMALS.

Mammals [from Lat. *mamma'lis*, pertaining to or having breasts; deriv. of *mam'ma*, breast, pap, teat]: the highest class of the vertebrate branch of the animal kingdom, and therefore the most specialized or highest group of living creatures. The class includes all vertebrates with warm blood, a heart of four chambers, the lower jaw composed of two branches articulated directly with the skull, and the

body partly or wholly covered with hair. It thus includes man, all the hairy quadrupeds, and the various whale and porpoise like animals which possess hair only in the embryonic state and often then only on the upper lip. The habit of bringing forth the young alive is not exclusively a character of the mammals, being shared by various reptiles and fishes. On the other hand, the very lowest of the mammals, the Monotremes, lay eggs similar to those of the snakes, and the mammæ or milk glands of the female are scarcely differentiated. The characters of the mammals may be given in brief as follows:

Hair.—Hair is found in some degree on all mammals and in no other group. It is found in the embryo in whales only, and then confined to the upper lip. In the porcupines, hedgehogs, etc., the hair is stiffened into spines. In some groups, as the armadillos, the skin is hardened into a bony case sometimes suggesting the shell of a turtle.

Skeleton.—The skeleton is highly developed and perfectly ossified, its different parts more constant in the forms, numbers, and relations than in the reptiles and fishes. The vertebral column is divided into five distinct regions:

1. Cervical (neck) vertebræ, usually seven in number, rarely six or nine.

2. Dorsal (back) vertebræ, variable in number, having ribs attached.

3. Lumbar (loin) vertebræ, without ribs.

4. Sacral vertebræ, connected with bones of the pelvis, and 5. Caudal (tail) vertebræ, these varying greatly in number. In the Cetaceans and Sirenians, aquatic Mammalia, the pelvis and hinder limbs are wanting or aborted. In this case the lumbar, sacral, and caudal vertebræ are indistinguishable. The first two cervical vertebræ are always modified as the atlas and axis.

The skull is very characteristic, and may be divided into four parts: (1) cranium, (2) lower jaw, (3) auditory ossicles, (4) hyoidean apparatus. The cranium, as in other animals, is the modified anterior continuation of the vertebral column.

The skull undergoes considerable change in development from the low forms to the high ones, as well as with age. In the lower types the segmented or quasi-vertebrated character is much more evident, and is in correlation with the development of the brain, whose several parts are more nearly on a longitudinal axis. In the progress from the low to the high forms the several regions of the brain become concentrated and subordinated to the cerebrum. The skull follows, and in man the cerebral cavity forms the largest portion. In the lower forms the brain, and consequently the cerebral cavity, increases but little, if any, after birth; the subsequent growth being chiefly due to the development of ridges for muscular insertion, air-cells, and the extension of the jaw-bones. The brain also differs comparatively little in size in the members of a natural family, although the skulls may vary greatly: the differences as to the skulls between large and small animals are due chiefly to the outgrowth of bone. The skull is also modified to adapt the animal to its surroundings, and consequently in the aquatic forms, as the Cetaceans, it is excessively modified.

With the anterior ribs, at least, at their distal ends, are connected a chain of median bones or cartilages designated by the common name of *sternum*. This apparatus is very variable in its development.

(1) The cranium is most uniform in all the types at the posterior part, and deviates most at the distal and peripheral parts. The hindmost segment has an axial element (the *basioccipital*), with which, on the respective sides, are connected two lateral ones (the *exoccipital*), chiefly bearing the condyles for the articulation of the "backbone," and these are connected above by a keystone element (the *supraoccipital*): these four elements, always separately developed in early life, in some of the lower forms (e. g. marsupials) are persistent as separate bones throughout life, but in the higher forms early coalesce into a single bone, the occipital; they all bound the aperture through which the nervous system enters the skull, the "foramen magnum." On the axial line, in front of the basioccipital, also an unpaired bone, is the *basisphenoid*; with the upper sides of this are connected dilated wing-like elements, one on each side (the *alisphenoids*); with the anterior surfaces another axial element (the *presphenoid*) articulates; and with the upper margins of this and the anterior of the alisphenoid two lateral elements (the *orbitosphenoid*) are connected; finally, with the inferior surface of the previous axial bones, as well as with processes of the alisphenoids, is connected a median vertical element (the *pterygoid*); these several elements (i. e. basisphenoid, alisphenoid, presphenoid, orbitosphenoid, and pterygoid) are in various degrees combined, all being united in the higher animals, including man, in a single bone—the sphenoid: this itself, in its axial portion, finally coalesces behind with the occipital. The roof of the skull is formed, in front of the supraoccipital element, first, by two bones (the *parietal*), which are chiefly connected by their lateral margins with the alisphenoid elements, and these are followed forward by two other bones (the *frontal*), connected below with the orbitosphenoid elements; in front are the *nasal*. The foremost axial bone is the *mesethmoid*, which together with two lateral ones (the *ethmoturbinal* and *maxilloturbinal*) form the compound ethmoid. All the bones thus far enumerated, or at least the combinations, concur together and with the periotic bones (hereinafter mentioned) to form the cerebral chamber or calvarium. The olfactory chamber is in advance; its floor, and partly its sides, are constituted in front by the *intermaxillary* and *supramaxillary* bones, and behind by the *palatine*; its roof by the *nasal* and in part the *frontal* bones. Lodged between the frontal, supramaxillary, and palatine bones is one which enters into the front margin of the orbit, is in most a thin laminar bone, and, being generally provided with a canal for the lachrymal gland, is called the *lachrymal* bone. The periotic bones, already referred to, are interposed between the occipital, parietal, and sphenoid ones, and are represented, it is alleged, in the embryo by three centers of ossification: these, however, very soon unite and form a single bone (the *periotic*), which includes the labyrinth of the inner ear; the antero-internal portion of this forms the so-called "petrous" portion, and the postero-internal the "mastoid" portion. With this bone is connected, and often ankylosed (as in man), a scale-like bone called the *squamosal*, which emits from its anterior borders the zygomatic process to meet the malar or cheek bone; from the inferior portion is developed the *tympanic* bone, which forms the auditory bulla so ordinarily developed in mammals. These several elements frequently coalesce and form a compound temporal bone.

(2) The lower jaw is composed of two simple rami (*mandibles*), connected together at the symphysis, and each has a more or less convex condyle by which it articulates with a "glenoid cavity" at the base of the zygomatic process of the squamosal bone. In this simplicity of the rami and direct articulation with the skull the mammals differ widely from all other vertebrates.

A bar-like bone (*malar* or *jugal*) generally connects the zygomatic processes of the squamosal and frontal bones, but is frequently absent, as in many Insectivores, Edentates, and Cetaceans.

The limbs are formed in the same general way, although much modified by adaptation to the different functions in the different groups. There are always four limbs, except in the marine forms, in which the hinder pair are usually wanting.

The anterior limbs have each successively a long bone (*humerus*), two parallel bones (*radius* and *ulna*), a group of usually eight or nine small bones (*carpal bones*), a row of longer bones (*metacarpal*) forming in man the palm of the hand, and three rows of phalanges or finger-bones, the number and form varying much in different groups.

With the humerus is articulated the flattened shoulder-bone or scapula, and in many forms the clavicle connects the shoulder with the sternum. The clavicle present in man is wanting in many forms.

The pelvis is formed by the sacrum and two large compound bones (*innominata*), each composed of *ilium*, *ischium*, and *pubis*. The hinder limbs are formed of bones corresponding to those of the fore limb, the *femur*, the parallel tibia and *fibula*, the tarsus, metatarsus, and phalanges. An additional bone, the *patella* or knee-cap, is usually present, protecting the knee-joint.

Muscular System.—The muscles are extremely varied in the different groups. They are better differentiated than in the lower forms. Only the diaphragm is peculiar to mammals.

Nervous System.—The brain is highly developed; the cerebrum always larger than the cerebellum—much more so in the lower forms, and excessively preponderant in the higher ones (especially in man). While in the lower forms it leaves exposed the entire cerebellum, as well as the optic lobes and the olfactory ones, its increasing volume in the higher forms overlaps those parts, until finally in man all are covered from view from above. The hemispheres of the cerebrum are connected (1) by an *anterior commissure*, and

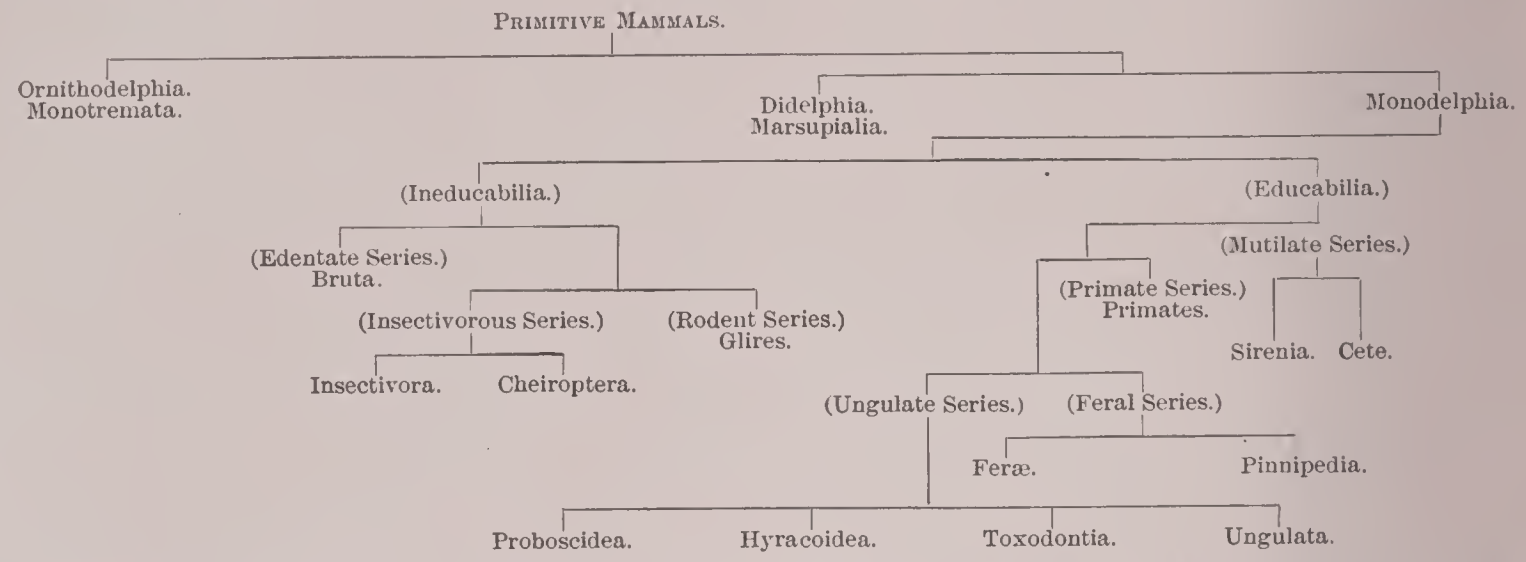
(2) by a great superior commissure, the *corpus callosum*; these are developed in inverse proportion, in the lower forms the anterior commissure being very large, while the corpus callosum is very small; in the higher forms the corpus callosum is greatly developed, while the anterior commissure is extremely reduced. The cerebral hemisphere in the smaller and inferior forms are nearly smooth, while in the larger and more highly organized ones they are deeply convoluted. The most characteristic feature in the brain of mammals is the development of the corpus callosum.

Dental System.—The teeth of mammals are usually well developed and well distinguished. In the whalebone whales, ant-eaters, and some related forms, they are wholly wanting. The narwhal has but one tooth, while some porpoises have 200. Usually the teeth are divisible into incisors, canines, and molars, and they are usually implanted by roots in the jaws.

Alimentary System.—The alimentary canal and its appendages exhibit great variations, but offer nothing especially distinctive of the group.

mæ vary greatly; they are without teats in the Monotremes, but have them in the marsupials and ordinary mammals. They are almost always on the inferior surface of the trunk, and either abdominal, inguinal, or on the breast.

Evolution and Genetic Relations.—The class of mammals is so decidedly differentiated from all others, and its early history is so fragmentary, that the exact line of descent of its members is not apparent. It is, however, most probable that the original progenitors of the class were modified from the Dinosaurian reptiles, or near allies of those animals, and that they culminated into the present types at a comparatively early epoch, the earliest known forms—those found in the Liassic formation—being quite specialized. Unquestionably, the Monotremes are the most reptile-like; the marsupials and the placental mammals are successively divergent and specialized from the primitive type. The successive differentiation and development of the various orders of the class may be exhibited in a diagrammatic form or genealogical tree. In this the more generalized forms, or quasi-eldest, are represented in each case by the left branch or fork:



Circulatory System.—The blood has its red blood-corpuscles non-nucleated. The circulation is complete and closed, the stream being received and transmitted by the right half of the quadrilocular heart to the lungs for aëration, therein oxygenated and warmed, thence sent to the left side of the heart, and finally transmitted through the system. Thus, although resembling birds, mammals are distinguished from the reptiles and inferior vertebrates.

Respiratory System.—Respiration is effected in all cases by inhalation of the air direct, and consequently by means of the lungs. These are, in common with the heart, in a special thoracic cavity, separated from the abdominal cavity by the diaphragm. This diaphragm, by its alternate contraction and expansion, assists the lungs in their inhalation and expulsion of air. The windpipe or trachea bifurcates, and sends special branches to the respective lungs.

Reproductive System.—The male and female organs, although strictly homologous and in early embryonic life undistinguishable, become greatly differentiated in after life. In the female the chief organs are the ovaries, which by oviducts communicate directly with the uterus, and thereby with the vagina. In the male the testes (which are homologous with the ovaries), although in the lower types abdominal, in the higher descend into external "serotal" pouches, and the penis is almost always external. The eggs are in the lowest type of considerable size, but in the others extremely small. Impregnation is always effected internally. The fœtus in the lower type is not long carried in the mother's womb, but is born in a comparatively immature state, and attached to the teats by the mother; in the higher type it is nourished by means of a peculiar outgrowth in connection with the embryo and wall of the uterus (the *placenta*) in the womb, and when born is of considerable size and quite mature in development.

The development of the uterus and its relations to the vagina, as well as the development of the vagina and its connections, exhibit several modifications in the various groups which are coincident with other phases of progress, and indicate successive stages of differentiation.

For the nourishment of the new-born young a peculiar provision is made in the development of certain glands (*mammary*), which in the female are highly specialized and secrete the milk. The position and number of these mam-

Geographical Distribution.—Mammals exist in almost every region of the globe, but were wanting, previous to their introduction by man, in the Polynesian islands, as well as in New Zealand. Monotremes are peculiar to Australasia. Marsupials are now confined to Australasia and outlying islands and America; in the former numerous types being represented, and in the latter but one—the opossums. Insectivores are wanting in the regions where marsupials abound, but are well represented in the entire northern hemisphere, as well as in Asia and Africa. Primates are represented especially in the tropical regions of Africa, Asia, and America, but in very different forms, the lowest type (Lemuroids) being now peculiar to the Old World, and best developed in Madagascar; and in Africa and Asia the highest type (catarrhine monkeys and apes) is also existent, while in America all the species are of an inferior type of monkeys —the platyrrhine group. The Edentates are represented only in warm countries, and have most members in America (the sloths, ant-eaters, armadillos, and pichiegos). The carnivorous mammals are quite widely distributed, extending almost between the extremes of the northern and southern hemispheres, and under the same generic forms on at least the continental areas of both the Old World and the New, Australia alone having no representatives except of a single species of dog (*Canis dingo*). The *Felidæ* (cat) and *Canidæ* (dog) families are especially thus distributed. The others are more limited, or have a greater number of genera restricted to limited countries. The ungulates are in recent times much restricted; the *Equidæ* (horses) and *Rhinocerotidæ* (rhinoceroses) being peculiar to the warmer regions of the Old World, although horses have become feral and greatly increased in numbers on the plains of South America. The proboscidians (elephants) are now restricted to the Old World; one generic form (*Loxodonta*) being represented in Africa, and another (*Elephas*) in Asia. Bats, fitted by their organization for extensive migrations, are found nearly everywhere; but many generic types, notwithstanding their apparent equal capability of extension, are quite confined in their range. The Cetaceans are abundantly represented in the polar regions by peculiar genera and species, but are also rich in types common to the entire tropical zone, and have also several peculiar fresh-water types in the tropics. About 2,500 species of Mammals are now recognized.

Geological Range.—For a long time it was believed that no representatives of Mammalia existed previous to the Tertiary epoch. The evidence, however, is now conclusive of their existence in the Mesozoic, both in the Triassic and Oölitic periods, although only fragments, chiefly of lower jaws, have been found. These remains have been mostly attributed to the order of Marsupials. In the Tertiary epoch numerous remarkable extinct types, representing even orders without living members, were in evidence, and have furnished clews for the appreciation of the genetic relations of the several groups of the class. Those of the U. S. have been chiefly studied by Leidy, Cope, Marsh, Osborne, and Scott. See PALEONTOLOGY and VERTEBRATES, FOSSIL.

Classification.—Prof. Huxley has divided the mammals into the following primary groups: (1) Sub-class Ornithodelphia, with the order *Monotremata*; (2) sub-class Didelphia, with the order *Marsupialia*; and (3) sub-class Monodelphia. The Monodelphia are first discriminated into (*a*) those with median incisor teeth developed (Edentata), and (*b*) those with median incisor teeth developed, and the latter into (1) *Non-deciduata*, including the orders *Unyulata*, *Toxodontia*, *Sirenia*, and *Cetacea*; and (2*a*) *Deciduata with a zonary placenta* (Hyracoidea, Proboscidea, and Carnivora), and (2*b*) *Deciduata with a discoidal placenta* (Rodentia, Insectivora, Cheiroptera, and Primates). Most modern writers have followed substantially this arrangement, although in some cases older names have been recognized for some of the orders.

THEODORE GILL.

Revised and abridged by D. S. JORDAN.

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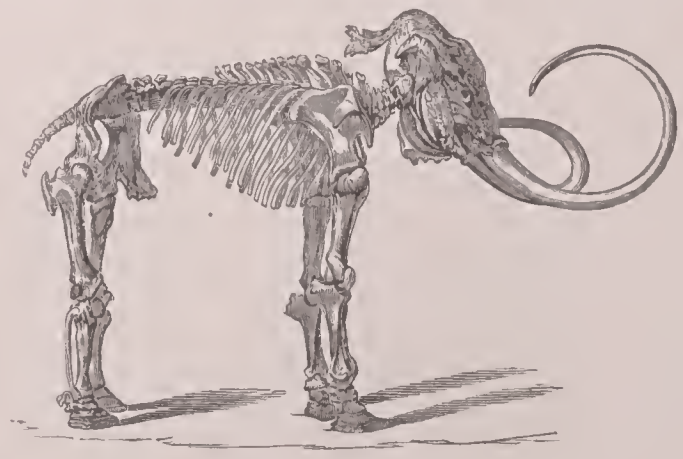
D. S. JORDAN.

Mammary Glands [*mammary* is from Lat. *mamma*, breast, pap]: the organs which produce milk; one of the most characteristic and distinctive marks of the mammalian class of vertebrates. No animal except the mammals produces milk, or has anything approaching the character of a mammary gland. Ordinarily the mammary glands of the male are undeveloped. The male of the human race has been known to secrete milk and actually nurse a child, and during a few days after birth the breasts of both sexes secrete a small quantity of liquid resembling milk. The mammary gland is of various structure in different animals. In the Ornithorhynchus it is a collection of simple cæcal follicles, opening on the surface, without a nipple; and the mother appears to possess the power of extruding the milk into the mouth of the young animal. The Cetaceans have very simple mammary glands, and the teat is inclosed in a slit. The marsupial mammals attach their young, in an exceedingly embryonic state, to the nipple, and the gland is provided with a muscular apparatus by which the mother feeds the feeble young creature at will, expressing the milk, which flows into the stomach of her offspring. In the higher animals the young are fed by suction. The mother does not feed her suckling, though her *consensus* is apparently needful to the free secretion of milk. Thus it is well known that if cows are beaten or irritated before milking, the flow of milk is small. The mammary glands are always in pairs, and placed symmetrically on either side of the mesial line and on the ventral aspect of the body, but in number and in position they vary greatly in the various species. Some animals, like the cow, have often a pair or two of abortive or undeveloped nipples, besides those which yield milk. In the human species the mammæ consist of lobes and lobules of gland-tissue, with interlobular fibrous and fatty substance. The lobules consist ultimately of little groups of vesicles which open into minute ducts; the ducts converge into larger ducts, which at the base of the nipple open into *ampullæ* or reservoirs of milk. The nipple is slightly erectile, and in the human species has several orifices for the discharge of milk. The milk-ducts are lined with pavement epithelium. Occasionally accessory rudimentary mammary glands are observed on the chest, abdomen, shoulders, or elsewhere. The gland itself is subject to many inflammatory, malignant, cystic, and other diseases. Of these, one of the most frequent is acute inflammation, an extremely painful affection occurring almost always during lactation. Hot stimulating lotions and the careful drawing of the milk are very useful. The gland should be suspended in a bandage. If it be not desirable to prolong the lactation, a solution of atropia should be applied, which often arrests lactation, and thus alleviates the disease remarkably; but if this be applied, the infant should not be fed from the breast, unless after the poisonous atropia has been carefully removed from the surface by washing. The breast is one of the common seats of cancer in the female. This disease is readily recognized by its appearance, the pain it occasions, and by the deterioration of the woman's health. Prompt removal may prolong life, but does not often prevent spread of the disease or recurrence *in loco*.

Revised by WILLIAM PEPPER.

Mammee' Apple [*mammee* is from Haitian *mamey*]: the fruit of trees of the order *Guttiferæ* (*Mammea americana* and *M. africana*), growing respectively in South America and the West Indies and in Africa. The fruit of the American species is very agreeable to the taste. The tree is very valuable for its timber.

Mammoth [from Russ. *ma'mont*, *ma'mantŭ*; cf. Tartar *mamma*, earth, the mammoth being believed by some Tartar tribes to have been a burrowing animal]: an extinct species (*Elephas primigenius*) of elephant, about twice the weight of the living species, formerly abundant in the higher latitudes of both the Old and New Worlds. Their remains are abundant in Siberia and Alaska, where their tusks are gath-



Skeleton of mammoth.

ered as an article of export. The mammoth was closely related to the existing Indian elephant, and some authors have considered them identical. It differs, however, in many respects, and one of the most important of these differences is found in the molar or grinding teeth. These teeth are broader than those of *E. indicus*, and have narrower, more numerous, and close-set transverse plates and ridges. They exemplify the extreme type of the peculiar elephantine dentition. The tusks are long and much curved, in some cases forming a complete circle, but being directed outward they clear the head, and the points are directed outward, downward, and backward. Two principal sizes of tusks are found —the larger averaging 9½, the smaller 5½, feet in length. They seem to have belonged to males and females respectively. Tusks have, however, been found over 12 feet in length. This animal is better known than any other species extinct before the historic period, as its remains have been perfectly preserved in the ice and frozen soil of the Arctic regions. A fine specimen was discovered at the close of the eighteenth century, in a cliff at the mouth of the river Lena. The flesh was so well preserved that dogs and wild animals fed upon it. The skin was thick, and covered with a reddish wool and long black hairs. This skeleton is now preserved at St. Petersburg, and measures 16 ft. 4 in. from the fore part of the skull to the end of the tail, which is imperfect. Parts of the skin of the head, the strong ligament of the nape, which principally sustained the head, and the hoofs remain upon the skeleton. The hairy covering enabled the mammoth to endure a much colder climate than that to which the existing elephants are confined. Its food consisted of the leaves and branches of northern pines, willows, birches, and other hardy trees, such as may now be found along the isothermal of 40° Fahr., which in that age may have run as high as Northern Siberia, where these animals then lived in large herds. They roamed also over Europe, where they were contemporary with at least two kinds of two-horned rhinoceroses, a hippopotamus, gigantic deer, three kinds of wild oxen (two of which were of large size, and one shaggy and maned), a tiger as large as that of Bengal, and another fierce carnivore of equal size, the *Machærodus*, together with troops of hyænas, and a savage bear larger than the grizzly of the Rocky Mountains. During the Palæolithic and Reindeer eras they were contemporary with men, who have left rude delineations of this animal engraved on the ivory of its own tusks. Much confusion has existed among naturalists in regard to the species of mammoth. Cuvier referred to the single species, *E. primigenius*, teeth from Europe, Northern Asia, and all North America, from strata as early as the Lower Pliocene, and as late as the frozen drift and ice-cliffs of Siberia. De Blainville included the existing Indian elephant in the species, thus giving it a range both in time and space unequaled by any known mammal in a state of nature. Later naturalists have more carefully discriminated the species, and restricted its range to Europe, Northern Asia, and Northwestern North America above the parallel of 40°, and in time to the Quaternary age. The mammoth of the warmer parts of North America is regarded as a different species, *E. americanus*, and is comparatively little known, as the remains hitherto found have consisted principally of teeth. These have often been found associated with more numerous and better preserved remains of the mastodon. From the Tertiary of Europe and Asia, Dr. Falconer enumerates ten species of the genus *Elephas*, which he divides into three sub-genera—*Euelephas*, *Loxodon*, and *Stegodon*. No remains of elephants have yet been found below strata referred to the Miocene.

O. C. Marsh.

Mammoth Cave: believed to be the largest known cavern in the world; near Green river, Central Kentucky. The Carboniferous limestone, which covers a large area in Kentucky and adjacent States, abounds in caverns, whose underground passages must measure many thousands of miles in length. Mammoth Cave was discovered in 1809, and for a time it was used chiefly to obtain niter for the manufacture of gunpowder, especially during the war of 1812, the niter being found in deposits on the floor of the cave, chiefly near the entrance, and owing its origin to the accumulation of animal remains, especially of bats. In later years the cave became a resort for travelers, and it is now a valuable property on this account. It has never been carefully surveyed, but its passages aggregate many miles in length. Its larger chambers are beautifully ornamented with stalactites and stalagmites. One chamber, called the Great City, is said to cover a space of 2 acres. Some of the passages are occupied by streams or pools. The cave air is dry, and almost constant in temperature, seldom varying more than 2 from 53° F. In summer time the relatively cool air flows out from the entrance, and external air is drawn down through sink-holes in the roof; in winter the cold external air flows in at the main entrance. The animals living in the cave are a few species of fish, two species of crayfish, and several insects, as well as the bats that divide their time between the cave and the outer air. Some species of the cave animals are white and blind; others have color and well-developed eyes. The former are thought to have occupied the cave for long ages, gradually adapting themselves to its darkness; the others are supposed to have been introduced later. W. M. Davis.

Mams: See Indians of Central America.

Mamun, Al (Abul Abbas Abdallah), or **Abdallah III.**: seventh caliph of the Abasside dynasty; b. at Bagdad in 786; a son of Haroun-al-Raschid: governor of Khorassan in 800; ascended the throne in 813, after the deposition and death of his elder brother, Mohammed II. el Emin. He was a mild and merciful prince, tolerant of other religions than his own, but weak, irresolute, and unable to hold his empire together. Several provinces declared themselves independent, and even over Syria and Egypt he exercised only nominal authority. He was, however, distinguished as a patron of literature and science. He himself wrote several books, and, like his father, made Bagdad the center of learning. He had the masterpieces of the Greeks translated into Arabic, and the first translation of Euclid ever made was dedicated to him. When in Egypt he is said to have become excited over the tales of immense treasures concealed in the Great Pyramid, and to have set many workmen at finding an entrance. After prodigious labor they effected a forced passage, whereby he was enabled to make his way into what has since been called "the king's chamber," there to behold only the solitary sarcophagus of Cheops. By the forced passage then made visitors now penetrate to the interior of the pyramid. He died in 834, near Tarsus, while marching against the Byzantine emperor Theophilus.

E. A. Grosvenor.

Man: collectively, the whole human species. The scientific study of man is sometimes called anthropology, although this word has other meanings, and by French writers is limited to the study of the physical structure of man. (See Anthropology.) By whatever term designated, the study of man should be regarded as a branch of natural science, to be pursued under the guidance of accurate observation and experimental research, embracing all his nature and all the manifestations of his activity, in the past as well as in the present, the whole co-ordinated in accordance with the inductive methods of the other natural sciences. It includes, therefore, history and archæology, as well as the examination of the living representatives of the species; as ethnography, it must define the physical and mental characteristics of races and peoples; and as ethnology and sociology it must trace the intellectual or psychical development of the various subdivisions of the species.

Zoölogical Position of Man.—In the realm of organic life man is classed as a vertebrate animal, belonging to the division of the Mammalia and the order of Primates. In this order he belongs to the highest family, that of the Hominidæ (Broca, Huxley), in which he is the sole species and genus, under the title *Homo sapiens*, man the intelligent. The two anatomical characteristics which beyond all others distinguish him from the other members of the order of primates are—1, his erect position, which enables him to walk upon his lower members only, leaving the higher, the arms and hands, free for other uses; and 2, the remarkable development of his brain, which confers upon him the intellectual superiority which has finally made him the master of the world. Besides these leading differences, there are many others less prominent or less constant. Among them are the nearly equal size of his teeth, all other Primates having a tendency to the elongation of the canine teeth; the greater length of the lower limbs as compared with the upper, the reverse being the case with apes and monkeys; a different anatomical arrangement of the structure of the foot, by which man walks on its sole, while anthropoids turn it slightly on the side; the position of the thumb on the hand in opposition to the fingers, while in the anthropoids it is more on a line with them, and is less flexible; and other minor points. It must be added that no one of these traits is of such a character as to separate man any

more widely from other families of the Primates than these in turn are separated among themselves. Even erect stature is not a characteristic either in infancy or in old age.

Date of Man's First Appearance on the Earth.—Before the sciences of geology and prehistoric archæology had been developed there were no data by which the date of man's first appearance on the earth could be even guessed at. The ancient Egyptians placed it about 25,000 years before the time of the Greek historian Herodotus, while illiterate tribes imagined it occurred but a few generations back. In Christian communities the chronology of the Old Testament was very differently computed, in Great Britain the estimate of Archbishop Ussher, that the creation of man took place 4004 B. C., being generally received. It is now acknowledged by every one that this is entirely inadequate, as there are still standing temples in Egypt whose foundations were laid much earlier than that. We must turn to geological measures of time in the discussion of the question. Of the two latest great periods, the Tertiary and Quaternary (see GEOLOGY), man appears to have existed only in the latter. The evidences of his presence in the Pliocene (or latest Tertiary), which have been alleged from time to time, have not borne examination. In the Quaternary the inquiry arises, Did he appear before, during, or after the remarkable lowering of temperature which took place about the middle of it, known as the Glacial Epoch or the Great Ice Age? The evidence is almost conclusive that he lived in Western Europe certainly, and in America perhaps, before this astonishing change occurred. His rude stone implements have been found in the river gravels of England, France, and Spain, associated in original deposition with the bones of tropical animals, such as the hippopotamus, the African elephant, and the hyæna. These belonged to the preglacial fauna of those localities. From that geological period onward the remains of human handiwork are constantly exhumed from many deposits; but when geologists are asked to assign in years the antiquity of the oldest strata containing such remains their estimates vary greatly. Some place them as far back as 250,000 years (Mortillet), while others are not willing to assign them a greater age than the tenth of this amount, or even less (Upham, Nadaillac). Omitting these extremes and following the average estimates of several careful observers, we may assume 30,000 years as the minimum time requisite to effect all the geologic and physical changes which have taken place since the deposition of the earliest discovered remains of man's industry.

Unity or Plurality of Origin.—While it is generally conceded that man is, zoölogically, of one species, it by no means follows from this that this species had but one origin; that all its members are descended from one original pair. Upon this question there has been and still is a wide diversity of opinion. Those defending the view that there was but one ancestral pair are known as monogenists, while those teaching a plurality of origins are called polygenists. To the latter school belonged the elder Agassiz, who assumed eight or nine centers of appearance for the human race; Dr. S. G. Morton, who thought he could point out twenty-two centers; Nott and Gliddon, who even taught a specific diversity of races, followed Agassiz; and in recent years the French school of polygenists have been ably represented by Topinard, Hovelacque, and Hervé, as well as many other writers. The arguments advanced in support of their views turn on the differences of the varieties of men, the difficulties in supposing wide migrations in the early history of the race, the less viability of the mixed population, and the analogy of lower forms which are believed to have developed the same specific traits in unconnected localities. A careful examination of these arguments does not strengthen them. All must acknowledge that the differences between the varieties of the human species are vastly less than between man and the highest anthropoid, and those who believe that he developed from such an ancestor need not hesitate to believe that his descendants could diverge to the extent now visible in the species. There is no good ground for asserting the less viability of mixed races when these arise under favorable hygienic conditions, and the theory of dispersion from one center becomes easy enough when sufficient time is allowed. Finally, the theory of a single origin is the simpler, and it is the rule in scientific reasoning always to adopt the simpler hypothesis when it explains the facts. From these considerations the majority of anthropologists, both in Europe and America, are inclined to favor the opinion that the human species arose in some one locality, and spread thence over the face of the earth, following in this the position of Darwin, who wrote: "All the races of man agree in so many unimportant details of structure, and in so many mental peculiarities, that they can be accounted for only through inheritance from a common progenitor."

Birthplace of the Human Species.—It is not an idle question, and it is one not beyond reply, to inquire where on the globe man first came into being. Through a process of exclusion we can define it with a certain amount of precision. The oldest known relics of the race, the physical geography of the earth and its geologic history, are the guides in this investigation. Wherever man first appeared, it must have been where other of the highest Primates also lived, as he must be regarded as the last and highest development of organic nature. This consideration at once excludes the American continent, Australia, and many other localities in which no high apes, those which are tailless and have thirty-two teeth, have been discovered either living or fossil. None of the oldest remains of man have been exhumed in the high northern latitudes of Europe, Asia, or America, nor in the islands of the oceans. In the early Quaternary, at the period man probably first appeared, Central and Southern Africa and Central and Southern India were large islands, cut off from the main body of the eastern hemisphere by broad seas (Suess, Huxley). These and allied considerations, which there is not space to recapitulate, lead almost certainly to the conclusion that the birthplace of man was somewhere on the southern slope of the vast mountain chain which extends in an almost unbroken line from the northern coast of Spain eastward to the Himalayas, and from our present knowledge the western rather than the eastern extremity of this chain is that which offers the higher probability of having been the cradle of the species. There is much more to be said for that locality than for some sunken continent (the Atlantis or Haeckel's Lemuria) as the scene of man's first activity.

Theories of the Origin of Man.—The belief formerly entertained was that man and the other species of animals were the results of acts of special creation by the Divine Will acting upon inanimate matter. When the laws of change in organic forms came to be more closely studied it became evident that such a view is consistent neither with the highest conception of divinity nor with observed facts. A universe requiring such constant interferences would be inferior to one acting under grand and eternal laws, just as any machine is less perfect the more frequently it requires the attention of its designer. In some form, therefore, the theory of the evolution or transformation of one organic form into another is alone that which at once satisfies the reason and elevates religious thought. This marvelous process goes on, however, under such strange and obscure laws that it is still far from being understood. Darwin thought that he had discovered in sexual selection, the survival of the fittest, and the transmission of accidental and acquired qualities, the main factors of change; but his explanations have been greatly weakened and modified by later observers. Especially with reference to man it has been found impossible to secure proof that he came into existence, as Darwin taught, by a series of slow and gradual modifications from some extinct form "of a hairy quadruped furnished with a tail and pointed ears, arboreal in its habits." No "connecting links" between these widely diverse forms have been exhumed in spite of the most prolonged and painstaking search. Other theories of evolution, supported by abundant observations, offer less difficult solutions of the enigma. Rapid acceleration in the evolutionary process has been observed in some organic forms under novel stimuli (Hyatt, Cope); and that form of evolution known as *per saltum*, or "with a bound," has been abundantly illustrated by competent observers (Meehan, Mivart, Ferris). New forms arise by what seems to be the action of chance, but undoubtedly in obedience to laws unknown to us, and these forms are perpetuated and improved by favoring circumstances. As we know that the highest qualities of humanity—beauty, strength, and genius—occasionally appear in the individual when there is no trace of them in his ancestry, so the sudden development of allied traits in the original pair may have gifted them and their children with the superiority requisite to endow the species Man with the powers which are his own. This is by some called the doctrine of *heterogenesis.*

Traits of Primeval Man.—No skeletons have yet been discovered which could with any certainty be attributed to the man of the drift; but in the caves of France and Bel-

gium there have been found at least five more or less complete which, from the nature of their surroundings, must have been those of the ancient Palæolithic inhabitants. They have been carefully studied and brought into comparison with some of the oldest human remains from the tombs of Egypt and the valley of the Euphrates (Virchow, Rohan). The result is that neither in stature, cranial capacity, muscular development (as judged by the marks of the insertions of muscles and the volume of the bones), nor in any other osteological criterion, did these earliest members of the species differ more from those now living than do these among themselves in their different varieties. The many thousands of years which have elapsed, and the extensive changes in the conditions of life, have exerted no marked and permanent effect on the osseous system, and therefore, we may reasonably infer, none on the soft parts. All adaptations have been strictly within the limits of specific variation; and we have no grounds for assigning to these earliest known men an inferior brain or a lower intelligence than is seen among various savage tribes still in existence. The tools and weapons they manufactured were equal and often notably superior to those of the Tasmanians or Fuegians of the nineteenth century; and the etched figures on bones which they left (see CAVE-DWELLERS) prove that an artistic spirit and an appreciation of symmetry arrived very early in the history of culture. On the other hand, an examination of the most ancient relics of man's handiwork wherever found proves conclusively that he began at the foot of the ladder of culture, that his condition was one of utter savagery, and that the idea once entertained that his first state was one of high civilization, from which he subsequently fell, is utterly baseless. It is very doubtful whether he had any other language for generations than emotional cries; and it is almost certain that for a much longer time he had no religious conceptions whatever, because among his earliest remains no objects of a religious significance have been found.

The Dissemination of the Species.—Man is by nature a migratory and not a sedentary animal. His constitution more than that of any other mammal enables him to bear without injury the extremes of climate and the greatest variations in temperature. At his origin for an indefinitely long time the sources of his subsistence were exclusively hunting and fishing, and these occupations always forced him to wide wanderings in search of his food-supply. We know from the character and location of the oldest signs of his industry that his favorite home was along the shores of seas and the banks of streams. These are the natural highways of nations, and when urged by a scantiness of returns, the pressure of foes, the desire for a more genial climate, or simple restlessness, to extend his journeys, the roads lay ready-made before him. This explains why men seem already to have reached every continent before they had emerged from what is known as the Palæolithic or old Stone Age. At a later time, but still far within the prehistoric period, other motives led to a wide distribution of peoples. The lust of conquest spurred to many a distant voyage by sea or campaign by land; and the establishment of commercial relations brought very remote tribes into communication. Herodotus describes trade routes existing at and long before his time from the Straits of Gibraltar to the Euphrates valley, and in North America shells from the Pacific and obsidian from the Yellowstone Park were transported to the shores of the Delaware and the Hudson.

Causes of Variations in Man.—Those who accept the theory of monogenism, or that all men are descended from one original pair, have to explain by what natural causes the races of men have come to differ so widely in their mental and physical characteristics as we find to be the case at the present day. The problem is a complicated one, and a number of influences must be considered. First in importance is the food-supply, which must be considered both in respect to quantity and quality. Although man is by nature omnivorous, his organs are materially modified by the character of his sustenance, whether animal or vegetable, whether easily digested or the reverse, whether abounding or lacking in nitrogenous elements. Even more is his development influenced by its quantity. Insufficiency infallibly leads to degeneration and retardation or arrest of development, and this in turn to mental or physical depravity. Mainly through what he eats and drinks he becomes liable to, or is enabled to resist, the attacks of diseases; and this bears directly on his death or survival under given conditions. Climate is next in importance, as its chief factors—drought or humidity, heat or cold, cloudiness or sunlight—increase or diminish the conditions of health or disease. The pernicious effects of malaria and other so-called "endemic" diseases depend directly on climatic relations. Altitude must also be considered. Its influence on the physical traits is sometimes very conspicuous, as among the Aymaras of Peru. External causes of this nature react powerfully on the emotional and intellectual faculties and their activity. The heat of the tropics, as well as the cold of the Arctic regions, militate against the highest energy of the psychical attributes. They tend to leave man under the influence of the mighty forces of nature around him, and prevent his emancipating himself from his merely animal life. See CLIMATE.

Areas of Characterization.—The general effects of such influences as have just been described make themselves felt over definite areas of wide extent. These have been called areas of characterization (de Quatrefages), or geographical provinces (Bastian), or natural kingdoms (Wallace). They present throughout their length and breadth a prevailing similarity of fauna and flora extending in time throughout most of the Quaternary period or longer. In general terms they correspond to the great continental areas, but rather as these existed in early Quaternary times than at the present day. Europe, for instance, was connected both with Western Asia and Northern Africa. Undoubtedly man has also been profoundly influenced by the same general causes which define these zoölogical kingdoms. His separation into various sub-species, characterized by indelible differences, arose at some remote epoch, when for a long time the men of the primitive type were subjected to the contrasted conditions of these areas, and the species being in its early youth, and hence more susceptible to impressions than later, became divided into its several races as we now know them, the differences being constantly strengthened by close intermarriage.

Racial Characteristics.—We know that the characteristics of races are of great antiquity and singular permanence, for we find in the paintings on Egyptian tombs, dating three or four thousand years before the Christian era, the traits of the white and black races depicted as clearly as they exist to-day. The most prominent of these characteristics is the color of the skin. Its three chief shades are white or whitish, yellow or olive, and dark brown or black. Equally important and persistent is the character of the hair, which is either straight, wavy or curly, or frizzly and woolly—peculiarities which depend upon the shape of the single hairs, whether cylindrical or flattened, the latter giving the "kink" or twist, while the former lies straight and without curliness. Of the features the most characteristic is the nose, which is broad and flattened in some races, narrow and prominent in others. The latter are called *leptorhinic*, the former *platyrrhinic*. Much attention has been paid to the shape of the skull as an ethnic criterion, but it must be said with little positive results. The chief measure considered is the proportion which its length bears to its width. When the head is notably long it is called *dolichocephalic*, when shorter than the average, *brachycephalic*. The size and permanence of the teeth, the proportions of the upper and lower extremities, the greater or less obliquity of the pelvic bones, and the persistence of fœtal or infantile developments, have also considerable value in certain races and nations. As for stature, muscular strength, longevity, and corporeal symmetry, these can not be said to be characteristics of any special race.

Classification of the Races of Men.—The differences above referred to have been taken as the bases to divide the species Man into a number of sub-species, varieties, or races, some writers preferring one criterion, some another. The founder of scientific anthropology, Blumenbach (b. 1752), established five races, which he named the Caucasian, Mongolian, Ethiopian, Malayan, and American. This is the groundwork of many of the modern systems, but it is defective in several respects, especially in applying the term Caucasian to the white race and Ethiopian to the blacks. The naturalist Cuvier sought to simplify it by assuming only three races, the white, the yellow, and the black—a scheme still generally adopted in France, but objectionable as confounding the American with the Asiatic varieties. Huxley, Haeckel, and others have endeavored to define races by the appearance of the hair, the former distinguishing between the Australoid, Mongoloid, Negroid, and Xanthrochroic (yellow-haired) types; while the latter reduced all to two main varieties, the woolly haired, subdivided into the

1. TEUTON.
2. ALPINE.
3. ITALIAN.
4. SWEDE.
5. GREEK.
6. RUSSIAN.
7. JEW.
8. PERSIAN.
9. TURK.
10. TURKESTAN.
11. LAPP.
12. JAPANESE.
13. KOREAN.
14. CHINESE.
15. SIAMESE.
16. JAVANESE.
17. EAST INDIAN.
18. FILIPINO.
19. LADRONE.
20. SAMOAN.

RACES OF

ANKIND.

21. AUSTRALIAN.
22. PAPUAN.
23. FIJIAN.
24. SOLOMON ISLES.
25. NEW ZEALAND.
26. ZULU.
27. SOMALI.
28. CONGO TYPE.
29. ALGERINE.
30. ESKIMO.
31. ALASKAN.
32. BLACKFOOT.
33. SIOUX.
34. MEXICAN.
35. PUEBLO INDIAN.
36. BRAZILIAN.
37. AMAZONIAN.
38. PATAGONIAN.
39. HAWAIIAN.

fleece-haired and the tuft-haired, and the smooth-haired, this again subdivided into the straight and the curly haired. The Swiss anatomist Retzius maintained that the shape of the skull and the bones of the face offered the most salient traits, and upon this established four sub-species—those with narrow heads and projecting jaws; with narrow heads and straight jaws; with broad heads and projecting jaws; and with broad heads and straight jaws. Others (F. Müller, Latham) have classified the races according to the peculiarities of their languages; and others, again (Waitz, Ratzel), according to their progress in culture. It is safe to say that none of these schemes has given satisfaction, and, indeed, owing to the extensive intermixture which has taken place between races, it is impossible to frame any which does not reveal incompleteness in some directions. We are building on secure ground, however, if we take as a point of departure the great "areas of characterization" or zoölogical provinces above referred to, and derive from them the fundamental variations of the human species. Proceeding from these, we can classify the principal peoples of the earth in the following manner without notable error:

I. The Eurafrican Race.

So called from its earliest historic location in Central and Southern Europe, and in Northern Africa; portions of it also occupied Eastern Asia. Its physical traits are a white or whitish color of the skin, wavy or curly hair, and a narrow, prominent nose. Its two branches are the South Mediterranean and the North Mediterranean, which embrace the following stocks and groups or peoples:

A. South Mediterranean Branch: I. The Hamitic stock. This includes the ancient Libyans and Numidians, and their descendants, the modern Berbers, Kabyles, Tuaregs, and related tribes of the Sahara Desert and Atlas Mountains; the Gallas, Somalis, Danakils, and related tribes of East Africa between the Gulf of Aden and the Indian Ocean; and in all probability the Copts or Ancient Egyptians, represented today by the Fellaheen. II. The Semitic stock. This seems to have developed in Arabia, and includes the tribes of that peninsula, ancient and modern. Colonies from it passed into Africa, and became the Ethiopians or Geez, the Tigres, the Amharas, the Harraris, and the modern Abyssinians. All these speak Semitic dialects. Another early migration journeyed eastward, and became the ancestors of the Syrians and Arameans, the Assyrians and Babylonians, the Israelites, Samaritans, and modern Jews, as well as the Phœnicians and Hittites of the Old Testament.

B. North Mediterranean Branch: I. The Euskaric stock. The only representatives of this are the modern Basques, descended from the ancient Iberians, and speaking a language without known affinities. II. The Aryan or Indo-European stock. This includes most of the nations of Europe and the non-Semitic whites of Asia. It is now believed to have originated in Western Europe, and to have migrated easterly. Its main groups are (1) the Celtic peoples, as the Welsh, Irish, and Highland Scotch, the Manx and the Armoricans of Brittany. (2) The Italic peoples, chief of whom were the ancient Romans and their descendants. (3) The Illyric peoples, represented by the modern Albanians. (4) The Hellenic peoples, embracing the ancient and modern Greeks. (5) The Lettic peoples, who are found on the Baltic Sea as Letts and Lithuanians. (6) The Teutonic peoples, among whom were the Goths and Vandals, the Angles and Saxons, the Danes, Northmen, Franks, and Lombards. From them are descended the modern Germans, Scandinavians, Danes, Dutch, and English. (7) The Slavonic peoples, as the Russians, Poles, Bohemians, Servians, Montenegrins, Dalmatians, and Croatians of modern Europe. (8) The Indo-Eranic peoples, or Asiatic Aryans, chief among whom are the Armenians, the Persians and Parsees, the tribes of Afghanistan and Beluchistan, the Kurds and Ossetes, and the Hindus of India, with many less important members. III. The Caucasic peoples, living in and near the mountains of the Caucasus range. The Circassians, Georgians, Lesghians, Kists, and Mingrelians are the chief groups.

II. The Austafrican Race.

So called from its earliest location in Africa in its southern or austral regions. Its physical traits are a black or dark color of the skin and eyes, hair frizzly or woolly, nose flat and broad. It is divided into three branches, as follows:

I. The Negrillo Branch. Most of these are small in size, and dwell near or S. of the equator. The equatorial group is represented by the dwarfs or pygmies of the Congo basin, known as Akkas, Tikkitikkis, Obongos, Dokos, etc., while the more southern group includes the Bushmen, Hottentots, Namaquas, and Quaquas.

II. The Negro Branch. This includes the innumerable tribes and petty nations living between the Atlantic and the Nile, S. of the Sahara Desert and N. of the Congo basin, in the modern Guinea, Senegambia, and the Sudan. They present the purest types of the black race.

III. The Negroid Branch. Divided into the Nubian group, in which fall the Nubas, Barabras, Pouls, Nyamnyams, etc.; and the Bantu group, where are found the Caffirs, Zulus, Bechuanas, Suahelis, and numerous others. All of these are probably the result of an intermixture of races.

III. The Asian Race.

Located originally in Central, Eastern, and Northern Asia, with an outlying branch in Northern Europe. Its physical traits are a yellow or olive color of the skin, hair straight and black, nose medium and often depressed at the bridge. Its two main branches are the Sinitic and the Sibiric; members of the former speak monosyllabic, tonic languages; of the latter, agglutinative, polysyllabic tongues.

I. The Sinitic Branch. So named from the Latin *Sina* = China. It embraces the Chinese proper, the Tibetans, and the Indo-Chinese of Siam, Annam, Burma, and Cochin China.

II. The Sibiric Branch. So called from Siberia, the chief geographical location of its members; known also as Turanian and Ural-Altaic. It is divided into a number of groups: (1) The Tungusic peoples—the Tungus, Manchus, and Lamuts. (2) The Mongolic peoples, embracing the Mongols and Kalmuck Tatars. (3) The Tataric peoples, among whom are the Tatars (Tartars), Jakuts, Cossacks, and Turks of Europe. (4) The Finnic peoples, with whom belong the Finns, Lapps, and Magyars of Europe, and the Samoyeds of Siberia. (5) The Arctic peoples—the Chukchis, Kamtchatkans, Ghiliaks, etc., of Northern Siberia. (6) The Japanese peoples, represented by the modern Japanese of mixed descent.

IV. The American Race.

Usually, though erroneously, called American Indians. Their physical traits are a coppery or reddish color, hair generally straight and dark, with a reddish undertone, nose medium or narrow. The racial peculiarities are strikingly alike throughout the continent, so that the subdivisions are mainly geographical. Among the more important tribes in the extreme north are the Eskimos and their connections, the Aleutians, the Kolosch on the Pacific coast, and the Tinneh or Athabascans, who roam over Northern British America. S. of them, at the time of the discovery, dwelt the Iroquois and Algonkins. Around the shore of the Gulf of Mexico were the Creeks or Muskokees, the Choctaws, the Timucuas in Florida, the Nahuas about Vera Cruz, the Totonacos adjoining them, the Mayas in Yucatan, and numerous smaller tribes. The three last named were semi-civilized, as were also the Tarascos and Zapotecs of Mexico, the Mangues of Nicaragua, and the Huetares of Costa Rica.

In South America the most widely extended families were the Caribs, Arawacks, and Tupis, who possessed most of the soil of Brazil and extended over the West Indian Archipelago. The Botocudos continue to survive in a state of extreme savagery in Central Brazil. On the plateau of Colombia the Muyscas or Chibchas had developed a moderately high culture, especially in fine gold-work. S. of them, the kingdom of the Incas or Kechuas controlled the coast between the Andes and the sea for a distance of 1,500 miles, and erected architectural monuments which still excite the surprise and admiration of travelers. The tribes of the Gran Chaco in the Argentine Republic were in a low stage of development, like those of Patagonia and Tierra del Fuego. The Araucanians of Chili were not much higher, but became celebrated for their stubborn resistance to the Spanish and their unquenchable love of liberty.

V. Insular and Littoral Peoples.

These can scarcely be said to constitute a race by themselves, but rather the fragments of various races, much intermingled in blood. As a rule, they are dark in color, the hair wavy or frizzly, the nose medium or narrow. They may be classed as the Nigritic, Malayic, and Australic branches.

I. The Nigritic Branch. This is represented by the true Negritos, a small dark people, found in many of the tropical islands S. of Asia. They are known as Mincopies, Aetas,

Mantras, Semangs, etc. Resembling them in many respects are the black Papuans of New Guinea and the adjacent isles, and from some cross arose probably the less Negroid inhabitants of the Melanesian Archipelago, the Feejee islands, etc.

II. The Malayic Branch. This includes the Malays proper, the Battaks and Dayaks of Borneo, the Tagals of the Philippines, the Javanese, the Hovas of Madagascar, etc., and there is little doubt that with these should be grouped the Maoris of New Zealand and the Polynesians, quite to the Sandwich and Easter islands.

III. The Australic Branch. The Australians constitute the typical members of this branch. The Tasmanians probably were allied to them, and, according to an opinion which seems growing in favor, we should include in the same branch, as related both in language and physical traits, what are known as the Dravidians of India, who embrace the Tamils, Telugus, Canarese, Todas, Khonds, and many minor tribes, although these have reached a far higher status of culture than any Australian clan.

AUTHORITIES.—The following may be named as among the leading recent authorities on this subject: Brinton, *Races and Peoples* (New York, 1890); Hovelacque and Hervé, *Précis d'Anthropologie* (Paris, 1887); Rätzel, *Völkerkunde* (Leipzig, 1891); Schurtz, *Völkerkunde* (Leipzig, 1893); Topinard, *L'Homme dans la Nature* (Paris, 1891); the same, *Éléments d'Anthropologie Générale* (Paris, 1890); Tylor, *Anthropology* (London, 1881). D. G. BRINTON.

Manabí, maä-naä-bee', or **Manaví**: a province of Ecuador; on the Pacific coast, N. of Guayas, and directly under the equator. Area, 9,427 sq. miles. It lies entirely in the coast zone, consisting of comparatively low but much broken lands, covered in part with heavy forest and watered by several small rivers. Cacao and sugar are the principal products. Pop. (1885) 64,284. Capital and principal town, Puerto Viejo, which has about 6,000 inhabitants, and is the seat of a bishop. H. H. S.

Managua, maa'naä-gwaä: capital of Nicaragua; beautifully situated near the southern shore of Lake Managua; lat. 12° 7′ N., lon. 86° 12′ W. (see map of Central America, ref. 6–H). At the time of the conquest it was a large Indian town, but under the Spaniards it was neglected and reduced to an insignificant village. The rivalry of Leon and Granada led to the selection of this place for the capital of the republic in 1855, and since then it has been steadily growing. It is now united by railway with Granada, Leon, and the Pacific port of Corinto. The houses and Government buildings are unpretentious, but the city has been greatly improved of late years. Most of the coffee exported from Nicaragua comes from plantations around Managua. Pop. estimated (1888) 16,700. HERBERT H. SMITH.

Managua, Lake: See NICARAGUA.

Man'akin: a name given to the members of the family *Pipridæ*, a group of small birds peculiar to tropical and subtropical America, having as their most obvious characters a weak bill and the union of the middle and outer toe for about two-thirds of their length. The greater portion of the manakins are birds of gay or striking plumage, red, blue, yellow, chestnut, black, and white occurring in various combinations. The tail is usually short and square. A few are crested, and in some species several of the secondaries are very curiously modified in shape. The birds are active, associate in small flocks, inhabit dense forests, and feed on berries. F. A. LUCAS.


Golden-winged manakin.

Manáos, maä-nowz,' formerly *Barra do Rio Negro*; capital and principal city of the state of Amazonas, Brazil; on the left bank of the Rio Negro; 6 miles above its mouth in the Amazon, and about 1,000 miles by the river from Pará; lat. 3° 8′ 4″ S., lon. 60° 0′ 12″ W. (see map of South America, ref. 3–E). It was a Portuguese fort and village of semi-civilized Indians, of small importance until 1852, when it became the capital of the new province (now state) of Amazonas. With the opening of steam navigation on the Amazon, it became a central point for the commerce of the upper rivers, the Madeira, Negro, Purús, etc., and especially for the trade in rubber; its exports of this product in 1891 were over 22,000,000 lb. Other important exports are cacao, Brazil-nuts, dried fish, etc. Ocean steamers now ascend the Amazon to Manáos, carrying their freights directly to Europe and the U. S., but a portion of the trade is carried on through Pará. By its situation Manáos must, in the near future, become a city of great importance. The city contains several well-built public edifices, barracks, schools, a library, museum and a meteorological observatory. It is well supplied with water by an aqueduct half a mile long. The climate is healthful, though warm (mean temperature, 78° F.). Pop. (1893) about 20,000. HERBERT H. SMITH.

Manar', Gulf of: a wide inlet of the Indian Ocean between Ceylon and the southern extremity of Hindustan, and separated from Palk's Strait by the islands of Rameswaram and Manar, and a low reef called Adam's Bridge.

Manasquan: town; Monmouth co., N. J. (for location of county, see map of New Jersey, ref. 4–E); on the Cent. of N. J. and the Penn. railways; 15 miles S. of Long Branch, 40 miles S. of New York city. Its location near the Atlantic Ocean and on the line of popular watering-places has made it a favorite summer resort. Pop. (1880) not in census; (1890) 1,506; (1900) 1,500.

Manassas Junction, Battle of: See BULL RUN, BATTLE OF.

Manas'seh: the eldest son of Joseph; was adopted by Jacob on his deathbed, and became the head of a tribe of Israel, which numbered 32,200 warriors on the exodus from Egypt and 52,700 on the entrance into Canaan. It received land on both sides of the Jordan—on the western side, between the tribes of Issachar on the N. and Ephraim on the S.; on the eastern side, N. of Gad. In the eastern part lay the towns of Gadara, Gamala, Jabesh-Gilead, Gerasa, etc.

Manasseh: the fourteenth King of Judah; a son of Hezekiah; reigned from 696 to 641 B. C.; became an open idolater; was taken prisoner by the King of Assyria, and detained for several years at Babylon, but repented and was restored to his kingdom. His later reign was marked by zeal and prosperity. The apocryphal composition called *The Prayer of Manasseh* is received as canonical by the Greek Church.

Manasseh ben Israel, also less commonly known as **Manasse ben Joseph ben Israel**: Hebrew writer; b. in Lisbon in 1604. His family fled during the Inquisition to Holland, settling in Amsterdam. In 1622 Manasseh was far enough advanced in biblical and Talmudic studies to be ordained rabbi. He was also a good linguist. Though a prolific writer, he was merely a compiler. His extensive knowledge made him sought after by such Christian scholars as Caspar Barläus, John Gerhard Voss, and Daniel Huet. Unfortunately, Manasseh was very early in life caught in the meshes of the Cabbala; and the Christian mysticism of the time, which busied itself with apocalyptic reckonings, influenced him greatly. In order to earn a livelihood he became a printer, and set up the first Hebrew printing establishment in Amsterdam. Shortly afterward he published his first large work, *Conciliador* (1632), in Spanish, in which he endeavored to settle many difficulties met with in the Bible; but Manasseh soon turned to his more favorite studies. He believed that the Messianic time was at hand, and that the ten lost tribes had been found in America. Before, however, the Jews returned to their native place, prophecy had said they should be scattered to the four corners of the globe. In England the Jews had been forbidden to settle since they had been driven out in 1290. Manasseh set his heart upon gaining for his brethren permission once more to settle in England. He composed a work, *Esperanza de Israel* (Amsterdam, 1650), originally written in English, which he sent over to the state council with a letter begging for the readmission of the Jews. A favorable answer was received from Lord Middlesex. The Puritan movement in England had prepared the soil. The deeper study of the Old Testament had aroused a lively interest in the people of the Book; but nothing came of the attempt. On July 5, 1653, Manasseh renewed his petition to the Barebone Parliament. Though he had received his pass, he hesitated to go, in the meanwhile publishing *Pedra Gloriosa ó de la Estátua de Nebuchadnezar* (Amsterdam, 1655), illustrated with four copper-plates by Rembrandt. At last (about Oct. 25, 1655) he set out with some friends. He laid an *Humble Address to the Protector* before Cromwell, and published a *Declaration to the Commonwealth of England*. He was well received by Cromwell. A commission was appointed to consider the matter; but the opposition was great. Manasseh found it necessary to refute the many cal-

mmnies which had been spread abroad regarding his people. This he did in his *Vindiciæ Judæorum* (London, 1656). Cromwell was unable to carry his point; he dismissed Manasseh, after granting him a yearly pension of £100. On his way back Manasseh died at Middelburg, Mar., 1657 Though the resettlement of the Jews was retarded, largely by Manasseh's own indiscreet actions, he paved the way. In a short time the small number of Jews who had for years secretly lived in London was re-enforced by large numbers from Holland.

References.—The older literature will be found in Steinschneider's *Catalogus* (Cologne, 1645). The chief authority is Kayserling, *Jahrb. für Gesch. des Judenthums* (1860, pp. 87, *seq.*). Cf. also Grätz, *Geschichte der Juden* (x., pp. 12, *seq.*, 83, *seq.*); H. J. Koenen, *Geschiedenis der Joden in Nederland* (Utrecht, 1843); Schaible, *Die Juden in England* (Carlsruhe, 1890, pp. 52, *seq.*); *Papers of the Anglo-Jewish Historical Exhibition* (London, 1888); A. Stern, *Manasseh ben Israël et Cromwell*, *Revue des Études Juives* (1883, pp. 96, *seq.*); Lucien Wolf, *The Resettlement of the Jews in England*, *Jewish Chronicle* (London, 1887); *A Final Note on the Resettlement*, *Jewish Chronicle* (London, 1889); *The Petition of the Jews of London to Cromwell* (London, 1889).

Richard Gottheil.

Manatee', or **Laman'tin**: an aquatic herbivorous mammal of the order *Sirenia* and genus *Manatus* or *Trichechus*, often termed sea-cow. The adult manatee is from 8 to 12 feet long, clumsily built, the round body merging gradually into the tail, which is flattened and rounded at the end, quite different from the flukes of the whale or dugong. Fore limbs alone are present as flattened paddles; in one species, *M. australis*, the presence of the digits is indicated by nails. The head is small, the lips thick and extensible, the eye little, the ear a mere opening. The skin is thick, rather granular, with a few deep wrinkles marking the points of movement, and sparsely sprinkled with hairs. The bones are extremely

The manatee.

large and dense, and serve as ballast, rendering it easy for the animal to gather the aquatic vegetation on which it feeds and which it eats under water. Manatees are found in America from Florida to the Amazon and in some of the rivers of Western Africa. They are occasionally found along the coast, but their home is in quiet rivers and estuaries. They are shy and sluggish, and are hunted for their hide and flesh. The manatee is one of the animals which it is allowable for Roman Catholics to eat on fast-days. Three or four species are known—*Manatus senegalensis*, from Western Africa; *M. latirostris*, from Florida and about the Gulf of Mexico; *M. australis* and *M. inunguis*, from the rivers of South America.

F. A. Lucas.

Man'cha, La: an old province of Spain, comprising the modern province of Ciudad Real and portions of Toledo, Albacete, and Cuenca. It occupies the bare and monotonous elevated plateau of Central Spain, which is bounded S. by the Sierra Morena and N. by the Alcarria. It is sparsely peopled, and this circumstance, in connection with scarcity of water and the absence of trees, gives the region the dismal aspect of a desert. Nevertheless, whenever a little irrigation is attempted—and there is no difficulty in reaching water by digging—great crops of wheat, rye, barley, wine, oil, flax, etc., are raised. The mules reared in the province are considered the best in Spain, and the mineral wealth is considerable, quicksilver being produced at Almaden, saltpeter at Herencia and Alcazar de San Juan. The principal towns are Almodovar del Campo, Ciudad Real, and Valdepenas. The province, of which, during the Middle Ages, the eastern portion was known as La Mancha de Aragon and the western as La Mancha, is the scene of *Don Quixote*.

Manche, mänsh: department of France, bordering on the English Channel. Area, 2,289 sq. miles. The ground is mostly low, and in many places even marshy, though a range of hills traverses the department from N. to S., being connected with the hills of Maine and Brittany on the S., and at various places forming quite picturesque landscapes. The soil is fertile; grain, flax, hemp, and apples are produced, and many thousand gallons of cider are made annually. Large cattle and very strong horses are reared; also sheep of an inferior kind. Of the entire area, more than half is arable. The coast is often inhospitable and dangerous. Between it and the Channel islands the tide flows with tremendous force; the great Bay of Mont St.-Michel, comprising an area of 60,000 acres, was covered with forest until swallowed up by the tide of the year 709. Pop. (1891) 513,815; (1896) 500,052. Capital, St.-Lô.

Man'chester: city and borough (parliamentary and municipal); in the southwest of Lancashire, England; on the left bank of a narrow stream, the Irwell. By rail it is 183½ miles N. W. of London and 32 miles N. E. of Liverpool (see map of England, ref. 7–G). It is the center of the English cotton-manufacture, and both the seat and the headquarters of many industries. A number of bridges over the Irwell connect it with Salford (*q. v.*), which has a parliamentary representation and a municipality of its own. The Irwell, after receiving the waters of the Medlock and Irk, falls into the Mersey about 10 miles from Manchester. The area of the municipal borough of Manchester is 6,349 acres, and of the parliamentary borough 4,294 acres. For parliamentary purposes it is divided into six electoral districts, each of which returns one member to the House of Commons.

Thoroughfares and Public Parks.—Market Street, having at its western end the Royal Exchange, the great mart of the city, is the central thoroughfare. Behind the Exchange is St. Ann's Square, one of the chief shopping quarters. It leads into Deansgate, which is full of handsome shops and offices. Out of Deansgate is King Street, in which are the principal banks and insurance offices. Portland Street and Mosley Street contain many large warehouses of considerable architectural pretensions. From St. Peter's Square, which divides Mosley Street into two, proceeds a great arterial thoroughfare, Oxford Street. From the Royal Exchange a thoroughfare runs northward past the cathedral to the Bury New Road. This ascends almost the only high ground in the immediate vicinity of Manchester, and, traversing the semi-fashionable suburb of Higher Broughton (properly in Salford), leads to Kersal Moor, from which is obtainable a fine view of Manchester under its canopy of smoke. Many of the wealthy business men reside in the suburbs S. of the city, and at Sale, Bowdon, and Altrincham, in Cheshire. Manchester proper has six public parks. Of these the chief are Queen's Park (30 acres), and, also on the northeast, the pretty Philips Park (31 acres), in close proximity to the densely populated districts of Ancoats and Bradford. Alexandra Park (60 acres), the most extensive and picturesque of all, is at Moss Side, on the S. In the northeastern and very populous districts of the city there are five recreation-grounds. At Old Trafford are situated the Royal Botanical Gardens. For Peel Park and other Salford open spaces, see Salford.

Public Buildings.—The principal of these is the architecturally magnificent and profusely decorated new Town Hall (1868–77) in Albert Square, considered to be the finest municipal building in the kingdom. It is Gothic in style, covers 8,000 sq. yards, and contains more than 250 rooms. The building, site, etc., cost, up to 1890, more than £1,000,000 sterling. The new Royal Exchange (1869), in the Italian style, is said to be the largest in Europe devoted to commercial uses. The General Post-office (1881–87), between Brown Street and Spring Gardens, is in the Italian Renaissance style, and cost £100,000. The same sum was expended on the erection of the Assize Courts (1861–64), Great Ducie Street, a noble pile of buildings in Decorated Gothic. The Art Gallery in Mosley Street, formerly the Royal Institution, a fine building, now belongs to the corporation, and is to Manchester what the National Gallery is to London. The Free Trade Hall in Peter Street, for public meetings, concerts, etc., is built on the site of that in which the Anti-Corn-law League held its greatest meetings. The cathedral, the old parish church of Manchester, founded in 1422 and restored in recent times, has a fine choir, and its six side chapels make it, with the exception of that of Coventry, the widest church in England. The Memorial Hall, in Albert Square, is an edifice built by

Nonconformists in memory of the 2,000 ministers ejected in 1662. The Royal Infirmary (1752–1880), a spacious quadrangular building, is in Piccadilly, an eastern continuation of Market Street. It contains 300 beds, and has annually an average of 4,000 in- and more than 20,000 out-patients.

Public and Educational Institutions, Societies, etc.—Owens College, founded in 1846 as a university in miniature by John Owens, who bequeathed £100,000 for the purpose, is now, with some other provincial colleges, affiliated to the new Victoria University, the headquarters of which are in Manchester. The Grammar School, founded in 1592 by Hugh Oldham, Bishop of Exeter, has many exhibitions to Oxford and Cambridge. Chetham Hospital, for the education of poor boys, and the Chetham Library were founded in 1651 by Humphrey Chetham. Its library, open to the public, probably is the oldest free library in the kingdom. There are 50 Board schools and about 130 elementary schools, with an attendance of more than 72,000 scholars. Manchester was the first provincial town to avail itself of the Public Libraries Act of 1850. The headquarters of the free public libraries of Manchester is that in the old Town Hall in King Street. It contains a reference library open to all comers, and a lending library. It has seven branch free-lending libraries and newsrooms, and the number of volumes available for general use is considerably more than 200,000. A technical school, with workshops attached to it, is now supported by the corporation in connection with the old Mechanics' Institution. The Manchester Athenæum, a literary institution with library, news-room, and lecture-room, was founded by Richard Cobden and others for young men of the middle class. Of the many literary and scientific societies, the oldest, founded in 1791, is the Literary and Philosophical Society. The Chetham Society issues a valuable series of works on the history, biography, and general antiquities of Lancashire and Cheshire. There are upward of 130 places of worship belonging to the Church of England, and about twice that number belonging to Nonconformists. There are 12 Roman Catholic churches, several monasteries and convents, and 6 synagogues. Manchester has five theaters, the chief of which, the Theatre Royal, has the most capacious stage of any out of London. The principal music-hall is the Palace of Varieties. The Manchester races are among the best attended in the north of England. In 1893 the city contained 524 public-houses and 2,410 beer-houses.

Municipal Government.—Manchester is governed by a lord mayor and corporation. The corporation owns the markets, gas-works, and water-works, and the local tramways are mainly its property. It is now (1894) constructing, at an enormous cost, a system of water-works to bring a new supply of water from the Lake of Thirlmere in Cumberland; and has obtained powers for the supplying of electric light. It has erected public baths and abattoirs, and has laid out two public cemeteries. The public free libraries and parks, the Technical School, the Art Gallery (for which it has expended many thousands of pounds in the purchase of works of art)—all belong to it and are administered by it. The Manchester corporation derives from its markets, gas and water works, a large revenue, which is applied to relieve the ratepayers and in public improvements. In 1893 its income from all sources was £1,254,647, and its total expenditure £1,239,183. Manchester has also an energetic school board, which has erected a number of public elementary schools.

Manufactures, Commerce, etc.—There are still in Manchester proper a large number of factories and works in which the various processes of the cotton-manufacture, calico-printing among them, are carried on, sometimes on a very extensive scale, but cotton-spinning itself is receding from Manchester to outlying districts. Machine and boiler making, iron-founding, chemical works, and literally hundreds of other industries are displacing the ancient supremacy of cotton. Manchester is, moreover, not only a great manufacturing city, but a great emporium and commercial center. Most of the manufacturers and other producers of the busy towns surrounding Manchester—within 20 miles of it there is a population of 3,000,000—have places of business in Manchester, and make the exchange their rendezvous. Thus a worldwide commerce is centered in Manchester. Its enormous industrial interests are watched over by the chamber of commerce. This body sometimes makes independent inquiries at its own cost, and its suggestions in regard to industrial and other legislation and the duties of the imperial Government in furtherance of commerce and navigation are always attentively considered by the ministry of the day.

The Ship-canal.—Manchester has ample communication by railway with all parts of Great Britain, and before the railway era profited by canal communication with the principal centers of industry and population in England. Its chief traffic was with Liverpool, through which it received its imports of raw cotton and foodstuffs, and, like the other districts of South Lancashire, exported its manufactured textiles and the many other products of its industry. The payments for Liverpool dock-dues and the carriage of goods by the Liverpool and Manchester Railway were a considerable tax on the industries centered in Manchester, and it was thought that a great saving would be effected if the city were placed by a ship-canal in direct water communication with the sea. In 1882, when Parliament was asked to sanction the construction of a ship-canal from the estuary of the Mersey to Manchester, the undertaking was so strongly opposed by Liverpool that it was not until 1885, and after an expenditure of £200,000, that the act of Parliament constituting the company was passed. Its capital was ultimately fixed at £10,000,000 sterling, which was raised with difficulty, not more than £3,000,000 being subscribed in the Manchester district. The work was begun in Nov., 1887. Before it was finished the whole capital of the company was exhausted, and the Manchester corporation advanced a loan of £5,000,000 sterling, on the condition, which was agreed to, that it should have the virtual control of the administration of the canal, through being represented by eleven members on the board of twenty-one directors. The canal was informally opened for traffic on New Year's Day, 1894, and formally on May 21, with full state ceremonies, by Queen Victoria in person. The canal, being much of its course a canalized river, is 35½ miles long, twice the width of the Suez Canal, and has a depth of 26 feet, allowing vessels of the greatest burden to sail from the Mersey to Manchester. For a detailed description of its route and the manner of its construction, see SHIP-CANALS.

From the extensive quays and wharfages at the principal points on the canal, it has been described as one large dock. At Manchester and Salford there are seven docks with a total water area of 104 acres, and about 5 miles of quays, occupying an area of 152 acres. Up to June, 1894, the chief development of the canal traffic had been through coasting vessels to and from British ports, and with Holland, France, and Spain. According to an official report for the first five months of 1894 the proceeds of traffic on the canal during that period amounted to £33,701. The merchandise transported in seagoing vessels amounted to 211,915 tons; that transported in barges to 63,785 tons; while the passengers numbered 323,056.

Population, etc.—At the census of 1891 the population of Manchester was 505,368. In 1893 the registrar-general estimated it at 515,598, and that of Salford at 203,431; together 719,029, the largest urban population in the United Kingdom with the exception of that of London. In 1881 the population of Manchester was only 341,414; the subsequent increase has been in some measure due to the addition to Manchester in 1890 of outlying townships. Of the population of Manchester in 1891 26,394 persons (9,444 males and 16,950 females) were employed in the textile industries, chiefly cotton, and 7,200 in the production of machinery of various kinds. The foreign population, 8,941 in number, included 5,078 natives of Russia and Russian Poland, 2,016 natives of Germany and Austria-Hungary, and 431 natives of the U. S. In 1893 the death-rate was the very high one of 24·9 per 1,000. The population in 1901 was 543,930.

History.—In the sixteenth century Manchester was noted for its woolens, which, singularly enough, were called "cottons" (supposed to be a corruption of "coatings") long before the textile use of the cotton-plant was known in England. Traces of the use of cotton woven in the textile manufactories of Manchester are found toward the middle of the seventeenth century, but yarn spun of cotton was used by the weaver only as weft and not as warp until in the latter half of the eighteenth century textile fabrics wholly of cotton were made possible by Hargreaves's invention of the spinning-jenny and Arkwright's of the rollers. (See COTTON MANUFACTURES and LANCASHIRE under *History.*) Manchester sided with the Parliament in the great civil war of the seventeenth century, while in the eighteenth century it appears to have developed to some extent Jacobite sympathies. Except under Cromwell's Protectorate, Manchester was without parliamentary representation, but the Reform Act of 1832 gave it two members. In still more re-

cent times it became very important politically as the headquarters of the Anti-Corn-law League (*q. v.*). In 1853 it was made a city by royal charter. A bishopric of Manchester was created in 1847. See Baines, *History of the County Palatine of Lancaster* (latest edition, 1886–93), vol. ii., under *Parish of Manchester*; Saintsbury, *Manchester*, 1887 (a compact and lively history of Manchester from the earliest times to the date of publication); Kelly, *Directory of Lancashire, Liverpool, and Manchester* (1892).

Francis Espinasse.

Manchester: town; Hartford co., Conn. (for location of county, see map of Connecticut, ref. 8–I); on the Hockanum river, and the N. Y. and N. E. Railroad; 8 miles E. of Hartford. It contains the silk-mills of one firm, which cover about 8 acres of ground and employ about 2,000 persons; 9 paper-mills; a manufactory of electric dynamos, generators, and motors, and one of incandescent lamps; and cotton, woolen, stockinet, needle, and other factories. The town is lighted by electricity, and has water and sewerage systems, electric street-railway, high school library, and a weekly newspaper. Pop. (1880) 6,462; (1890) 8,222; (1900) 10,601. Editor of "Saturday Herald."

Manchester: city; capital of Delaware co., Ia. (for location of county, see map of Iowa, ref. 4–J); on the Maquoketa river, and the Ill. Cent. Railroad; 47 miles W. of Dubuque. It has a high school, library and reading-room (founded in 1883), containing 9,000 volumes, several mills and factories, large dairy trade, and two weekly newspapers, and is principally engaged in farming and dairying. Pop. (1880) 2,275; (1890) 2,344; (1900) 2,887.

Manchester: village; Washtenaw co., Mich. (for location of county, see map of Michigan, ref. 8–J); on the Lake Shore and Mich. S. Railway; 22 miles S. of Ann Arbor, 55 miles W. of Detroit. It is in an agricultural region, has considerable fruit interests, and contains large roller-process flour-mills, several planing-mills, foundry and machine-shops, brewery, stone-boat factory, book-publishing and stationery manufacturing-house, refrigerator-factory, electric-light plant, and a weekly newspaper. Pop. (1880) 1,156; (1890) 1,191; (1900) 1,209. Editor of "Enterprise."

Manchester: city (settled in 1772, incorporated as the town of Derryfield in 1751, name changed to Manchester in 1810, made a city in 1846); one of the capitals of Hillsboro co., N. H. (for location of county, see map of New Hampshire, ref. 10–E); on both sides of the Merrimack river, at the mouth of the Piscataquog river, and on the Concord and Montreal and the Boston and Maine railways; 16 miles S. of Concord. The Amoskeag Falls, the highest on the Merrimack river, with a fall of 54 ft. 10 in., provide a valuable water-power, which is utilized by means of two canals by four large manufacturing establishments. The city owes its importance as a manufacturing center to the Amoskeag Manufacturing Company, which has controlled the water-power of the Merrimack river for many years. The census returns of 1890 showed that 371 manufacturing establishments (representing 53 industries) reported. These had a combined capital of $21,462,683; employed 14,467 persons; paid $5,558,962 for wages and $10,842,645 for material; and had products valued at $18,654,547. The principal industry was the manufacture of cotton goods, which had 4 establishments, $14,017,554 capital, and 9,617 employees; paid $3,417,235 for wages and $6,441,521 for materials; and had products valued at $10,957,219. Next in importance was the manufacture of foundry and machine-shop products, which had 10 establishments, $583,014 capital, and 205 employees; paid $106,616 for wages and $317,494 for materials; and had products valued at $506,115. The Amoskeag, Manchester, Stark, and Amory mills have in the aggregate 478,000 spindles and 15,800 looms, and make about 287 miles of cloth per day, including sheetings, drillings, ginghams, denims, tickings, seamless bags, etc. The Manchester locomotive-works, with a capital of $150,000, have a capacity of 50 Amoskeag steam fire-engines per annum and 14 locomotives per month. Other manufactories make about 171,000 dozen pairs of stockings per annum, 26 tons of paper per day, and a large amount of edge-tools, files, machinery, carriages, leather, boots and shoes, wood-work, ale, needles, etc. The city has a system of water-works, completed in 1874 at a cost of $600,000, with a reservoir of 16,000,000 gal. capacity, fed from Lake Massabesic, 4 miles from the city. The city contains a Roman Catholic cathedral, academy, convent, and orphan asylum; State Industrial School; county court-house; U. S. Government building that cost $250,000; a hospital, a high school, 8 grammar-schools, and a training-school for teachers; 5 public parks; public library, with over 32,000 volumes, founded in 1854; 5 national banks, with combined capital of $750,000, and 6 savings-banks, with surplus of $855,500; and 3 daily, 2 semi-weekly, 8 weekly, and 6 monthly periodicals. Pop. (1880) 32,630; (1890) 44,126; (1900) 56,987. Editor of "Union."

Manchester: village; Adams co., O. (for location of county, see map of Ohio, ref. 8–D); on the Ohio river, and the Ches. and O. Railway; 40 miles W. of Portsmouth, 72 miles E. by S. of Cincinnati. It is a shipping-point for a large agricultural region, and has three churches, Soldiers' Memorial Hall, weekly newspaper, flour and planing mills, and a furniture-factory. Pop. (1880) 1,455; (1890) 1,965; (1900) 2,003. Editor of "Signal."

Manchester: town; one of the capitals of Bennington co., Vt. (for location of county, see map of Vermont, ref. 9–B); on the Battenkill river, and the Benn. and Rutland Railway; 30 miles S. of Rutland. It is one of the oldest settled towns in the State, has a picturesque mountain location, contains several miles of marble sidewalk, and is a popular summer resort. It is the seat of Burr and Burton Seminary, and of a classical school for both sexes. Water is bottled from newly discovered mineral springs. Pop. (1880) 1,928; (1890) 1,907; (1900) 1,955.

Manchester: city; Chesterfield co., Va. (for location of county, see map of Virginia, ref. 6–H); on the James river, and the Richmond and Danville Railroad; opposite Richmond. It is in an agricultural and coal-mining region, is principally engaged in manufacturing, and has a daily newspaper. Pop. (1880) 5,729; (1890) 9,246; (1900) 9,715.

Manchester New College: a theological school at Oxford, England, not connected with the university, but supported mainly by Unitarians for the education of their ministers. It is a lineal successor of the famous Warrenton Academy, in which Priestley taught and Malthus was educated. As Manchester Academy it received its first class in 1786. It has had a migratory existence. In 1803 it was moved to and remained in York till 1840, when it returned to Manchester. In 1853 it was transferred to London, and in 1889 to Oxford, where it has been housed in new buildings that compare favorably with those of the university. It was first called Manchester New College on its return to Manchester in 1840. Its most famous teacher was Dr. James Martineau, who joined the faculty in 1840 and retired in 1885. His department was that of mental, moral, and religious philosophy. The head of the college is now Dr. James Drummond; Prof. Charles B. Upton and Prof. J. Estlin Carpenter are his colleagues in the departments of philosophy, New Testament criticism, and Oriental languages and religions. John W. Chadwick.

Manchineel' [from Span. *manzanillo*, deriv. of *manzana*, apple]: a very poisonous evergreen tree of the West Indies, the *Hippomane mancinella*, belonging to the family *Euphorbiaceæ*. Its white *latex* or juice burns the skin upon which it falls. To taste its fragrant fruit would be dangerous were it not that the mouth is at once blistered by it. It is affirmed that men have died from sleeping in its shade, but it is believed that the bark of the *Bignonia leucoxylon* (which often grows near by) is an antidote to the poison. The beautiful wood is of excellent quality, but is poisonous even when dry. The bastard manchineel of the West Indies, also poisonous, is *Cameraria latifolia*, family *Apocynaceæ*.

Manchuria: the land of the Manchus; an extensive region of Northeastern Asia, forming the most easterly part of the Chinese empire. It extends from 40° to 53° 30′ N. lat., and from 118° to 135° E. lon. It is bounded on the S. by Korea and the Gulf of Liao-tung, on the W. by Mongolia, and N. and E. by Asiatic Russia, from which it is separated by the Amur and the Usuri rivers. The country formerly extended as far N. as 58° N. lat. and as far E. as 142 E. lon., but in 1860 the parts which lay N. of the Amur and E. of the Usuri were ceded to Russia. (See Maritime Province.) Its present area is estimated at 362,310 sq. miles, and its population (mostly Chinese) at from 7,500,000 to 18,000,000.

Physical Features.—Two well-marked natural divisions present themselves, one draining to the N. and the other to the S., the dividing line being a slightly elevated ridge which stretches westward to Mongolia from the Shan-alin or Long White Mountains, the true main chain of the mountain system of the country, which runs in parallel

ridges from N. E. to S. W. The northern division consists of large plateaus, bordered on the W. by the Hingan (or Khingan) Mountains, and traversed by several broad valleys, of which that of the Sungari is the most remarkable. Both plateaus and mountains are covered with many dense forests, in which roam the tiger and other wild animals. Most of the heavy timber used in North China comes from the virgin forests of Manchuria, or from the neutral strip which separates it from Korea. The valleys and the great alluvial plains of the southern division are well cultivated, and yield large crops of pulse, barley, wheat, millet, maize, rice, cotton, indigo, tobacco, sesamum, etc. Ginseng and rhubarb are also extensively produced.

The chief rivers are the Sungari, the Hurka, and the Usuri, which rise on the north side of the Shan-alin, and flow northward to the Amur, and the Liao, which rises in Mongolia, and flows E. and S. into the Gulf of Liao-tung. Some of the peaks of the Shan-alin attain heights of from 10,000 to 12,000 feet.

Climate.—The climate is healthful but severe, the temperature ranging from 10° F. below zero to 90° and 95° F. above. The rivers are frozen from four and a half to five months every year, during which all navigation ceases.

Divisions.—For administrative purposes Manchuria is divided into three provinces—Liao-tung or Shing-king (*q. v.*) in the S., Kirin in the center, and Tsitsihar in the N. Mukden, also known as Shin-yang and Fung-t'ien-foo, is the capital.

Inhabitants.—The Manchus, who now form about one-twelfth of the population, are a Tartar people of Tungusic origin, descendants of the Jurchin or Niu-chi, who overran Northern China in the twelfth century and established the Kin or Golden dynasty (later overturned by the Mongols), and of the tribes who followed Nurhachu (1559–1626) and his successors in his conquest of Liao-tung and Liao-si, in the first half of the seventeenth century, who aided the Chinese general Wu-san-kwei in suppressing the rebel Li-tse-ching, and who retained the country for themselves, establishing (in 1643) the *Ta-Tsing* or "Great Pure" dynasty now in power in China. Though for military purposes they are divided into "eight banners," they are a quiet, inoffensive people, noted for their politeness, and are rapidly being outnumbered by Chinese settlers from the northern provinces. They now speak the Chinese language, and Chinese is the only language taught in their schools. Their own language is practically dead. R. L.

Mancinelli, Luigi: See the Appendix.

Mancini, măăn-chee'nĕe: the name of an Italian family which during the minority of Louis XIV. played a very prominent part in the history of the French court. The father, Michele Lorenzo Mancini, married in 1634 a sister of Cardinal Mazarin; she bore him five daughters, and to provide for this "battalion of nieces" by means of good marriages was for several years the chief aim of their uncle's policy. I. Laure (1635–57) married the Duke of Mercœur, and was mother of the Duke of Vendôme. II. Olympe (1639–1708) married the Prince of Carignan, and was mother of Prince Eugene. III. Marie (1640–1715) married Prince Colonna, but left him and died in obscurity. Though unprepossessing in appearance, she was accomplished and attractive, and the young Louis XIV. proposed to marry her, but was prevented by her uncle. IV. Hortense (1646–99) married the Marquis of La Meilleraye, who assumed the title of Duke of Mazarin. V. Marie-Anne (1649–1714) married the Duke of Bouillon. It is said that they were all at one time or another the mistresses of Louis XIV.

Mancini, Pasquale Stanislas: lawyer and statesman; b. near Ariano in 1817; at an early age became prominent as a publicist; took a lively part in the Neapolitan movements of 1848, after which he retired to Turin with his wife (the gifted poetess, Laura Beatrice Oliva Mancini, who died in 1869), and there practiced with great success as an advocate. In 1851 he was elected Professor of International Law in the University of Turin, where his lectures were enthusiastically praised. In 1855 Cavour invited Mancini to take part in the Consiglio del Contenzioso Diplomatico. As an opposition member of Parliament the speeches of Mancini were listened to with lively interest. In 1862 he was for a short time Minister of Public Instruction while Rattazzi was president of the council. He afterward lived in Rome, being at the same time a deputy in Parliament, a professor in the university, and an active advocate. In the peace conference at Ghent in 1873 Mancini, as representative from Italy, was chosen president of the congress. He published in 1873 his *Prelezioni di Diritto Internazionale*, and also an admirable essay on Machiavelli. He was Minister of Foreign Affairs in 1881–83. D. Dec., 1888.

Manco, maan'kō, called Manco Inca, Inca Manco, and by some authors Manco Inca Yupanqui, or Manco Capac II.: son of Huaina Capac, Inca sovereign of Peru, and brother of Huascar; b. about 1500. After the death of Atahualpa and Huascar he became the rightful sovereign of the Inca empire. As Pizarro and his Spaniards approached Cuzco (Nov., 1533) Manco, judging that resistance would be useless, went out to meet them peacefully; he proved his legal claims, which were so far recognized that, by Pizarro's order, he was crowned at Cuzco according to the ancient ceremonies; but his sovereignty was little more than an empty show, the Spaniards being now the real masters of Peru. Manco served them as a loyal ally, and even marched with them against the hostile army of Quizquiz; later he detailed an army to accompany Almagro to Chili, but his position became more and more irksome, until he was virtually a prisoner in Cuzco. In Apr., 1536, he escaped, speedily raised an army of Indians, being recognized everywhere as Inca, and for several months besieged Cuzco, then under the command of Hernando and Juan Pizarro. The Spaniards were driven to great extremities, losing many men, among them Juan Pizarro; and meanwhile other armies, acting under the Inca's orders, attacked the various Spanish strongholds, so that for a time they were threatened with the loss of Peru. The pressing danger brought strong re-enforcements from Panama, Guatemala, and Mexico. On the return of Almagro from Chili Manco attacked him at Yucay (early in 1537), but was defeated. Later in the same year he was driven into the mountains between the rivers Apurimac and Vilcamayu, where he maintained his independence and kept up a predatory war on the Spaniards. When the younger Almagro rebelled (1541), Manco sent a force to assist him, and on the defeat of that leader he gave refuge to some of his fugitive followers. In a quarrel he was killed by one of these men (1544). Herbert H. Smith.

Manco Capac, or **Ccapac**: See Incas.

Mandæ'ans: a religious sect in South Babylonia, living in great poverty in the marshy land near Wāsit, Basra, Sūk Esh-Shiyuch, and in Chuzistan. Ignatius a Jesu in 1652 gave their numbers as 25,000; Siouffi in 1873 as 4,000. They are erroneously called by Europeans "Christians of St. John," "Nazareans," "Sabæans." They call themselves Mandæans—believers in *Manda* (*γνῶσις*), i. e. *γνωστικοί*. Their history is involved in great obscurity, their own traditions in this respect being utterly worthless. They possess quite an extensive religious literature, written in an Aramæan dialect which is very similar to that of the Babylonian Talmud, and in a script similar to the one brought by Syriac missionaries into Mongolia and Manchuria. Their chief works are *Ginza* (Treasure), called also *Sidrā Rabbā* (Great Book); *Sidrā de Yahyā* (Book of John), called also *Derāshē demalkē* (Discourses of the Kings); *Qolasta* (Book of Songs); *Dīwan*; and *Asfar Malwāshē* (Book of the Signs of the Zodiac). According to Nöldeke, these date from about 650–900 A. D., though they undoubtedly are based upon earlier documents. It is difficult to give a clear conception of what the Mandæan religion teaches, as it shows very little unity. It is a purely local religion, based upon old polytheistic ideas, to which elements have been added drawn from Babylonian, Persian, Jewish, Christian, and Manichæan speculations. According to Brandt, four layers can be distinguished in the earlier writings: (1) Oldest layer of heathen Gnosticism, polytheistic and full of mythological ideas; (2) reproduction of Christian Gnostic ideas; (3) theories in regard to life after death, drawn from Persian sources; (4) the system of the "King of Light," which is made up of Persian dualism and Christian monotheism.

The Mandæan religion seems to be based upon the idea that the soul really belongs to a better world, that of the *First Life*. It is only temporarily attached to the body; it can be brought back to the world of spirit by the exercise of those rights which the Mandæan religion demands. The *gods of light* have chained the powers of darkness in the lower world. Our world was created by the powers of the *Second Life*, and was badly made. Demons of darkness try to drag men down from the world of light; but man has been taught that he belongs to the higher regions. He must worship the *Manda of Glory*, and must acquire that cleanliness which is to be found in rivers. In these he must bathe, and then at death he will return to the shining ether. To this original system many additions were made. The

story of John the Baptist must have reached the Mandæans at an early time. He has become one of their heroes. Other Christian elements found entrance at a later date, when they began to style themselves *Nazōrāyē*; but in consequence of the Nestorian propaganda a bitter enmity arose between the Mandæans and Catholicism. They declared the Holy Spirit and the Christian Messiah, his son, to be the authors of all false religion. They speak of the lying prophet, who was crucified because of his lies. Christian institutions are said to be copied from those established by their own *Mandā de Ḥayyē*.

LITERATURE.—Ignatius a Jesu, *Narratio . . . Christianorum Sancti Joannis* (Rome, 1652); D. Chwolsohn, *Die Ssabier und der Ssabismus* (St. Petersburg, 1856); H. Petermann, *Reisen im Orient* (Leipzig, 1861; ii., pp. 83, *seq.*); M. N. Siouffi, *Études sur la religion des Soubbas* (Paris, 1880); M. Norberg, *Codex Nasaræus* (Hafnial, 1817); H. Petermann, *Thesaurus, seu Liber Magnus* (Leipzig, 1867); J. Euting, *Qolasta* (Stuttgart, 1867); T. Nöldeke, *Mandäische Grammatik* (Halle, 1875); A. J. H. W. Brandt, *Die Mandäische Religion* (Leipzig, 1889); *Mandäische Schriften . . . übersetzt und erläutert* (Göttingen, 1893); Lagarde, *Mittheilungen* (iv., Göttingen, 1891, pp. 129, *seq.*).

RICHARD GOTTHEIL.

Man'dalay: formerly capital of the kingdom of Burma, and now of British Upper Burma; situated 3 miles from the Irawadi river, a little N. of Amarapura, the former capital (see map of N. India, ref. 8–L). It was founded in 1859, and is laid out in three parallelograms, one within the other, separated by walls, ditches, towers, palisades, and other kinds of fortifications. The innermost parallelogram is occupied by the king's palace, with a spiral tower rising above his throne, and its gardens; the second by the military and the government officials; the third by the merchants and mechanics. It was taken by the British in 1885. On Mar. 30, 1892, a large part of the city was burned. Pop. (1891) 188,815. Revised by M. W. HARRINGTON.

Manda'mus [Lat., liter., we command, 1st pers. plur. pres. indic. of *manda're*, command]: a common-law writ issued by a court (usually one of general jurisdiction) commanding the performance by the person (a public officer or officer of a corporation) to whom it is issued of some particular and specific thing which the law provides he shall do. Originally, in England, law was administered by popular courts, in which the people were at the same time judges of the law and of the facts. This system of popular courts soon gave way to a system of royal courts in which professional judges learned in the law decided the questions of law, while the questions of fact were left to the juries, which are the direct successors of the old popular courts. The substitution of royal and professional courts for popular tribunals was due to the issue by the king, who was from the earliest times considered to be the fountain of justice, of writs through which he supplemented the injustice which was so characteristic of the original system of popular courts. These writs originally issued from Chancery, and were modeled upon the writs which were developed on the Continent by the Carolingian lawyers. Later, however, they were issued directly by the royal courts themselves without the intervention of the chancellor. Soon most of the writs by which ordinary actions at law were begun became writs, as the law expressed it, *ex debito justitiæ*, or writs of right, which issued as of course upon the application of any person who deemed himself aggrieved. While most of these writs became thus open to any individual, certain of them still remained prerogative in character—that is, the courts could refuse to issue them if they thought the cause of justice would not be subserved by their issue. Among these writs which retained their prerogative character was the writ of *mandamus*. Originally it was merely a means by which the crown might exercise a general control over the action of its subordinate officers. It finally, however, became one of the well-recognized means by which one of the royal courts—namely, the court of king's bench, in which the king was supposed always to be present—exercised the control, which on this account was attributed to it over other tribunals. While the writ of *mandamus* became one of the well-recognized remedies to be administered by the court of king's bench, it never became a remedy which was open to all individuals, and which could be made use of in the settlement of the ordinary relations of private life. It has always retained a certain public character, and is even now made use of generally only where the public is concerned. It may not be employed to enforce the performance of an action by a merely private person (*State* vs. *Tolle*, 71 Missouri 645. In this case the court refused to issue it in order to force an executor to publish a notice of the sale of real estate. See also *State* vs. *Turnpike Company*, 16 Ohio State 308, where it was refused to enforce the performance of a merely private contract); but issues only to an administrative or inferior judicial authority or to a municipal or a private corporation where such private corporation is regarded as acting somewhat as a governmental agent.

The only exception to the rule of the public nature of this remedy is to be found in some cases of its issue to officers of private corporations. Thus it lies to compel the surrender of corporate books and records to officers properly entitled to have them. (*American Railway Frog Company* vs. *Haven*, 101 Mass. 398.) Here the theory of its issue is that it is to the public advantage that officers in these corporations shall perform regularly the duties imposed upon them by law. Another result of its public character is that the people or the State is, nominally at least, a party to the action which results from its issue. The title of the action instituted by a writ of *mandamus* is almost invariably the State or the people on the relation of some private individual against the person to whom the writ is issued.

The fact that the writ was originally issued by the court of king's bench, the acknowledged superior of all other English courts, has, like other incidents of its origin and early history, had an important influence in deciding what court in the U. S. may issue it. This is determined very largely by statute, but at the same time is determined in accordance with its history. It is usually issued by the common-law court of general jurisdiction, the court which has inherited the jurisdiction of the court of king's bench. As a result, it is not issued by a court possessing appellate jurisdiction only. (*State* vs. *Biddle*, 36 Indiana 138; *Cowell* vs. *Buckelew*, 14 California 640.) The only possible exception to the rule is to be found in the case where the writ is issued to enforce an already acquired jurisdiction, as, for example, where it is issued to enforce the payment of a judgment already obtained in the appellate court, and which some public authority has refused to satisfy. (*Ex parte Crane*, 5 Peters 189, *Ex parte Bradley*, 7 Wallace 365.) Further, it may be issued by an appellate court to an inferior court, to order such court to exercise its jurisdiction, when it may be regarded as issued either in the exercise of an appellate jurisdiction, or as in aid of an already acquired jurisdiction. *People* vs. *Bacon*, 18 Michigan 247.

While the whole tendency of modern development has been to assimilate the writ of *mandamus* more and more to an ordinary action (*Commonwealth* vs. *Denison*, 24 Howard 66), nevertheless, as a result of its originally prerogative characteristics the issue of the writ still lies in the discretion of the court. This discretion, however, is a legal discretion, and therefore the decision of the court to which application is made for its issue is generally regarded as appealable. (*People* vs. *Board of Police*, 107 New York 235, and *People* vs. *Chapin*, 104 New York 96.) Another effect of its originally prerogative character is that it is at the present time an extraordinary remedy, that is, it will never issue where there is another adequate remedy. (*People* vs. *Hawkins*, 46 New York 9, and *State* vs. *Supervisor*, 26 Wisconsin 79.) It has been held by the courts that neither a civil action for damages against officers for neglect of duty nor the remedy by indictment is an adequate remedy. *People* vs. *Green*, 58 New York 295, 306, and *Fremont* vs. *Crippen*, 10 California 211.

The purpose of the issue of the writ is also somewhat peculiar. This is, as it originally was and as the meaning of the Latin word by which the writ is known would imply, to command directly the performance by the person to whom it is issued of some particular and specific thing which the law provides he shall do. It corresponds as a public legal remedy somewhat to the private legal remedy of specific performance.

As the purpose of the writ is to enforce the performance by public or quasi-public agencies of the duties specifically required by the law, the writ will issue to all officers of the Government, both administrative and judicial, no matter what their rank may be (*United States* vs. *Schurz*, 102 United States 378); but will not issue to control the discretion of even the humblest officer. The rank of the officer is of no significance. The issue of the writ depends almost altogether upon the character of the duty, whether ministerial or discretionary, whose performance it is sought to

enforce. The only possible exception to this rule is to be found in the case of the President of the U. S., against whom the writ has never been issued, and against whom it is fair to suppose it never will be issued, on account of the reluctance of the court to interfere with the executive. Most of the State courts extend this exception to the Governor also. (*State* vs. *Drew*, 17 Florida 67, and *State* vs. *Towns*, 8 Georgia 369, 372.) While the spirit of the rule as to discretion is the same when the *mandamus* is issued to administrative as it is when it is issued to judicial officers, the fact that judicial officers have as a rule to perform only discretionary duties, whereas in the case of administrative officers many, if not most, of their duties are ministerial in character, a practical difference arises from the application of this rule to these different authorities. Thus the *mandamus* almost never issues to inferior courts to compel the performance of a specific action. It issues merely to force such bodies to exercise their discretion where they have refused to exercise it, on the ground that the duty of exercising their discretion is a ministerial duty, while the way in which they shall exercise it is of course a matter of discretion. (*Ex parte Loring*, 94 United States 418.) The rule is the same in the case of discretionary duties of administrative officers; here, as in the case of judicial officers, it is obligatory upon them to exercise their discretion in some way, and their negligence in this regard is considered to be the violation of a ministerial duty. *People* vs. *Auditors*, 82 New York 80.

While the main purpose of the *mandamus* is to protect private rights from encroachment by the officers of the Government, it is also made use of merely to maintain the law, where no particular private right is violated. While there is some conflict upon this point, by far the better rule, both from the point of view of political expediency and from that of legal authority, is that in the case of matters affecting the public as a whole any individual citizen may apply to the court for the issue of the *mandamus* to compel the performance by public officers or corporations of duties imposed upon them by the law. (*Union Pacific Railway Company* vs. *Hall*, 91 United States 343, 355.) In these cases not only the individual citizen, but also the proper officers of the Government, may apply to the court for the writ. See *Attorney General* vs. *Boston*, 123 Mass. 460.

The practice of the writ is, of course, regulated in detail and somewhat differently by the statutes of the different States, but generally as follows: The person desiring the issue of the writ makes application by affidavits to the competent court, which will then issue to the person against whom it is demanded that it shall go, either a rule to show cause why the *mandamus* should not issue or what is known as an alternative *mandamus*. This procedure has the effect of bringing the defendant into court, and on the return to either the rule to show cause or the alternative *mandamus*, the matter is decided upon its merits, and the *mandamus* is either granted or refused. As has been said, the decison granting or refusing the writ is generally now regarded as appealable. FRANK J. GOODNOW.

Mandan: city; capital of Morton co., N. D. (for location of county, see map of North Dakota, ref. 3–D); on the Missouri river at the mouth of the Heart river, and on the N. Pac. Railroad; 5 miles W. of Bismarck, the State capital. It is in a stock-raising region, has valuable coal mines in its vicinity, ships large quantities of wool, and has three weekly newspapers. Pop. (1880) 239; (1890) 1,328; (1900) 1,658.

Mandans: See SIOUAN INDIANS.

Manda'ra, or **Wandala**: kingdom of Central Africa, S. of Bornu; consists of a large, well-watered, very fertile, and well-cultivated valley, partly encircled by high mountains. The inhabitants are Mohammedan Negroes, who are industrious in the manufacture of cotton fabrics and articles of iron, and possess a celebrated breed of horses. The capital is Doloo, with 30,000 inhabitants. The former capital, Mora, was entirely destroyed in the war with Bornu in 1863. Revised by C. C. ADAMS.

Mandarin-duck: a species of duck, *Aix galericulata*, related to the wood-duck of North America; found in China and Japan. The plumage of the male is very gorgeous, varied with brown, yellow, and red, though these last two colors are in subdued tints. Besides a crest of steel-green with purplish reflections, there is a collar of loose reddish feathers, and the innermost tertiary is modified into a fan shape, and stands out from the rest of the wing. This duck is often kept in captivity, especially in China, where it is looked upon as the emblem of conjugal attachment. F. A. LUCAS.

Mandate [from Lat. *manda'tum*, command, mandate, deriv. of *manda're*, command]: at Roman law, is a contract by which the one party agrees to execute a commission received from the other. The person commissioned (*mandatarius*) is bound to do what he has undertaken to do, provided it be lawful and possible, and is held to exercise ordinary diligence. He is of course responsible for whatever comes into his hands in the execution of the commission. The mandator is responsible for expenses incurred by the mandatary. The contract is a friendly one (*ex amicitia*); and while the mandatary may receive a fee (*honorarium*, *salarium*), he may not receive payment (*merces*). If it is agreed that he shall be paid, the contract is not mandate, but a hiring of service (*locatio conductio operarum* or *operis*).

Mandate may include an authorization to the mandatary to represent the mandator in a legal act, e. g. in concluding a contract or in conducting a law suit. In this case the mandatary is the agent or attorney (*procurator*) of the mandator. Such an agent, however, must act in his own name. The rights acquired do not vest directly in his principal (*dominus*), but must be transferred to the latter. The liabilities incurred are also primarily those of the agent, although his creditors may have recourse against the principal on the ground that the latter has expressly or impliedly authorized them to deal with the agent. An implied guaranty of this sort does not result from the mandate to the agent and his disclosure of his agency, but from other acts of the principal, e. g. from his putting the agent in charge of a ship or a shop.

"*Qualified*" *Mandate*.—The contract of mandate, however, may be simply a contract of guaranty. When, for example, one person authorizes another to lend money or furnish goods on credit to a third person, he who has given such authorization is responsible *as mandator* for any resultant loss. The reason for this extension of mandate was a practical one. The regular contract of guaranty was a formal contract (*stipulatio*); mandate was informal.

Mandatum actionis.—In the appointment of a procurator to represent the mandator in enforcing a right of action, the Roman jurists found a means of ceding rights of action, which in principle was not permitted. The cessionary, figured, technically, as a mere attorney, but it was agreed between him and the mandator that he should keep whatever he obtained from the debtor. He is procurator in his own interest—*in rem suam*.

Extinction of the Contract.—Mandate is revocable at the pleasure of the mandator, and is extinguished by his death; but such revocation or death does not affect the claim of the mandatary against the mandator or his heir for expenses incurred before he learned that the mandate was at an end. The procurator *in rem suam* was partially protected by imperial legislation against the results of such a technical extinction of his rights as cessionary.

MODERN EUROPEAN LAW.—The law of *agency* in modern Europe is a further development of the Roman law of mandate. As far as the relations between principal and agent are concerned, the Roman rules are substantially unchanged; but the relations of principal and agent to third parties have been wholly reconstructed. Mediæval practice worked out the rules that the mandatary or procurator might contract in the name of his principal; that in such case all the rights created by the contract were directly and immediately vested in the principal; and that the liabilities incurred were not liabilities of the agent (so long as he has acted within the limits of his commission), but of the principal. Strictly considered, these results do not flow from the mandate to the agent, but from the grant of power (*procuration*, *Vollmacht*) which accompanies the mandate; and some modern legislations (e. g. the Swiss federal law of obligations and the German (draft) code) separate the law of agency or representation (*Vertretung*) from the law of mandate. In most of the European codes the whole subject is treated under the head of mandate (*mandat*, *Auftrag*). The rules laid down are very similar to those of the English common law. See AGENCY.

The "*qualified*" *mandate* has practically disappeared. The contract of guaranty is in principle informal, so that there is no need of having recourse to the theory of mandate; and where special kinds of guaranty, or contracts of guaranty involving more than a certain amount, are required to be in writing, it is not admissible to evade this requirement by invoking the rules of mandate. Modern codes, therefore, either ignore this form of mandate, or declare that it is governed by the rules of guaranty.

Apart from the cases above discussed, mandate is still recognized in very much the Roman sense, as a friendly contract of service. The requirement that the service shall be gratuitously rendered is generally disearded; but in spite of the abandonment of this technical distinction between mandate and hire of service, the two are still treated as distinct contracts.

MANDATE AND BAILMENT.—At Roman law mandate might incidentally include the transfer of property for safe-keeping or for other purposes. In such cases a "real contract," or, in English phrase, a "bailment," is associated with the mandate, and at Roman law the property might be recovered either by action on the real contract or by action on the mandate. It was probably through a misconception of these Roman rules that the Roman term "mandatum" came to be used, in English common law, to designate a particular form of bailment. See BAILMENT.

LITERATURE.—Domenget and de Peyronny, *Du Mandat* (2d ed. Paris, 1870); Amann, *Der Procurator und der Mandatarius* (Heidelberg, 1880); Le Jolis, *Du Mandat* (Paris, 1882). MUNROE SMITH.

Mandelgren, NILS MÅNSSON: critic; b. in Sweden in 1813; studied at the academies of Stockholm and Copenhagen. Among his writings are *Monuments scandinaves du moyen âge* (1855–62) and *Samlingar till svenska odlingshistorien* (Collections bearing upon the History of Swedish Civilization, 1866–68). Besides these he has published minor writings, partly of a polemical nature. P. G.

Man'derson, CHARLES FREDERICK: soldier and lawyer; b. in Philadelphia, Feb. 9, 1837; received an excellent education; removed in 1856 to Canton, O., and studied law; was admitted to practice and elected city solicitor. He entered the Union army in 1861 as first lieutenant in the Nineteenth Ohio Regiment, and served through the civil war with great bravery in Mississippi, Alabama, Tennessee, and Kentucky, taking part in all the principal engagements, rising to be colonel and brevet brigadier-general of volunteers. At the close of the war he resumed the practice of law at Canton, O.; removed to Omaha, Neb., in 1869, and devoted himself to his profession. He was elected to the U. S. Senate Jan. 31, 1883; re-elected 1888; was president *pro tem.* of the Senate 1891–93.

Mandeville, BERNARD: b. at Dordrecht (Dort), Holland, about 1670; studied medicine, and took his degree at Leyden, Mar. 30, 1691, after which he settled in London as a physician. Published *Esop Dressed, or a Collection of Fables in Familiar Verse* (1704): a *Treatise of the Hypochondriac and Hysteric Passions* (1711), highly commended by Dr. Johnson; *The Grumbling-hive, or Knaves turned Honest* (1705); and in 1714 an enlarged edition, under the title *The Fable of the Bees, or Private Vices Public Benefits* (2d ed., 1723), which was censured by Berkeley and others, and presented as a nuisance by the grand jury of Middlesex. A second part of the *Fable* appeared in 1728, and both parts in 1732. He also published *Free Thoughts on Religion* (1720); *Origin of Honor* (1732); *A Letter to Dion* (1732); and *A Modest Defense of Public Stews* (1740). He was patronized by Lord Macclesfield, and died in London, Jan. 21, 1733. Revised by A. R. MARSH.

Mandeville, or **Maundeville**, Sir JOHN: the reputed author of an early English book of travels. According to the account which he himself gives in the book, he was a native of St. Albans; left England in 1322, and traveled until 1357 in Turkey, Armenia, Tartary, Persia, Syria, Arabia, India, Egypt and Upper Egypt, and a great part of Ethiopia; was for some time in the employ of the Sultan of Egypt, and wrote especially for the benefit of pilgrims going to Jerusalem, where he had often been. The work was written in popular style, was widely read, and translated in manuscript into various languages, and was one of the earliest of printed books. It appears to have been first printed in German about 1475; the earliest (dated) English edition was in 1499. Until quite recently it was assumed that Mandeville was a veritable person, if not the extensive traveler which he claimed to be; and he has been called the father of English prose. Recent investigations have shown—(1) that the earliest known manuscript of the work is French (dated 1371), and there is internal evidence that all others were derived from it; (2) that the whole, or almost the whole, of the matter is taken from earlier authors, especially from William of Boldensele, a German knight who visited Jerusalem 1322–23, from Friar Odoric, who traveled in Asia 1316–20, and from the *Speculum* of Vincent de Beauvois; there are even statements taken from Pliny; (3) that the author is identical, in all probability, with one Jean de Bourgogne (perhaps an Englishman), who died at Liège in 1372—whether Bourgogne or Mandeville was the fictitious name is doubtful. Notwithstanding these facts, there can be no doubt that Mandeville's travels were widely read and believed, and that they had considerable influence in promoting the spirit of discovery during the fourteenth and fifteenth centuries. See Yule, *Cathay and the Way Thither* (1866); Schönborn, *Bibliographische Untersuchungen über die Reise-Beschreibung des Sir John Mandeville* (1840); E. B. Nicholson and Sir H. Yule in *Encyclopædia Britannica*, 9th ed.; *Dictionary of National Biography*, article *Mandeville*. HERBERT H. SMITH.

Mandin'go: a vast territory in Western Africa, extending E. of Liberia and Sierra Leone and N. of the European possessions and Ashantee on the Gulf of Guinea, its northern limit being about 12° N. lat. It is mostly a high table-land. Its people, supposed to number 5,000,000, are among the finest specimens of the Negro tribes, and are divided into small states of considerable power, the largest of which is the empire of Samory, which, though at war with the French for years, is not yet fully subjugated. The most powerful element in the population is the Fulbe or Fellata, whose influence is potent over a large part of the Western and Central Sudan. The inhabitants of this region are zealous Mohammedans, and every settlement has one or more rudely built mosques. The entire region is in France's sphere of influence, and the French explorer Binger has done most to reveal it to the world. He crossed the entire region (1887–88), and was the first European to visit Kong, its most important town. C. C. ADAMS.

Mandioca: See MANIOC.

Man'dolin [from Ital. *mandolino*, dimin. of *mandola* (by popular etymology) < Lat. *pandu'ra* < Gr. πανδοῦρα]: an instrument of music somewhat resembling the guitar and the lute. Its body is an open shell-shaped box made of strips of bent wood. It has four or five strings, which are struck by the plectrum. The neck has a finger-board. This instrument is chiefly Italian. Its sounds are peculiar, but sweet and loud.

Mandrake [O. Eng. *mandragora*, from Lat. *mandragoras* = Gr. μανδραγόρας. Cf. Fr. *mandragore* < Lat.]: a solanaceous perennial herb, *Mandragora vernalis*, a native of the warm parts of the Eastern continent. It is a narcotic poison, and was used by the ancients for its soporific and anæsthetic effects. Anciently it was believed to have many magical virtues: it could cure barrenness; its forked root was likened to a man, and believed to possess a soul; it was believed to shriek so loudly when dug up that the person removing it died. Consequently, the earth was carefully loosened by one whose ears were stopped with wax, and a black dog was attached by cords to the root to drag it out. The name has been applied in the U. S. to *Podophyllum peltatum*, the May-apple, of the barberry family.

Mandrill [= *man-ape*, from Eng. *drill*, ape, with the prefix *man*, given on account of its size; cf. Fr. *mandrille*: Ital. *mandrillo*]: a large, powerful, and short-tailed baboon (*Cynocephalus mormon*) found in Northern and Western Africa. The appearance of the full-grown male is at once ludicrous and repulsive. The sides of the long muzzle are much swollen and of a brilliant blue, furrowed with purple and scarlet. The end of the nose is bright red, the chin has a yellow beard, while the large ischial callosities are resplendent with red and blue. It is a hideous brute, and excels in cunning and strength, as well as in ferocity. F. A. LUCAS.

Mandu'ria (anc. *Mandy'rium*, or *Mando'nium*): town in a fertile part of the province of Lecce, Southern Italy (see map of Italy, ref. 7–H). It was originally a Greek settlement, and S. of the town are ancient sepulchers in which Greek vases of much interest have been found. Pliny mentions an intermittent spring which still exists here, and there is another of great antiquity issuing from an excavation in a rock. Pop. about 8,870.

Maneesa: See MANISSA.

Ma'nes [Lat., from adj. stem *mani-*, good; cf. *immanis*, translated by the Gr. χρηστοί]: in Roman religious language the name given to the dead, conceived of as bodiless spirits enjoying immortality like the gods, and hence the frequent formula *di* or *divi manes*. Their abode is in the depths of the earth, from which they emerge at certain seasons. Altars were erected to them, and sacrifices, con-

sisting of food, drink, perfumes, and flowers, were offered. LARES (*q. v.*), manes, and genii are different designations of the spirits of the dead which can not always be distinguished sharply. Manes corresponded, however, more nearly to the Christian conception of the soul, and accordingly the formula *dis manibus* is even found on early Christian inscriptions. G. L. HENDRICKSON.

Manet, mȧ̆ nā′, ÉDOUARD: genre and portrait painter; b. in Paris in 1833; pupil of Couture; was awarded a second-class medal at the Salon of 1881; decoration of the Legion of Honor in 1882. He is generally recognized as the chief of the impressionist school of painters in France, and his pictures were for several years rejected by the jury at the Salon. His influence on modern art has been very considerable and in the main for good, although his own works are of very unequal merit. One of his most celebrated works, *Olympia* (1865), is in the Luxembourg Gallery, Paris, and at the Metropolitan Museum, New York, is a picture that shows him at his best, *The Boy with the Sword* (1861). D. in Paris, Apr. 30, 1883. WILLIAM A. COFFIN.

Man'etho (beloved of Thoth): an Egyptian priest and temple-scribe of Sebennytus (*Thebneter*) in the Northern Delta; a contemporary of Ptolemy I., Soter (cf. Plutarch, *Isis*, c. 28), and of Ptolemy II., Philadelphus (286–247 B. C.). He was employed about 260 B. C. by the latter to compile from native sources a history of Egypt and its gods. For this task he was qualified by acquaintance with Greek as well as Egyptian literature. A number of other works have also been attributed to him, but all have perished. We possess only extracts made by Josephus, Eusebius, Africanus, and others. The quotations made by Josephus (*Contra Apionem*, i., 14; Whiston's translation, New York, 1824, vol. iv., p. 371 ff.) relate to the occupation and expulsion of the Hyksos. Those by Eusebius cover the entire period (*Eusebii Chronicorum Canonum quæ supersunt*. ed. Alf. Schoene, 2 vols., Berlin, 1866–75; *Georgii Syncelli Chronographia*, in *Corpus Script. Hist. Byzant.*, Bonn, 1829, 2 vols.; Scaliger, *Eusebii . . . Chron. Canon.*, lib. 2, Leyden, 1606). More or less complete collections of the entire material are contained in Müller's *Fragmenta historicorum Græcorum* (4 vols., Paris, 1841–51, vol. ii., p. 511–616, 1848); in Bunsen's *Egypt's Place in Universal History* (1848, vol. i., p. 605 ff.); in George Syncellus (see above); and in Cory's *Ancient Fragments* (London, 1876, p. 104 ff.). Manetho divided the history from Menes to Alexander into three parts (*τόμοι*), the first including the first eleven dynasties (*δυναστεία*), the second extending from the twelfth to the nineteenth, and the third from the twentieth to the thirtieth. (See EGYPT.) Before the first dynasty was the mythological rule of the gods and demi-gods (followers of Horus), extending over immense periods. As the Egyptians possessed no fixed era, the dynastic lists of Manetho afford the only means of dating events in Egyptian history. The dynasties appear to have been based upon geographical or historical considerations rather than upon heredity. Monumental lists, such as the tablet of Abydos (see MEMNONIUM), do not show any such divisions. Manetho's list gives a high antiquity to Menes, the first king; estimates vary between Champollion's 5857 B. C. and Wilkinson's 2320 B. C. The lower estimates are based upon the presumption of contemporaneous dynasties. On the other hand, it is contended that there is no monumental evidence of the fact to be found, and it appears probable that Manetho himself excluded all but legitimate lines from his record.

CHARLES R. GILLETT.

Man, Fall of: See FALL OF MAN.

Man'fred: King of Sicily; b. in Sicily about 1232; a natural son (afterward legitimized) of Frederick II. of the house of Hohenstaufen; received, on the death of his father in 1250, the principality of Tarentum, and acted as regent in Italy during the absence of his half-brother, Conrad IV. He subdued with great valor the insurrections in Capua, Naples, and other cities, but his services were ill rewarded by Conrad. In 1254 Conrad died, and Manfred was for the second time appointed regent in Italy during the minority of Conradin, and, on a rumor of the death of Conradin in Germany, he was proclaimed King of the Two Sicilies, and crowned at Palermo, Aug. 11, 1258. The rumor proved false, but he now refused to abdicate; and when the pope, Urban IV., put him under ban, he invaded the Papal States and conquered all Tuscany after the victory at Montaperto, Sept. 4, 1260. His government, thus consolidated, was vigorous and beneficial to the country. He founded Manfredonia, built the harbor of Salerno, and established schools in all the large cities. At his magnificent court poets and scientists gathered together, and he himself was the most brilliant in the whole circle, a true Hohenstaufen. Meanwhile the pope, Urban IV., and after him Clement IV., put up for sale in Europe the crown of Naples and Sicily, and Charles of Anjou, a brother of Louis IX. of France, was found to be the highest bidder. With a French army he landed in Italy, was crowned in Rome Jan. 6, 1266, and defeated Manfred, by treachery rather than by valor, in the battle of Benevento, Feb. 26, 1266. Manfred himself fell in the battle, and, being under the papal ban, was buried without ceremonies under a heap of stones, afterward called the "rock of roses." His wife and sons were imprisoned—the former for eighteen, the latter for thirty-one years.

Manfredo'nia: a maritime town in the province of Foggia, Southern Italy; on the Gulf of Manfredonia; about 23 miles N. E. of Foggia (see map of Italy, ref. 6–G). The commerce of the port is very considerable, and several European nations have consuls here. It is also an important fishing-station. The town itself is pleasantly situated at the foot of Monte Gargano. The site was chosen by Manfred in 1261, who induced the inhabitants of the large but fever-stricken Siponto to settle here. The Turks destroyed this town in 1620, and it has never recovered its former prosperity. Pop. about 8,330.

Mangalúr, or **Mangalore'**: town of British India; in the Presidency of Madras, on the Malabar coast, in lat. 12° 52′ N. (see map of S. India, ref. 6–C). It is poorly built, but stands in a fertile plain, surrounded with palm-groves and plantations of rice and sugar, and has a large trade in sandal-wood and rice. Pop. 32,100.

Man'ganese [: Fr. *manganèse*: Ital. *manganese*, prob. corrupted from Lat. *mag'nes*, magnet, or from *magnesia*, because of certain resemblances]: a chemical element. The earlier chemists considered the manganese ores as containing some modifications of iron, but Pott in 1740, and others subsequently, Kaim, Winterl, Scheele, and Bergmann, proved that they contained a metal chemically distinct from iron; and Gahn, the master of Berzelius, first obtained the metal manganese at a date not left on record. It was in examining the action of hydrochloric acid on pyrolusite, in the course of his investigation of this very question, that Scheele made the discovery of *chlorine* in 1774.

Manganese occurs widely distributed in nature, principally in the form of the dioxide, MnO_2, commonly called black oxide of manganese, and known to mineralogists as pyrolusite. It occurs also as *braunite*, which is an oxide of the composition Mn_2O_3; as *hausmannite*, Mn_3O_4; *manganite*, $H_2Mn_2O_4$; *rhodocroisite*, $MnCO_3$, etc. The metal is isolated from its oxides by heating them to a high temperature with charcoal; by decomposing a solution of the chloride by means of the electric current; by treating the fluoride with metallic sodium. Manganese is a reddish-white metal with a luster like that of iron. When it contains some iron and carbon it is gray and looks like cast iron. It is about as hard as this, is brittle, and can be powdered comparatively easily. It melts at a temperature between the melting-point of iron and that of platinum. Its specific gravity, according to the method of preparation, is 6·85 to 7·99. It decomposes water with evolution of hydrogen, slowly at the ordinary temperature, rapidly at boiling temperature. It dissolves easily in all dilute acids. It is not at all, or only very slightly, magnetic. Manganese forms valuable alloys with other metals, especially with iron. Pig-iron always contains some manganese. *Spiegel-iron* contains upward of 5 per cent. manganese; *ferro-manganese* contains 20 per cent. or more, and even as much as 86 per cent. Both spiegel-iron and ferro-manganese are used in steel-making (See IRON.) *Manganese bronze* is made by adding manganese to ordinary bronze. The symbol of manganese is Mn, and its atomic weight 54·8. Manganese forms a great variety of compounds. Thus with oxygen it forms the following: MnO, Mn_2O_3, Mn_3O_4, MnO_2, Mn_2O_7. Of the oxides the dioxide, MnO_2, or pyrolusite, is the most common. This occurs in nature in considerable quantities. It is used chiefly in the preparation of CHLORINE (*q. v.*). It is also used in the preparation of OXYGEN (*q. v.*), and for the purpose of decolorizing glass. If added alone to colorless glass it gives it an amethyst color, but when added to poor glass with a green color the two colors neutralize each other, and the glass becomes nearly colorless. Various attempts have been made to economize in the use of manganese dioxide in the prepa-

ration of chlorine, and *Weldon's process* has come into extensive use as a result of these efforts. In the first stage of the manufacture of chlorine, hydrochloric acid acts upon manganese dioxide as represented in this equation:

$$MnO_2 + 4\,HCl = MnCl_2 + 2H_2O + Cl_2.$$

The products are manganous chloride, chlorine, and water. For the preparation of chlorine, the chloride is, of course, of no value; but by Weldon's process it can be brought back again to a condition in which it has the power to give chlorine when treated with hydrochloric acid. It is first treated with lime in solution when it is converted into manganese hydroxide, $Mn(OH)_2$, and calcium chloride is formed at the same time:

$$MnCl_2 + Ca(OH)_2 = Mn(OH)_2 + CaCl_2.$$

When this hydroxide, mixed with lime, is allowed to stand in contact with the air it takes up oxygen, and a compound known as calcium manganite is formed. This has the composition $CaMnO_3$ or $CaMn_2O_5$, and is formed according to one of the following equations:

$$Mn(OH)_2 + Ca(OH)_2 + O = CaMnO_3 + 2H_2O;$$
$$2Mn(OH)_2 + Ca(OH)_2 + 2O = CaMn_2O_5 + 3H_2O.$$

Both these compounds give chlorine when treated with hydrochloric acid. The manganese again appears as the chloride, and can be again converted into the manganite, and so on. In practice, the waste liquor is mixed with calcium carbonate to neutralize the acid. After settling, lime enough is added to precipitate the manganese as hydroxide and to form with this the manganite. Then steam and air are passed into this mixture, when the oxidation takes place, the manganite being formed.

Manganic Acid and the Manganates.—When treated with energetic oxidizing agents in the presence of bases the oxides of manganese form manganates, of which potassium manganate, K_2MnO_4, may serve as an example. In composition the manganates are analogous to the sulphates and chromates, as shown by the formulas:

K_2SO_4.	K_2CrO_4.	K_2MnO_4.
Potassium sulphate.	Potassium chromate.	Potassium manganate.

When a solution of a manganate is treated with an acid the manganic acid is set free and is decomposed at once into *permanganic acid* and manganese dioxide; or, when carbon dioxide is passed into a solution of potassium manganate, *potassium permanganate* is formed. This has the composition $KMnO_4$. It is manufactured on the large scale, and is extensively used in the laboratory, and acts as an oxidizing agent. It is nearly black, with a grecnish luster. Its solution in water has a purple or purplish-red color, according to the concentration. When it gives up its oxygen it becomes colorless in acid solution. The permanganates and manganates are valuable disinfecting agents, and the sodium salts are extensively used under the name of *Condy's fluid.*

Revised by Ira Remsen.

Mange [formed as base to *mangy*, from Fr. *mangé*, liter., eaten, perf. partic. of *manger*, eat]: a cutaneous disease of dogs, horses, cattle, swine, and sheep, distinguished by the presence of *acari* or mites upon the skin, and also marked by scurfiness, itching, heat, and pimples. Sulphur ointments, carbolic-acid washes, corrosive sublimate in weak solution, and decoction of tobacco or of the green leaves of Indian poke or itchweed (*Veratrum viride*) are all useful applications. The afflicted animal should be kept alone, for the disease is contagious. When the mites have been destroyed the animal needs liberal feeding, and perhaps some mild tonic, like iron. A little copperas dissolved in his drink is generally sufficient.

Mangel-wurzel: See Mangold-wurzel.

Mangiagalli, măăn-jĕĕ-aa-gaăl'lĕĕ, Luigi, M. D.: gynæcologist; b. at Mortara, Italy, June 16, 1850; was educated at University of Pavia; was assistant at the Midwives' School, Milan, 1878–82; Professor of Obstetrics at the University of Sassari 1882–84; at University of Catania 1884–88; since 1888 has been director of the obstetrical and gynæcological clinic in the Great Hospital of Milan. He is the author of about forty professional essays in Italian medical journals.

Man'go [from Portng. *manga*, from Tamil *mānkāy*]: the fruit of an East Indian tree, *Mangifera indica*, of the family *Anacardiaceæ*, now naturalized in most warm climates. The tree is widespreading, and affords a dense shade. There are many varieties of the fruit, many of which are very fine for desserts, having an agreeable blending of sweetness and acidity. The fruits of other species of this genus are eaten, but none of the others are valuable. The tree is generally raised from seeds, but the finer varieties are propagated by layering and inarching.

Mangold-wurzel [= Germ., beet-root; *mangold*, beet + *wurzel*, root]: usually written mangel-wurzel in the U. S., and often abbreviated to mangel or mangold; a name adopted into English by farmers and others to designate the larger and coarser varieties of the beet (*Beta vulgaris*), extensively grown as food for domestic animals. (See Beet.) Mangolds are too coarse and rank for human food, and even for cattle they are often harsh and irritant to the bowels when first harvested; but in a few weeks they "ripen" and then they may be fed to all kinds of stock with great advantage, though too liberal feeding is believed to have a diuretic effect. Mangolds need a generous soil, clean culture, and liberal manuring. As much as 35 tons, or 1,200 bush., to the acre have been grown in favorable circumstances.

Revised by L. H. Bailey.

Mang-ka: See Bang-ka.

Man'gosteen [from Malay *mangusta*, the native name]: the fruit of a small tree, *Garcinia mangostana*, of the family *Guttiferæ*, a native of the Spice islands, now grown in many tropical regions, and cultivated in the Eastern Archipelago. The tree becomes about 20 feet high and has some resemblance to the fir, though its leaves are large, oval, and glistening. From the Moluccas it has been introduced into Ceylon and several points of Southern Asia, and even into the Antilles, though not without difficulty. The fruit externally resembles an orange, but is usually brownish red rather than yellow. The outer rind is very thick, rich in tannin, and very astringent and inedible, but it is sometimes used medicinally in dysenteries. The edible portion is a pulp which surrounds the seeds, large and five in number. This juicy pulp is described as having the whiteness and solubility of snow, and a delicate, delicious flavor. This fruit is perfectly wholesome, and is very refreshing in fevers. The tree is highly ornamental.

Man'groves [by analogy of *grove* (referring to its spreading by forming new stems) from Malay *manggi-manggi*, the native name]: shrubs and trees of the family *Rhizophoraceæ*, natives of the muddy coasts, tidal estuaries, and salt marshes of hot countries, where they form dense thickets. *Rhizophora mangle* and *candelaria* are the typical mangroves. The mangrove is found in many tropical regions, and is abundant on the coasts and keys of Florida. The fruit is eatable, the bark useful in tanning. Most of the mangroves are remarkable as invaders of the domains of the sea, which they slowly convert into dry land. Their stems put forth long aërial roots which extend down into the water; the seeds germinate in the fruit, and send down a long and heavy root, which on falling sinks into the mud; and thus the mangrove swamp slowly gains upon the shallow seas, spreading like a banyan-grove. The roots and stems give lodgment and shelter to innumerable bivalves, crabs, and other aquatic animals of different descriptions, while the branches swarm with aquatic birds. The wood of some species is hard, heavy, and useful in the arts, particularly in boat-building. Mangrove-wood is often brought to seaports as part of a ship's dunnage. It is sold as firewood, for which some species are excellent. The bark is also imported for tanner's use, and is useful for some kinds of woodwork. In some countries there are other trees which share the habits and the habitat of the mangrove, as the *Laguncularia racemosa* (family *Combretaceæ*) of the West Indies, Florida, etc. The white mangroves (*Avicennia*) of Australasia, India, South America, etc., are of the family *Myoporaceæ*, and have the habit of true mangroves. The bark of some species (as *A. tomentosa*) is excellent for tanning. The resin, the seeds, and the roots of this species are used as food by the poor in many countries. The *Conocarpus racemosa*, a mangrove of Brazil (family *Combretaceæ*) yields bark for tanning. Zanzibar exports to Arabia great numbers of mangrove poles, called "Zanzibar rafters," in trade.

Mangues: See Indians of Central America.

Manhattan: city; capital of Riley co., Kan. (for location of county, see map of Kansas, ref. 4–H); at the junction of the Big Blue and Kansas rivers; on the Atch., Top. and S. Fé, the Chi., Rock Is. and Pac., and the Union Pac. railways; 48 miles W. of Topeka. It is in an agricultural, fruit and stock raising region, and is noted for its magnesian limestone and cement. It contains marble-works, iron-foundry,

windmill-factory, sash and door factory, and 4 weekly and 2 monthly periodicals, and is the seat of the State Agricultural College. Pop. (1880) 2,105; (1890) 3,004; (1900) 3,438.
EDITOR OF "REPUBLIC."

Manhattan College: an institution in New York city, which began as a secondary school shortly after the arrival in New York city of the Brothers of the Christian Schools in 1853. In 1863 the course of studies was made broader and higher, and the former Academy of the Holy Infancy was incorporated with the University of the State of New York, empowered to confer degrees, and chartered as Manhattan College. The first graduates went forth from its halls in 1866. Its courses are chiefly two: one leading to the degree of bachelor of arts, the other to that of bachelor of science. Besides these departments it includes a polytechnic institute in Fifty-ninth Street, New York city, known as De La Salle Institute, occupying the building formerly known as the Charlier Institute, where special attention is given to preparing students for civil engineering. From its earliest days the college has always offered a business course to those young men who sought immediate preparation for commercial pursuits. The chief affiliations of Manhattan College are St. Joseph's College, Buffalo; Sacred Heart Academy, Classon-on-the-Sound; Christian Brothers' Academy, Irvington; De La Salle Institute, Troy; Christian Brothers' Academy, Albany; and La Salle Academy, Providence. The Alumni Association of the college, numbering over 400 members, is the oldest Roman Catholic society of the kind in the city of New York. C. H. THURBER.

Manhattan, Borough of: See the Appendix.

Manheim: borough (founded in 1762 by Baron Henry William Stiegel, who established here the first glass-works in the U. S.); Lancaster co., Pa. (for location of county, see map of Pennsylvania, ref. 6–H); on the Phila. and Reading railroad; 10 miles N. N. W. of Lancaster. It has large steam flour, saw, and planing mills, foundries, and machine-shops, carriage and cigar factories, and an extensive mill-furnishing plant; is in a rich agricultural region; and contains 2 national banks, with combined capital of $210,000, an attractive public park, and 2 weekly newspapers. Pop. (1880) 1,666; (1890) 2,070; (1900) 2,019. EDITOR OF "SENTINEL."

Mani: See CENTRAL AMERICAN ANTIQUITIES.

Mania: See INSANITY.

Man'ichæism [from Lat. *Manichæ'us* = Gr. Μανιχαῖος, Manichæus, a Manichæan]: a religious system which arose toward the end of the third century in the Persian empire, compounded mainly of Persian Dualism, Buddhism, and Syrian Gnosticism, and using certain Christian ideas as a gloss for a heathen theosophy. Its founder was Manes or Mani, b. at Marderin, Babylon, about 216; who appeared on Mar. 20, 242, as a religious teacher in Babylon, but, being unsuccessful there, he for forty years lived the life of a wanderer. He announced himself as the "Messenger of the True God," and among Christians as the promised Paraclete. Returning to Persia, he made at first a favorable impression upon the king, but was finally crucified by him at Gundesapur, about 277.

Ancient Persian Dualism furnished the fundamental idea of this system. In it good and evil were opposed from eternity, and were represented by light and darkness. The good god, Ormuzd, and his twelve sons, constituting the kingdom of light, were in eternal warfare with Satan and his demons, the kingdom of darkness. Inroads had been made by the latter upon the former, and in order to guard the borderland Ormuzd places over it an Æon (the mother of life), who gives birth to the ideal man; who, assisted by the five pure elements, enters on the contest, but is taken captive. Another Æon (the living Spirit) is now sent to his aid—not, however, in time to prevent the kingdom of darkness from swallowing up part of his luminous essence (the soul of the world). The remaining part of the ideal man—the Jesus Impatibilis—is now transported to the sun. Out of the mixture of the luminous essence, thus absorbed, with the kingdom of darkness, the living Spirit now creates this present visible world, in order that from a process of purification now entered on the particles of light may now regain strength and freedom. From this mixture every man has, besides a soul of light, an evil soul; the former of which is to gain the victory by drawing to itself the particles of light scattered through nature, and especially in the vegetable world. While this purification is being accomplished under the superintendency of the ideal man residing in the sun, and of the living Spirit, the evil demons, on the other hand, are attempting by false religions, as Judaism and heathenism, to bind souls to the kingdom of night. At last the ideal man in the sun—the Christ—descends in a seeming bodily form, and aims by his doctrine to liberate the imprisoned souls of light. He is seemingly killed by demons, but it is only the phantom of his body that is crucified; but his doctrine is misapprehended and misrepresented by his apostles, to restore which to its purity Mani, the promised Paraclete, is sent. He was thus the head of the Church, with apostles, bishops, presbyters, deacons, and evangelists under him. His community or Church was divided into the catechumens or *auditores*, and the elect or perfect; the latter to be supported by the former, while they, the elect, were to practice the most rigorous asceticism and to abstain from marriage and from sins of the mouth, the hand, and the body. Baptism and the Lord's Supper—the former with oil, the latter without wine—were part of the secret ceremonial of the perfect. They had no altars or images. The sun was revered by them merely as representative of the ideal man, or the principle of light. Fasts, prayers, and readings from Mani constituted their worship. Sunday was a festival devoted to the sun; but their great festival was the anniversary of the martyrdom of Mani. The Old Testament they rejected absolutely, and of the New they retained only what had been revised and redacted by the Paraclete, Mani.

In various forms and combinations, and under various names, its main elements were soon after the death of its founder widely diffused through the Roman empire. Africa was its chief seat in the West, and its chief apostle there was Faustus of Mileve, who wrote apologies for it and against Christianity. Through his influence Augustine was for a time captivated with its promises of occult and profounder wisdom, but afterward, disappointed and disgusted with its emptiness, he wrote largely and with great earnestness against it. From Valentinian I. (364–375) the Roman emperors issued frequent and severe edicts against it. In Africa it was also persecuted by the Vandals, and whole shiploads of its adherents (477) were transported by them to the continent of Europe. At the time of Leo the Great (A. D. 440–461) numbers of them were found at Rome. The sect was distinguished by rigorous formal asceticism, but was accused of Antinomian principles, and of the indulgence of secret lusts. The elements and principles of the Manichæan system were diffused through Spain through the Priscillianists, a dualistic sect, which, appearing 380, spread extensively, but was finally suppressed 583. Despite the rigorous measures taken against them in various countries, the elements of their system appear during the Middle Ages in various mystic and Gnostic schools, such as the Paulicians and the Catherini, by whom its doctrines were widely diffused through the south of France and Germany, where successively they established their chief seats. Indeed, the mystery of the origin of evil and the seeming dualism of human nature have ever tended to drive minds in the direction of their speculations, though entirely independent and ignorant of their system. Revised by S. M. JACKSON.

Manid'idæ [Mod. Lat., named from *Ma'nis*, the typical genus; from Lat. *ma'nes*, ghosts]: a family of mammals of the order *Bruta* or *Edentata* and the sub-order *Squamata*. The pangolins, or scaly ant-eaters—as these animals are called—feed principally on termites, and are mostly terrestrial in their habits, although one African species climbs trees. They roll into a compact ball when attacked or frightened. The tail of the long-tailed manis (*Manis longicauda*) contains more vertebræ—forty-six to fifty—than that of any other mammal. They are at once distinguished from all other mammals by the peculiar modification of the integumentary appendages, which are developed as large leaf-like scales arranged in regular rows and simulating the appearance of a pineapple or pine-nut; the body is elongated, with a long, flattened tail, and the scales extend on the tail as well as the head, and sometimes the feet; so much do they mimic lizards that the older authors confounded them with the latter under the name *Lacertus*; the feet are normal in form, and the digits are developed in full number—i. e. five to each foot—but the external are much shortened; the animals, however, are club-footed, and walk on the outer side of the feet. The skull is quite peculiar, depressed conic in outline, with small intermaxillaries; maxillaries short, and with the malar processes declivous; the palatines expanded in front; no malars or lachrymals; a large lachrymal opening; teeth are entirely wanting. The family has about eight

species. They have been by some combined in a single genus, and by Gray divided among five—viz., (1) *Manis*, (2) *Phatagin*, (3) *Pholidotus*, (4) *Pangolin*, and (5) *Smutsia*; the representatives of the first and second (*Manis*), as well as fifth (genus *Smutsia*), groups inhabit Africa, and those of the third and fourth (genus *Pholidotus*), India.

Revised by F. A. Lucas.

Manihiki (mă̆a-nē̆e-hee'kē̆e) **Islands**: a Polynesian group of twelve islands, occupied by the British in 1888. They lie N. of the Society islands and W. of the Marquesas, between lats. 3° 30′ and 13° S. and lons. 150° and 167° W. Area (combined), 53 sq. miles. Pop. estimated at 1,700. The natives are professing Christians. M. W. H.

Manil'a, or **Manilla**: the capital of Luzon and of the Philippine Archipelago; on the west coast of Luzon, lat. 14° 35′ N., lon. 120° 59′ E., on the west shore of the circular Bay of Manila (30 miles across), and at the mouth of the small Pasig river (see map of East Indies, ref. 3–G). The city proper, or *Manila murada*, is surrounded by a wall, and is properly only a large fort containing numerous public buildings. Most of the city lies outside the walls, and includes several suburbs of the natives. The population, according to the report of the Board of Health, May, 1901, was 244,732, made up as follows: Americans, 8,642; Filipinos, 181,360; Chinese, 51,567; Spaniards, 2,383; and other foreigners, 960.

The climate of Manila is hot and wet, but salubrious. The mean temperature is 81° F.; the death rate per thousand in 1900 was 34·47. The city is occasionally swept by the terrible typhoons of the China Sea, and is also subject to frequent earthquakes, some of which are very destructive. The city possesses a well-equipped observatory.

Manila is celebrated for the Manilla Hemp (*q. v.*) or *abaca*, which it exports. Its chief manufacture is that of cigars or cheroots, a state monopoly until 1882, which occupies many thousand workers of both sexes, and exports about 100,000,000 cigars annually.

The city was founded in 1571 by Miguel Lopez de Legaspi, and was surrounded with a wall in 1590. It was invaded by the British in 1762. Commerce with Spain was at first carried on by way of Acapulco in Mexico, and it was not until 1764 that Spanish vessels arrived by way of the Cape. The port was opened to foreign vessels in 1789, but commerce did not really flourish until the privileges of the Royal Company of the Philippines expired in 1834. Since 1880 Manila has been connected with Hongkong by telegraph. See Philippine Islands.

Mark W. Harrington.

Manil'ius, Marcus: Latin poet; wrote a didactic poem in five books, *Astronomica*, which has been preserved, but of his life and age nothing is known, though it is probable that he flourished under Augustus. The first manuscript was discovered by Poggio, and printed at Nuremberg in 1472. Scaliger in 1579, Bentley in 1739, and Jacob in 1846, have published editions based on several manuscripts. There is an English translation by Creech (1697) and a French by Pingré (1786). Manilius shows great learning, but is often obscure and sometimes stilted and forced. There are occasional flashes of genius, and here and there lines which haunt the memory like those of Lucretius, to whom, however, Manilius is as inferior in poetic fire as he is in sustained enthusiasm. In diction he is most indebted to Lucretius and Vergil. It seems singular that the poem should be mentioned by no Roman writer, but in the age of Constantine the Great it was known and used by the author of the Latin treatise on astrology, Julius Firmicus, and Robinson Ellis has found some traces of imitation in earlier writers. See his *Noctes Manilianæ sive dissertationes in Astronomica Manilii* (Oxford, 1891). M. Warren.

Manil'la Hemp [named from *Manila*, capital of the Philippines], or **Ab'aca** [the native name]: the fiber of a plant resembling the plaintain and the banana, *Musa troglodytarum*, belonging to the family *Musaceæ*. It is cultivated principally in the Philippine islands, and the fiber is obtained from the leaf-stalk of the plant. It is largely imported for the manufacture of cordage and canvas, which is of the very best quality, exceeding hemp in durability, but not in flexibility. Old Manilla is used for paper-stock, and makes a wrapping-paper of excellent quality and great strength. See Fiber.

Ma'nioc, Cassa'va, Juca, or **Mandioca** [*mandioca* is from Portug. *mandioca*, from Tupí *mandióg*; *cassava* is from Fr. *cassave*, from Span. *cazabe*, from Haitian *kasabi*]: the half-shrubby euphorbiaceous plant *Janipha manihot* (*Jatropha manihot*, L.), extensively cultivated for food in tropical America and Africa; its original habitat is unknown. At the time of the conquest, it was planted and used by the American Indians from Florida to Southern Brazil, constituting the chief source of food of the agricultural tribes in low and hot lands. The plants are propagated by cuttings. The tuberous roots, which are the only parts used for food, are grated and passed through a sieve (sometimes after maceration in water), and the resulting mass is subjected to pressure. This expels a juice which is very poisonous. A small portion of the poisonous principle remains, but this is very volatile, and is removed by roasting the mass in flat pans with constant stirring. The result is a nutritious and palatable meal, varying in quality according to the mode of preparation, and capable of being kept for a long time. It is eaten in this state or is made into cakes, porridge, etc. Soaked in water and allowed to ferment, it furnishes a mild alcoholic drink, much used by the Indians. Tapioca is the starchy matter precipitated from the poisonous juice; the latter, after boiling, is used as an ingredient of various sauces, and in the preparation of the West Indian dish called pepper-pot. *Janipha aipi*, Pohl, is an allied species, or probably variety, which is free from poisonous qualities, and is eaten as a vegetable, roasted or boiled. Many minor varieties have been described, but most botanists now regard them as modifications of a single species, produced by cultivation. H. H. Smith.

Manipur, or **Cassay**: a feudatory state of India, between Assam and Upper Burma, in lats. 23° 51′ to 25° 45′ N., and lons. 93° 2′ to 94° 40′ E. Area, 7,600 sq. miles. Pop. 221,070, mostly in the central valley—that of the river Namkathay, a tributary of the Kyendwen, and hence of the Irawadi. It is a very mountainous country; the highest points are in the N. (surpassing 8,000 feet), and the heights decrease toward the S. The rivers drain toward the S. to the Irawadi and toward the W. to the Meghna. In the middle of the central valley is Lake Logtak, at an elevation of 2,500 feet, apparently the remnant of an earlier lake of much larger size. It varies much with the season, and empties into the Namkathay river. The climate of the valley is temperate and equable. The nights are fresh in the hot season; in the cold season there are occasional white frosts. The rains are moderate, and the S. W. wind prevails during the year. There are occasional earthquakes, usually slight.

The only ores of value found so far are those of iron. The forests are dense, except in the central valley, and contain the teak, the wild tea-tree, the caoutchouc, the oak, and the ash. The bamboo is common. The elephant, rhinoceros, tiger, leopard, deer, wild buffalo, and monkeys abound. The principal culture is rice, but cotton, oil-seeds, pepper, tobacco, ginger, and Indian wheat are raised, as well as smaller quantities of bananas, pineapples, mangoes, potatoes of superior quality, plums, peaches, and apples.

The inhabitants are of Burman race with Naga intermixture. They profess Brahmanism, and this appears to be a recent introduction. Their language is classified by Cust as Tibeto-Burman. They are emigrants by nature, and are common over Upper Burma, where they are employed as porters and drivers. The capital is Manipur, or Imphal.

The kingdom of Manipur was allied to the Indian Government in 1762, and came under its protectorate in 1826, with an annual allowance of about $3,000 for care of the British-Burman boundary. The revenue of the rajah is $15,000 to $20,000, and the military force numbers about 27,000. The rajah was deposed by the mountaineers in 1891. The chief commissioner of Assam was sent to regulate the matter, when he and his escort and the resident agent were suddenly attacked and killed. More British troops were at once sent, and the chief officers of the rajahship were taken and executed or exiled. Chura Chund, a young relation of the ex-rajah, was placed on the throne and a British officer appointed to administer the state during his minority.

Mark W. Harrington.

Manipur (Burman *Imphal*): the capital of the state of Manipur; 236 miles N. W. of Mandalay, on the Namkathay, river; 2,330 feet above the sea, lat. 24° 44′ N., lon. 94° E. (see map of N. India, ref. 7–K). The city covers a considerable space and is surrounded by a wall. Villages are very numerous in the vicinity, some of them being really suburbs. M. W. H.

Manis: a general name for any member of the family Manididæ (*q. v.*).

Manis'a, or **Manis'sa** (anc. *Magnesia*): town of Asia Minor, Asiatic Turkey; on the Hermos; about 25 miles N. S. of Smyrna (see map of Turkey, ref. 5–D). It is a large city, containing more and finer public buildings, mosques, minarets, public baths, and bazaars than Smyrna, and carrying on an important trade in cotton, grain, and tobacco. This last article is raised in the immediate vicinity of the city, and is considered the best of its kind in Asia Minor. The streets of Manisa are generally protected against the sun by overspreading mats or vines. Pop. estimated at 50,000.

Man, Isle of: an island of Great Britain; in the Irish Sea; 16 miles distant from the nearest point of Scotland, and 27 miles distant from the nearest points of England and Ireland. Its length is 33 miles; breadth, 12½ miles; and area, 145,325 acres, of which two-thirds are cultivated. It is traversed from N. to S. by mountain ranges, whose highest peak, Snaefell, rises 2,024 feet above the level of the sea. The greater part of the island consists of clay; slate, zinc, and, in a lesser degree, copper and iron are mined, while lead is abundant, nearly 5,000 tons being extracted annually. The principal mine, at Laxey, on the east coast, is one of the most important in the United Kingdom. Agriculture and cattle-breeding are pursued to a considerable extent, the climate being very favorable. The fisheries are rich, and afford occupation to nearly 4,000 men and boys, the produce exceeding £60,000 annually in value. The inhabitants are of Celtic race, with an admixture of Scandinavian, and have a language of their own, the Manx—which, however, has been almost entirely supplanted by English. The Isle of Man has a constitution and government of its own. It has its own laws and law officers. The court of Tynwald consists of the lieutenant-governor and council, and the House of twenty-four Keys, or representatives. Since 1866 the latter has been elected by the people every seven years. The armorial bearings of Man are three legs in armor, conjoined at the thighs. Pop. (1891) 55,598. Principal towns, Douglas (the modern capital), Castletown, Peel, and Ramsey. See *The Isle of Man, its History*, etc., by Rev. J. G. Cumming; *History of the Isle of Man*, by Joseph Train; *Surnames and Place-names of the Isle of Man*, by A. W. Moore (1890). Revised by C. K. Adams.

Manistee': city (settled in 1841, incorporated as a city in 1869); capital of Manistee co., Mich. (for location of county, see map of Michigan, ref. 5–H); on Lake Michigan, at the mouth of the Manistee river, and on the Flint and Pere Marquette and the Manistee and N. E. railways; 72 miles N. of Muskegon. It is in the great peach and fruit belt of Michigan; has an excellent harbor; and ships annually 200,000,000 feet of lumber, and large quantities of shingles, lath, pickets, wood, bark, and salt. The river is here navigable for vessels drawing 16 feet of water. The salt interest has been developed rapidly, and the city claims to have the largest vacuum evaporating salt plant in the world, which in 1892 produced 6,295,000 bush. There are numerous steam saw, shingle, and planing mills, foundries and machine-shops, and furniture and other factories. The city has the Holly system of water-works, gas and electric light plants, electric street-railway, high school, 5 public and 5 parochial schools, 14 churches, hospital which cost $85,000, county infirmary, industrial home, driving-park association with grounds covering 23 acres, 2 national banks with combined capital of $200,000, a savings-bank with capital of $50,000, and a daily and 5 weekly newspapers. Pop. (1880) 6,930; (1890) 12,812; (1900) 14,260.

Editor of "Democrat."

Manistique, măn-is-teek': village (first mills erected in 1852, incorporated in 1877); capital of Schoolcraft co., Mich. (for location of county, see map of Michigan, ref. 2–G); on Lake Michigan, at the mouth of the Manistique river, and on the Minn., St. P. and Sault Ste. Marie Railway; midway between Escanaba and St. Ignace. It contains 7 churches, 3 graded public schools, and manufactories of pig-iron, lumber, sash, doors, and blinds, and has large shipping interests and a semi-weekly and 3 weekly newspapers. Pop. (1880) 693; (1890) 2,940; (1900) 4,126.

Editor of "Pioneer."

Manito'ba: a province of the Dominion of Canada, frequently spoken of as "The Prairie Province," the other divisions of Canada's prairie country, Assiniboia, Saskatchewan, and Alberta, being known as the Northwest Territories.

Location and Area.—It is a portion of the territory formerly known as Rupert's Land. In 1870 the Manitoba Act, passed by the Parliament of Canada, defined the boundaries of the new province of Manitobah, as it was at first spelled, which then comprised about 14,000 sq. miles, with a population of about 11,000, chiefly half-breeds. In addition to these, equally divided between men of French and British origin, there was a colony of descendants of Highlanders and a few Englishmen, native Canadians, etc.; also about 220 Indians, the masses of the Crees, Blackfeet, and others being W. of Manitoba. The province extends from 52° 50′ N. lat. to the 49th parallel (the international boundary-line), which separates it from the States of Minnesota and North Dakota, and from the 95th meridian to 101° 20′ W. lon. Area about 80,000 sq. miles, or over 51,000,000 acres.

Physical Features.—The province consists chiefly of prairie land, though extensive tracts are covered with deciduous trees, and at about 30 miles E. of Winnipeg (the capital) begins a region of swamp intersected by ridges and spaces of higher lands, the whole covered with spruce, a small quantity of white pine, tamarack, cedar, balsam-willow (white and red), aspen, and cottonwood, and, where fires have cleared the ground, in some places groves of aspen. It is in the main a flat country, but contains several stretches of high land, such as the so-called Riding Mountains, Turtle Mountain, Moose Mountains, and the Porcupine Hills. There are a great number of lakes in the province, some merely shallow depressions. The principal sheets of water are Lake Winnipeg, 270 miles long and from 20 to 60 miles broad; Lake Winnipegosis, 150 miles long and from 6 to 20 miles broad; and Lake Manitoba, 130 miles long and about 20 miles wide in its broadest part. The principal rivers are the Red, the Assiniboine, and the Winnipeg. The Red river rises in Lake Traverse, Minnesota, and for a long distance forms the boundary between Minnesota and North Dakota. It traverses Manitoba with many short and crooked stretches and empties into Lake Winnipeg. On its course through Manitoba it receives the Rosean and the Assiniboine rivers. In the U. S. it is called the Red River of the North. It is a muddy-colored stream, between banks of loose, pliable soil, and is liable to occasional freshets. It is high in the spring, but has cut itself so wide a channel that toward the end of the fall it is hardly navigable even for flat-bottomed steamboats. The Assiniboine rises a little to the N. W. of Manitoba, but the greater part of its crooked course is within that province, where it receives numerous smaller streams, the chief ones being the Little Saskatchewan, which unites with it near the city of Brandon, the Qu'appelle, the Shell, the Birdtail, and the Souris. The Winnipeg river flows out of the north end of Lake of the Woods, and empties into Lake Winnipeg near its southeast corner. It is a rocky, rapid river, with over thirty falls and rapids between the two lakes. All the waters of Manitoba flow into Lake Winnipeg, and thence through the Nelson river into Hudson Bay and the North Atlantic.

Geology.—The only minerals yet discovered are coal and, in Lake Winnipeg, a deposit of iron. The coal is a lignite, in some sections better than in others. It is largely used for household purposes. In Lake of the Woods, touched by the east boundary of the province, gold has been discovered and two mines are in operation.

Soil and Productions.—The soil is generally a loam on a clay bed, particularly rich in the valleys of the rivers. In some parts it is lighter and dryer. Here and there are unproductive alkaline spots or sandy hills. Every kind of root and vegetable common to temperate climates grows luxuriantly. Grain of all kinds ripens well; the Manitoba No. 1 hard, the highest grade of red Fyfe wheat, famous throughout the world, fetches the highest price in the London market. Large fruits do not prosper, but currants and berries yield well. In the woods are found wild grapes and plums. A yield of 3 tons of wild hay to the acre is not unusual. The total production of cereals in 1899 was 56,619,764 bush., of which 27,922,230 bush. were wheat and 23,318,378 were oats; of potatoes and other root crops, 5,896,503 bush.

Fauna.—There are many varieties of birds, ravens being the only ones that remain through the winter. The song-sparrow, the American robin, and the meadow-lark are the principal songsters. Wild fowl are in great abundance, including the swan, merganser, goose, sheldrake, duck, snipe, pelican, and plover. The Canada goose, the Arctic goose or wavy, and the laughing-goose are the most common. There are about twenty varieties of duck and three of snipe. Hawks, owls, eagles, and other smaller birds of prey are in all sections of the country. Prairie fowl are plentiful. The ruffed grouse or willow-partridge is common, and the pine

partridge is found in the more thickly wooded country. Bisons in a wild state are not now found in Manitoba. Elk (wapiti) are killed in the wilder parts, the Virginia deer is common, and in some parts of the wooded districts caribou are obtained. There are two kinds of wolves—the prairie-wolf, or coyote, and the larger and fiercer timber-wolf. The bear, fox, beaver, mink, and other fur animals, though rapidly decreasing wherever settlement is made, are still found in the province, the eastern and northern portions of which, being heavily wooded and sparsely settled, afford quiet retreats.

Climate.—The climate is cold in winter, the mercury sometimes, though rarely, falling to −50°. The province is very healthful, and not subject to violent storms. The winter begins about the close of November and lasts until April; the spring is short; summer lasts from June to the beginning of September; and the autumn is a delightful season, sometimes broken with rain. In a period of eleven years the maximum temperature was 95·34°; minimum, 40·51°; and mean, 33·06°. The mean annual rainfall was 16·977 inches; mean snowfall, 52·72 in.; mean number of days on which rain fell, 69; of snowfall, 45. Navigation opened between Apr. 12 and May 2, and closed between Oct. 28 and Nov. 21.

Divisions.—Manitoba is divided into seventy organized rural municipalities (besides cities, towns, and unorganized districts), each governed by a reeve and council, and for electoral purposes is divided into forty divisions for the provincial legislature, and seven divisions for the House of Commons at Ottawa. These seven are Winnipeg, Selkirk, Lisgar, Brandon, Marquette, Macdonald, and Provencher.

Principal Cities.—The principal cities, with population in 1891, are Winnipeg, the capital of the province, 25,642 (1896, 38,000); Brandon, the most important grain-market, 3,778 (1896, 5,500); and Portage la Prairie, on the Assiniboine river and three railways, 3,363 (1896, 4,000).

Government.—The government of the province is administered by a lieutenant-governor, appointed by the governor in council of Canada for a term of five years, with an executive council of five members, belonging to the legislature and responsible to it, and a single house of representatives called the legislative assembly, composed of forty members elected by popular vote for a term of four years. The province sends two senators (appointed for life by the federal cabinet) and seven popularly elected members of the legislature to the federal Parliament at Ottawa. There are a chief justice and three puisne judges of the court of queen's bench, and three county court judges.

Population and Races.—In 1881 there were 65,954 inhabitants, but 3,694 were taken off and added to Ontario when the boundary was changed; in 1891 there were 152,506, of whom 108,017 were Canadian born and 44,489 of foreign birth (England and Wales, 16,017; Scotland, 7,443; Ireland, 4,553; U. S., 3,063; Germany, 857; Scandinavia, 3,746; Russia, 6,220; France, 474; and miscellaneous, 2,116). There were also 4,236 Indians on reservations.

Industries.—Outside of Winnipeg the principal industry is farming in its several branches and the various occupations connected therewith. There is some lumbering, but the principal supply is from the country round the Lake of the Woods. In the city of Winnipeg and its suburb, St. Boniface, across the Red river, there is a variety of manufacturing industries, though as yet these are on a small scale. Winnipeg has a large number of branches of the principal banks of the Dominion, as well as of Canadian, English, and U. S. insurance and loan and mortgage companies. In the other cities and towns banks, insurance companies, and loan companies are represented by branches or agents. In 1894 there were in all twenty-eight local and branch banks and twenty-five private banking firms. At a great number of points there are grain elevators, the property sometimes of the railways and sometimes of private firms, and at every such point there is a market for grain, with close market quotations. Mills at Winnipeg, Keewatin, and other places through the province, constitute a large flour interest.

Finance.—Manitoba derives its means from a subsidy granted by the Dominion under the British North America Act on a basis of population, as is done in the case of all the provinces. The amount apportioned to Manitoba is $483,687. In addition, the province derives revenue from licenses, law stamps, succession duties, lands, and registration fees.

Means of Communication.—Besides the ordinary highways between municipalities, Manitoba is well served with railways. The Canadian Pacific Railway Company's main line enters the province near the north end of Lake of the Woods, and, passing through Winnipeg, traverses the province in a westerly direction, continuing on to the Pacific coast at Vancouver. This company has five branch lines radiating from Winnipeg, besides others in the Northwest Territories. In addition to these, the Northern Pacific Railway has three branches in the province connecting with its system in North Dakota and Minnesota, and the more northern portion of the province is served for about 225 miles from Portage la Prairie by the Manitoba and Northwestern Railway. There are no canals nor river connections, except so far as the lower part of Red river is served by the steamboat that at intervals goes from Selkirk on the west bank to the Grand Rapids of the Saskatchewan and the points on Lake Winnipeg.

Churches.—There is no state church in Manitoba, each denomination supporting its own ecclesiastical establishment; but there are a great number of churches throughout the province. The Roman Catholic Church is presided over by an archbishop, under whose jurisdiction are all the churches, convents, and schools of the denomination in the province. The Anglican Church has an archbishop at its head, who in 1894 was primate of all Canada; and the Presbyterian, Methodist, and other denominations are well organized.

Schools.—The separate school system was maintained in Manitoba till 1888, when the provincial legislature passed an act confining the government subsidy to undenominational schools. This act was challenged as being unconstitutional, but was sustained by the local court of queen's bench, whose decision was reversed by the Supreme Court of Canada, but reaffirmed by the judicial committee of the privy council in London, the final court of appeal. A "Remedial Act" (possible under the constitution of Canada) was demanded by the advocates of separate schools, but in 1895 had not been granted. There are four denominational collegiate institutions in Winnipeg—the Anglican, Roman Catholic, Methodist, and Presbyterian—and a college for women, an undenominational university, organized only for the conferring of degrees. The amount of money paid for education by the government is about $200,000 annually. There were in 1898 1,250 schools, 1,301 teachers, an enrollment of 44,070, and an average attendance of 24,958.

Charitable and Penal Institutions.—There is one penitentiary in Manitoba, 16 miles from Winnipeg; a lunatic asylum in the city of Brandon, and one at Selkirk; and court-houses and jails at these cities and at Portage la Prairie, the centers of the three judicial districts. There is a general hospital at Winnipeg, mainly supported by voluntary contributions, though the provincial government makes an annual grant to it and payment is made by patients in private wards. There are hospitals in St. Boniface, Brandon, and Morden, a deaf and dumb asylum and a Children's Home in Winnipeg, and a Home for Incurables in Portage la Prairie. The deaf and dumb asylum and the Home for Incurables are supported by the provincial government, the other institutions by municipal and government grants and voluntary contributions.

History.—The history of Manitoba properly dates back to 1812, when Lord Selkirk obtained a grant of land from the Hudson Bay Company, then owner and ruler of the country under a charter granted by Charles II. He then sent out viâ Hudson Bay a company of Sutherlandshire Highlanders. These, after various vicissitudes, settled at Kildonan along the west bank of Red river, about 4 miles N. of what is now Winnipeg. Frequent disturbances took place between the employees of the company and the Northwest Fur Company, in one of which Gov. Semple of the first-named company was killed; but on the amalgamation of the companies and the peaceful establishment of Fort Garry as a central trading-post at the junction of the Red and Assiniboine rivers, a settlement of French half-breeds, English half-breeds, discharged pensioners of the British army, missionaries, and retired employees of the company sprang up, radiating from the fort up and down the two rivers. In 1867 arrangements were made for surrendering the territorial possessions of the Hudson Bay Company to the British Government, to be transferred by it to Canada, the nominal consideration being £300,000 in cash, certain reservations around the company's posts, and one-twentieth of that part of Rupert's Land known as the "fertile belt." The transfer being made, the clerical advisers of the French half-breeds—alarmed at a possible influx of English-speaking Protestants from Ontario—induced a section

of the French half-breeds to resist the entry of William Macdougal, whom Canada had sent up as first governor, together with the public officers accompanying him. Having compelled him to return to Pembina, on the frontier of the U. S., the insurgents, headed by a half-breed named Louis Riel (subsequently hanged for inciting another rebellion in the Northwest Territories in 1885), seized Fort Garry, imprisoned the officers and other Hudson Bay Company's prominent settlers, and ended by shooting a Canadian named Thomas Scott, whom they had tried and condemned by a so-called court martial. Riel established a provisional government, which lasted until a force was sent up under Col. (now Lord) Wolseley, viâ Lake Superior and the Hudson Bay Company's bateaux route. This force, a regiment of British infantry (Sixtieth Rifles), two battalions of Canadian volunteers, and a few artillerymen and engineers, arrived in the Red river on Aug. 22, 1870, and, landing near Fort Garry on the 24th, took possession of the place and handed over the civil government to Donald A. Smith, the chief of the Hudson Bay Company. In a few days a new lieutenant-governor (Adams Archibald) arrived from Ottawa, and, being duly installed, the constitutional life of Manitoba commenced under the Canadian Act of Parliament (1870), called the Manitoba Act. The names of the several lieutenant-governors who have held this office since the restoration of order by the Red river expedition are Adams Archibald, Alexander Morris, Joseph Cauchon, James Cox Aikens, and John C. Schultz.

The first election for the provincial legislature took place on Mar. 2, 1871, and for the members for the House of Commons on Dec. 27, 1870. In 1871 Wemys Simpson was sent to negotiate treaties with the Indians, and since the completion of this duty there has been no interruption of peace. In 1878 the government of Canada began the construction of a line of railway from Emerson, on the international boundary, to Winnipeg, and a line from Thunder Bay, on Lake Superior, to Winnipeg. The rapid construction of the Canadian Pacific Railway and its many branches quickly converted the province into a great wheat-growing district, with market centers at all the principal railway points.

AUTHORITIES.—Hargraves, *Red River*; parliamentary documents; *Manitoba Free Press* (newspaper); Bryce, *Manitoba, its Infancy, Growth, and Present Condition*; *The Western World*; Macoun, *Manitoba and the Great Northwest.* MOLYNEUX ST. JOHN.

Manitoba Lake (Ind. Manitowapan, or Straits of Manitou): one of the three great lakes of the province of Manitoba, lying between Lake Winnipegosis and Lake Winnipeg. It is in lat. 50° to 52° N., lon. 98° to 100° W.; 80 miles long by 20 broad; area about 1,800 sq. miles; of very irregular form; 751 feet above the sea, and 121 above Lake Winnipeg, into which it empties through St. Martin's Lake, and 20 feet below Winnipegosis, from which it receives the drainage through the short Waterhen river. Otherwise it receives but little drainage. The shores are for the most part unsettled; the few residents are mostly Scandinavians. M. W. H.

Man'itou [Amer. Indian]: among the North American Indians of Algonquin stock, a name applied to any object of religious reverence or dread, whether it be a divinity, an evil spirit, a fetich, or an amulet. *Gitche Manitou* (the Great Spirit) is the Supreme Being.

Manitou'lin Islands [corruption of Indian *Manitowin*, divinity]: a line of rocky islands in the north end of Lake Huron, continuous geologically with the Saugeen peninsula, separating Lake Huron proper from Georgian Bay and the North Channel. They are, in order from the E., Fitzwilliam, Grand Manitoulin, Cockburn, or Little Manitoulin, and Drummond islands. The first three belong to Ontario, the last to Michigan. The largest and most important is Grand Manitoulin. It is very irregular in outline, having many deep bays, especially from the N.; is about 80 miles long by 20 broad; has a rough, irregular surface, innumerable lakes and streams, and is covered with forests of pines, spruces, and cedars. The largest lake is Tecumseth, area 55 sq. miles, near the center of the island. It has three different outlets to three distinct bays. Cockburn island has a diameter of 7 miles. The two islands together have an area of 1,182 sq. miles, and a population of about 2,000, more than half being Indians. The latter belong to the Algonquin race. The soil is poor and the climate cold for crops. The lakes and ponds abound in fish, and the islands make an agreeable summer resort. MARK W. HARRINGTON.

Manitou Springs: town; El Paso co., Col. (for location of county, see map of Colorado, ref. 4–E); on the Denver and Rio. G. and the Col. Midland railways; 6 miles N. W. of Colorado Springs, the county-seat. It is in the foot-hills at the base of the famous Pike's Peak, and is completely surrounded by hills, on which are many tasteful cottages. Six mineral springs, the Shoshone (sulphur), the Navajo and Manitou (both resembling seltzer-water), the Ute (soda), the Ute (iron), and the Little Chief, give the town its name. The town has an independent system of water-works, and an electric-light plant, both completed in 1887, a new union public school, several private schools, 4 churches, 5 large and many small hotels, numerous boarding-houses, and a weekly newspaper. Pop. (1880) 422; (1890) 1,439; (1900) 1,303. EDITOR OF "JOURNAL."

Manitowoc': city; capital of Manitowoc co., Wis. (for location of county, see map of Wisconsin, ref. 5–F); on Lake Michigan, at the mouth of the Manitowoc river, and on the Chi. and N. W. Railway; 75 miles N. of Milwaukee. It has a good harbor, direct steamboat communication with Milwaukee, Wis., and Ludington, Mich., and a considerable lake trade. There are foundries, machine-shops, tanneries, ship-yards, and edge and agricultural tool works, a subscription library, and six weekly newspapers. Pop. (1880) 6,367; (1890) 7,710; (1900) 11,786. EDITOR OF "PILOT."

Manizales, mäă-nēĕ-zaa′lās: a city at the extreme southern end of the department of Antioquia, Colombia; on a plateau E. of the river Cauca, 6,988 feet above the sea. It is in the midst of a rich grazing district, on the road leading from the upper Cauca to Antioquia, and near a pass in the Andes by which easy access is obtained to Bogotá. It was founded in 1848, and has had a more rapid growth than any other city of Colombia, though it suffered greatly from the earthquakes of 1875 and 1878. Owing to its position it is the military key to the Cauca valley, and has been a point of great importance in the civil wars of that region. Manizales has a large trade in cacao, which is brought from the plantations of the upper Cauca. On the side of the Ruiz volcano, near the city, there are hot springs, much used by invalids, and the water is brought in pipes into the city itself. Pop. (1892) 14,603. H. H. SMITH.

Manka'to: city; capital of Blue Earth co., Minn. (for location of county, see map of Minnesota, ref. 11–D); on the Minnesota river, at the mouth of the Blue Earth river, and on the Chi., Mil. and St. P., the Chi. and N. W., the Chi., St. P., Minn. and Om., and the Minn. and St. L. railways; 86 miles S. by W. of St. Paul, 140 miles W. of Winona. It is in an agricultural and timber region, with extensive stone quarries in and around it. The industries comprise the manufacture of woolen goods, linseed oil, flour, cement, fiber ware, brick and lime, foundry and machine-shop products, furniture, pipe, and candy. There are 3 national banks with combined capital of $350,000, a State normal school, public library, board of trade, and 2 daily, 6 weekly, and 2 monthly periodicals. Pop. (1880) 5,550; (1890) 8,838; (1900) 10,599. EDITOR OF "FREE PRESS."

Mankind: See MAN.

Manley, Mrs. DE LA RIVIÈRE: author; b. in the island of Guernsey in 1672. She published several scandalous novels, the best known of which is *Secret Memoirs and Manners of Several Persons of Quality of Both Sexes: from The New Atlantis* (1709), a licentious satire on distinguished public characters. The author published a key to this, entitled *Memoirs of Europe* (1710). The printer and publisher of *The New Atlantis* were arrested by warrant from the Secretary of State. Among Mrs. Manley's other books were a collection of letters, and *The Power of Love: in Seven Novels* (1720). D. in 1724. H. A. BEERS.

Mann, HORACE, LL. D.: educationist and philanthropist; b. at Franklin, Mass., May 4, 1796; graduated at Brown University 1819; studied law at Litchfield, Conn.; was admitted to the bar 1823, and settled in Dedham, Mass., whence he removed to Boston in 1833. He early entered political life, having been elected to the Assembly in 1827, and six years later to the Senate of Massachusetts. Of the latter body he became president in 1836. He identified himself from the first with all good causes, and had been selected to codify the laws of the State when his life work came to him. In 1837 the Legislature appointed a board of education to revise and reorganize the common-school system of the State. Mr. Mann was chosen secretary to this board. The pay was inadequate, and the duties most try-

ing; nevertheless he took up the work with joy. Unselfishly putting aside the most flattering opportunities in other directions, he devoted himself with absolute singlemindedness to the reform of the schools of Massachusetts. His twelve years of service in this office were epoch-making, not only in the educational history of Massachusetts, but in that of the U. S. as well. He sought to bring about needed reforms chiefly in three ways—1, by a series of teachers' conferences; 2, through a periodical, *The Common-school Journal*, which he founded and edited himself; 3, most important of all, through the annual *Report* that he was required to make to the board. The twelve volumes of these *Reports* (1837–48) are educational classics. In 1843 he visited Europe for the purpose of studying foreign school systems at first hand. The results of this tour of inspection, as published in his seventh report, stirred up bitter hostility. Indeed, all his work was accomplished in the face of uncompromising opposition from nearly all possible sources. In 1848 Mr. Mann was elected to Congress to fill the vacancy caused by the death of John Quincy Adams, and was reelected in November of the same year and again in 1850. In the opinion of many, one of his purposes in going to Washington was to aid in establishing a national bureau of education, but in this he was not successful, if he really cherished such a hope. From 1852 until his death, Aug. 2, 1859, he was president of Antioch College, Yellow Springs, O. The supreme work of Mr. Mann was the remodeling of the school system of Massachusetts. He introduced many of the features which are now widely accepted as invaluable elements of the school systems of the U. S., and to him as much as to any one person is due the founding of normal schools in the U. S. "Rarely have great abilities, unselfish devotion, and brilliant success been so united in the course of a single life." In addition to the *Reports*, his chief published works are: *Lecture on Education* (Boston, 1840); *Lectures on Education* (Boston, 1845); *On the Study of Physiology in Schools*; *A Few Thoughts for a Young Man* (1850); *Slavery, Letters, and Speeches* (1851); *Lectures on Intemperance* (1852); *Powers and Duties of Woman* (1853); besides numerous lectures and addresses. See his biography by his widow, Mary Peabody Mann (Boston, 1865); Boone, *Education in the United States* (1890); Gordy, *Rise and Growth of the Normal-school Idea in the United States* (1892).

C. H. Thurber.

Mann, Mathew Derbyshire, A. M., M. D.: gynæcologist; b. at Utica, N. Y., July 12, 1845; graduated at Yale in 1867; at the medical department of Columbia College in 1871; formerly was lecturer in the College of Physicians and Surgeons, New York, and in the Yale Medical School in 1893; is Professor of Gynæcology and Obstetrics in the University of Buffalo, New York. He is the author of a *Text-book on Prescription Writing* (1879); and editor of *The American System of Gynæcology* (1887–88).

Mann, William Julius, D. D., LL. D.: theological professor and author; b. in Stuttgart, Germany, May 29, 1819; was educated at the University of Tübingen; settled in the U. S. in 1845, following his schoolmate and life-long friend, Dr. Philip Schaff; was pastor in Philadelphia, first in the Reformed (German) church 1846–50, and from 1850 to 1884 of Zion's and St. Michael's church, the mother of the Lutheran churches of Philadelphia; was professor in the Theological Seminary (now at Mt. Airy, Philadelphia) from its establishment in 1864 until within a few months of his death in Boston, Mass., June 20, 1892. He was coeditor with Dr. Schaff of *Der Deutsche Kirchenfreund*, contributed to *Herzogs Real-Encyclopädie*, and was a constant writer to the German periodical press in the U. S. and Europe. His two most important works are *The Life and Times of Henry Melchior Muhlenberg* (Philadelphia, 1887), and, with the aid of Dr. Beale M. Schmucker, and Dr. W. Germann, an annotated edition of the so-called *Hallesche Nachrichten* (the reports of the founders of the Lutheran Church in Pennsylvania to the Orphan House in Halle). Of this work one volume has appeared (Allentown, 1886). See *Memorial*, by Dr. A. Spaeth, and *Memoir*, by Emma T. Mann, both published in Philadelphia in 1893.

Henry E. Jacobs.

Manna [= Lat. = Gr. μάννα, from Heb. *mān*: Arab. *mann*, manna, liter., favor. Cf. Heb. *man*, gift]: the concrete juice of a small tree native in the countries on the Mediterranean coast, the *Fraxinus ornus*. The manna of commerce is obtained exclusively from Sicily. It is in the form of cream-colored, brittle, spongy flakes of an agreeable sweet taste, and contains a large percentage of a peculiar sugar called *mannite*. Manna is a gentle laxative, and occasionally is used as such in medicine, especially in the case of children, from its pleasant taste. It is an ingredient of the old "black draught." The manna (Arab. *mon*) of the Sinaitic peninsula is found, during the month of June only, on the twigs and branches of the shrub *turfa*, whose botanical name is said by Porter to be *Tamarix gallica*. Small pots of it are kept for sale at the convent of Mt. Sinai. The present annual yield of the peninsula is 500 or 600 lb. only. See Food.

Manna-grass: the popular name for species of *Glyceria*, grasses growing in wet places in the temperate regions of nearly every quarter of the world. *G. fluitans* (called also floating manna-grass) is prized as affording abundant hay of very fair quality; and in Poland and parts of Germany the nutritious and palatable seed is collected and used as a grain under the name of Polish manna.

Manners, John James Robert, K. G., LL. D., D. C. L., P. C., by courtesy Lord John Manners: statesman; b. at Belvoir Castle, Leicestershire, England, Dec. 13, 1818; son of the fifth Duke of Rutland; educated at Eton and at Trinity College, Cambridge; was a member of the Camden Society, and took a deep interest in church restorations. He was in Parliament 1841–47 for Newark, 1850–57 for Colchester, and 1857–74 for North Leicestershire. In 1852 he became first commissioner of public works, and again in 1858 and 1866, in Lord Derby's administration. When the Conservatives again came into power, in 1874, he was appointed postmaster-general, and he held that position until they went out of office in 1880. In the brief Salisbury government of 1885 he took the same office, and in the ministry of 1886–92 he was chancellor of the duchy of Lancaster, also under Lord Salisbury. By the death of his brother, in 1887, he succeeded to the title of Duke of Rutland. He has published two volumes of poems, and some other works.

Mannhardt, maan'hărt, Johann Wilhelm Emanuel: writer on mythology and ethnology; b. in Friedrichstadt, in Sehleswig, Germany, Mar. 26, 1831; studied in Berlin and Tübingen; became editor in 1855 of the *Zeitschrift für deutsche Mythologie und Sittenkunde*; was privat docent in Berlin 1858; but subsequently retired on account of ill-health. D. in Dantzic, Dec. 25, 1880. Mannhardt's work was exclusively devoted to Germanic mythology and comparative ethnology. Of his scientific contributions may be mentioned *Wald- und Feldkulte* (2 vols., 1877), and especially his *Mythologische Forschungen*, published after his death by Patzig (Strassburg, 1884). See *Biographische Jahrbücher* (vol. iv., 1881, pp. 1 ff.).

Alfred Gudeman.

Mannheim, maan'hīm, or **Manheim**: town in the grand duchy of Baden, Germany; at the influx of the Neckar in the Rhine; 53 miles S. of Frankfort (see map of German Empire, ref. 6–D). It is well built, very regularly laid out, and contains a ducal palace, which is one of the largest buildings of the kind in Germany, and several fine churches. Its manufactures are important, and its trade is large and increasing. It is connected by a fine bridge (built 1865–68) with Ludwigshafen, on the opposite bank of the Rhine, and has a good harbor and extensive docks. Pop. (1900) 140,384.

Mannheim Gold: See Brass.

Manning: town; Carroll co., Ia. (for location of county, see map of Iowa, ref. 5–E); on the Chi. and N. W. and the Chi., Mil. and St. P. railways; 42 miles N. W. of Des Moines. It is in a farming region and is a grain and live-stock market. Pop. (1890) 1,233; (1900) 1,169.

Manning: town (county set off from Sumter 1885, town founded as the county-seat in 1886); capital of Clarendon co., S. C. (for location of county, see map of South Carolina, ref. 6–F); on the Central Railroad of S. C.; 70 miles E. by S. of Columbia, 77 miles N. W. of Charleston. It is in an agricultural and lumbering region, and has several churches and schools for white and colored people, and two weekly newspapers. Pop. (1890) 1,069; (1900) 1,430.

Editor of "Times."

Manning, Daniel, LL. D.: editor and politician; b. in Albany, N. Y., May 16, 1831; entered the office of *The Albany Argus* as an apprentice in 1842, and rose through all the various stages of the service till he in 1865 became associate editor, and in 1873 controlling proprietor. At the same time he took a very active part in politics, became a member of the Democratic State committee in 1876, and was its secretary in 1879–80 and its chairman in 1881–84. He was a delegate to the national Democratic conventions of 1876, 1880, and 1884, was chairman of that body in 1880,

and of the New York delegation to the convention of 1884. He was appointed Secretary of Treasury in Mar., 1885, by President Cleveland; resigned in Apr., 1887, on account of ill-health, and became president of the Western National Bank of New York city. D. at Albany, Dec. 24, 1887.

Manning, Henry Edward, Cardinal: b. at Totteridge, Hertfordshire, England, July 15, 1808; studied theology at the University of Oxford, and was appointed rector of Lavington and Graffham in Sussex in 1834, and Archdeacon of Chichester in 1840; but the Gorham case occasioned him to give up in 1851 his preferments in the Anglican Church and join the Roman Catholic. After residing for several years in Rome, he was ordained a priest in 1857, and appointed rector of St. Helen and St. Mary's, Bayswater, and on the death of Cardinal Wiseman in 1865 he was nominated Archbishop of Westminster. He was created a cardinal Mar. 15, 1875. He founded the Roman Catholic University of Kensington, Oct. 15, 1874, and took a very active part in the Council of the Vatican, defending the dogma of the infallibility of the pope. Cardinal Manning was a Christian socialist, public spirited, broad in his sympathies, and a friend of the laboring classes. D. Jan. 14, 1892. The most prominent of his writings are *The Eternal Priesthood*, *Religio Viatoris*, *The True Story of the Vatican Council*, *Independence of the Holy See*, *Four Great Evils of the Day*, *Fourfold Sovereignty of God*; *The Temporal Mission of the Holy Ghost* (1865); *The Temporal Power of the Pope* (1866); *England and Christendom* (1867); *Petri Privilegium* (1871); *Cæsarism and Ultramontanism* (1874); *The Internal Mission of the Holy Ghost* (1875); *Sin and its Consequences* (1876); *The Catholic Church and Modern Society* (1880), etc. Cardinal Manning replied to Mr. Gladstone's *Expostulation*, in *The Vatican Decrees in their Bearing on Civil Allegiance* (1875).

Mannite: See Manna.

Manoa: See El Dorado.

Manoel do Nascimento, mă-nō-el'dō-nă-sĕ-men'tō, Francisco: poet; b. in Lisbon, Portugal, Dec. 21, 1734. Though he was ordained priest in 1754, his intellectual sympathies were with the rationalists of his time, and he was an admirer of the French Encyclopædists. In consequence he was accused before the Inquisition by his former teacher of Latin, Antonio Felix Mendes, of reading and disseminating prohibited books. This was June 22, 1778, and on July 13 Manoel fled from Portugal to France, never to return. In Paris he wrote and published, under the name *Filinto Elysio* (by which he is better known than by his own), the greater part of his poetical works. His first model was Horace, and his experiments with Horatian meters, which curiously anticipate those of the modern Italian "Veristi," give him an important place in the history of the poetic art in Portugal. His opinions are always rationalistic in religion and liberal in politics, as may be seen in his ode to Washington. He excels rather in perfection of form than in poetic enthusiasm or imaginative impulse. Living in Paris during the beginnings of the Romantic movement in France, he saw the possibilities of this remarkable change of taste, and tried to make it known to his countrymen by translating into Portuguese Chateaubriand's *Martyrs* and Wieland's *Oberon*. He also made a version of La Fontaine's *Fables*. See *Obras completas de Filinto Elysio* (2d ed., 11 vols., Paris, 1817–19); *Obras, etc.* (new edition, ed. by Solano Constancio, 22 vols., Lisbon, 1836–40). D. in Paris, 1819. A. R. Marsh.

Man-of-war Bird: See Frigate-bird.

Manom'eter: See Pneumatics.

Manrique, mă-ree'kā, Jorge: Spanish poet. The date of his birth is unknown; he was killed in 1479 in a skirmish during an insurrection against the Spanish king. The son of Rodrigo Manrique, Count of Paredes, and the nephew of Gómez Manrique, both of whom were also poets (see the *Cancionero de Gómez Manrique*, ed. by D. Antonio Paz y Mélia, 2 vols., Madrid, 1885–86), he belonged to one of the oldest and most famous families of Spain. We have from him several love poems, printed in the *Cancioneros*, and, what his fame rests upon, a poem in *coplas de arte mayor* upon the death of his father in 1476. This work is commonly known by the simple title of *Coplas de Manrique*, as well befits its character, for few poems in the Spanish language are more simple, more sincere, or more profoundly moving. The *Coplas* were first printed in 1492, and at once produced a deep impression. They have often been printed since, both alone and in the *Cancioneros*. In the sixteenth century it became the fashion to accompany them with commentaries, or *glosas*, whether in prose or verse, no less than five such having come down to us. For a time these *glosas* much interfered with the popularity of the original poem. The *Coplas* are printed in volume xxxv. of Rivadeneyra's *Biblioteca de Autores Españoles* (Madrid, 1872); also with an English translation by H. W. Longfellow (Boston, 1833; the translation often since, in all editions of Longfellow's *Works*). A. R. Marsh.

Mansart, măn'saar', Jules Hardouin: architect; b. in Paris, Apr. 16, 1646; son of the painter Raphael Hardouin, and grand-nephew of Nicholas F. Mansart, from whom he took the name by which he is known. One of his earliest works is the Cathedral of Blois, a curious piece of belated Gothic. He was employed by the king's officers to erect pavilions at the five angles of the château at St.-Germain-en-Laye, but these were never completed, because Louis XIV. gave up St.-Germain as a residence about 1680, and they have since been destroyed. He was in great favor with the king, a member of the Academy of Fine Arts from its commencement, and architect of the king by special order, before the great undertaking of his life, the Château of Versailles, upon which he began to work about 1678. He built, during the same years, the royal château and pavilions at Marly, was made a noble in 1683, was named first architect of the king soon after, and in 1693 received the order of St. Michael. Constantly engaged upon the most important work, he was still the representative of a style and a way of looking at architectural problems which show little inspiration and little originality. These, however, were not the virtues of the art of the reign of Louis XIV.; Mansart is a perfect embodiment of the tendencies of his age. D. at Marly, May 11, 1708. Russell Sturgis.

Mansart, Nicholas François: architect; b. in Paris, Jan. 23, 1598. His brother-in-law, Germain Gauthier, was an architect of standing, and Mansart may have studied with him. His early work was in Paris, but has perished. The Hôtel Carnavalet, in which is now the Museum of the City of Paris, took its present shape under his direction. The Hôtel Toulouse, now the Bank of France, was his work in its original form. About 1635 he began the wing of Gaston d'Orleans at the Château of Blois, a building which, though overshadowed by the superior interest of the earlier parts of the château, has great value in its peculiar style. He was constantly occupied till his death in important work in Paris and elsewhere, and became titular architect of the king and member of the council of state. D. in Paris, Sept. 23, 1666. Russell Sturgis.

Man'sel, Henry Longueville, D. D.: metaphysician; b. at Cosgrove, Northamptonshire, England, Oct. 6, 1820; was educated at Merchant Taylors' School and at St. John's College, Oxford, where he became a fellow in 1842; was ordained priest of the Anglican Church 1845; became reader in Moral and Metaphysical Philosophy at Magdalen College, Oxford; delivered in 1858 the Bampton lecture on *The Limits of Religious Thought*; became Waynflete Professor of Philosophy 1859; Regius Professor of Church History and canon of Christ Church 1867; dean of St. Paul's 1868. D. in London, July 31, 1871. Besides the Bampton lecture volume aforesaid, his chief works are *Prolegomena Logica* (1851); *Metaphysics* (*Encyclopædia Britannica*, 1857); *The Philosophy of the Conditioned* (1866). He was one of the editors of Hamilton's *Lectures*. Dean Mansel was an elegant writer; in philosophy he was a follower of Hamilton. A posthumous work, *The Gnostic Heresies of the First and Second Centuries*, preceded by a memoir, was published in 1874. Revised by W. S. Perry.

Mansfeld, Peter Ernest II., Count: Protestant leader in the Thirty Years' war; son of Peter Ernest I., Count Mansfeld (1517–1604); b. at Luxemburg in 1580; entered the Austrian service in 1609, but angered at his ill-treatment by the Archduke Leopold he went over to the Protestant side, and on the outbreak of the Thirty Years' war joined the Bohemian rebels. He won a victory over Tilly at Wiesloch in 1622, and worried the imperialists by his repeated ravages of their dominions. When the Count Palatine Frederiek gave up the struggle, Mansfeld took service with the Netherlanders, but on the renewal of the war he returned to Germany with an army of 12,000 men, raised for the most part in England. He met with a crushing defeat at the hands of Wallenstein in the battle of Dessau, Apr. 25, 1626. D. at Racowitza, Bosnia, Nov. 29, 1626.

Mans'field: town; in the county of Nottingham, England (see map of England, ref. 8–I). It has a grammar school founded in 1561, a town-hall, manufactures of lace-thread and iron, and a large trade in corn, malt, and cattle. Pop. (1891) 15,925.

Mansfield: town; Bristol co., Mass. (for location of county, see map of Massachusetts, ref. 5–I); on the Rumford river, and the N. Y., N. H. and Hart. Railroad; 24 miles S. of Boston. It contains 8 churches, a high school, 8 grammar schools, public library (1884), 3 hotels, co-operative bank, and a weekly newspaper. The industries comprise manufacture of jewelry, straw goods, baskets, shoes, machinists' tools, foundry products, knives, boilers, and yarn. Pop. (1880) 2,765; (1890) 3,432; (1900) 4,006. EDITOR OF "NEWS."

Mansfield: city; capital of Richland co., O. (for location of county, see map of Ohio, ref. 3–F); on the Balt. and O., the Erie, the Penn., and the Pitts., Cin., Chi. and St. L. railways; 180 miles N. E. of Cincinnati. It is in an agricultural region; has manufactories of agricultural implements, flour, stoves, pumps, and numerous minor articles; and has a wholesale mercantile trade aggregating $3,000,000 annually. The city contains a Holly system of water-works, electric lights, electric street-railway, 2 libraries (Mansfield Lyceum and Memorial), 2 public parks, 9 public-school buildings, 2 national banks (combined capital $250,000), 2 State banks (capital $231,000), an incorporated bank (capital $500,000), a private bank, and 2 daily and 5 weekly newspapers. Pop. (1880) 9,859; (1890) 13,473; (1900) 17,640. EDITOR OF "NEWS."

Mansfield: borough; Allegheny co., Pa. (for location of county, see map of Pennsylvania, ref. 5–B); on the Pitts., Chartiers and Yough. and the Pitts., Cin., Chi. and St. L. railways; 5 miles W. of Pittsburg. It is in a coal and lead mining and natural-gas region, and has manufactories of lumber, sheet iron, glass, and locks. Pop. (1880) 1,172; (1890) 2,352. Part of Carnegie Borough since 1890.

Mansfield: borough; Tioga co., Pa. (for location of county, see map of Pennsylvania, ref. 2–F); on the N. Y., Lake Erie and W. Railroad; 30 miles S. W. of Elmira, N. Y. It is in an agricultural region, contains a State normal school, and has a weekly newspaper. Pop. (1880) 1,611; (1890) 1,762; (1900) 1,847.

Mansfield, EDWARD DEERING, LL. D.: journalist and author; b. at New Haven, Conn., Aug. 17, 1801: graduated at the U. S. Military Academy in 1819, but declined appointment in the army, and graduated at the College of New Jersey 1822; studied law at the Litchfield (Conn.) Law School, and was admitted to the bar in Connecticut, but immediately removed to Ohio, where in 1836 he was elected Professor of Constitutional Law in Cincinnati College. Leaving the profession of the law for that of public writer, he was editor of *The Cincinnati Chronicle* 1836–49, of *The Atlas* 1849–52, of *The Cincinnati Gazette* 1857, and of *The Railroad Record* 1854–72; and for several years contributed to *The New York Times* over the signature of *Veteran Observer*; was commissioner of statistics for the State of Ohio 1857–67. He was the author of *Utility of Mathematics, Political Grammar, Treatise on Constitutional Law, Legal Rights of Women, Life of General Scott, History of the Mexican War, American Education*, a volume of *Personal Memories*, and other works. The degree of A. M. was conferred on him by the College of New Jersey and that of LL. D. by Marietta College, Ohio. He was a member of the Société Française Statistique Universelle. D. at Morrow, O., Oct. 27, 1880.

Mansfield, JOSEPH KING FENNO: soldier; b. at New Haven, Conn., Dec. 22, 1803; graduated at West Point and was appointed a second lieutenant of engineers in 1822. Prior to 1846 Mansfield was engaged entirely on engineering duty on the Atlantic and Gulf coasts. In the war with Mexico, as chief engineer of Gen. Taylor's army, he distinguished himself and was made brevet colonel. Returning to duty with his corps (in which he had attained a captaincy in 1838) at the close of the war, he was for five years a member of the board of engineers for fortifications on the Atlantic and Pacific coasts, when he was appointed (1853) inspector-general of the army, with the rank of colonel, which position he held at the outbreak of the civil war. In Apr., 1861, he was placed in command of the department of Washington, and at once began the work of fortifying the capital, receiving the appointment of brigadier-general of volunteers the following month. In November he was transferred to the command of Newport News, participating in the capture of Norfolk, May 10, 1862; was transferred in command of Suffolk June–Sept., 1862; promoted major-general of volunteers in July; assigned to the command of a division in the Army of the Potomac Sept. 10, at the head of which, a week later, at the battle of Antietam, he received wounds from the effects of which he died the next day, Sept. 18, 1862, at Sharpsburg, Md.

Mansfield, RICHARD: actor; b. on the island of Heligoland, May 24, 1857; spent his early youth in the U. S. He was the son of Mme. Mansfield-Rudersdorff, the singer. He studied for the East Indian civil service, but abandoned the idea of pursuing that career for business, afterward for literary and artistic work, in both of which he was unsuccessful. In 1877 he made his appearance at St. George's Hall, London, at a musical entertainment, but failed to make an impression. After undergoing many hardships, he traveled through the English provinces playing small parts in Gilbert and Sullivan's comic operas. In London he afterward appeared in comic opera, in comedy, and in tragedy. In Sept. 26, 1878, he made his first appearance in the U. S. at the Standard theater in New York, as Dromez, in the opera *Les Manteaux Noirs*, and was favorably received. In the production of *A Parisian Romance* at the Union Square theater, Jan. 10, 1883, he made an instant hit as Baron Chevrial. He began his career as a star May 3, 1886, at the Madison Square theater, New York, in the play of *Prince Karl*. The characters with which he is most identified are Dr. Jekyll and Mr. Hyde, in the dramatized form of that story; Tittlebat Titmouse, in *Ten Thousand a Year*; and Beau Brummell, in the play of that name. He appeared in *Dr. Jekyll and Mr. Hyde* in London in 1888, at the Lyceum theater, and subsequently as Richard III. On Sept. 12, 1892, he appeared at Daly's theater, New York, in Joseph Hatton's dramatization of *The Scarlet Letter*.

B. B. VALLENTINE.

Mansfield, WILLIAM MURRAY, Earl of: Chief Justice of England; b. at Scone, Perthshire, Scotland, Mar. 2, 1705; was the fourth son of Viscount Stormont, a Scottish nobleman of Jacobite opinions; educated at Westminster School, at Christchurch, Oxford, and at Lincoln's Inn, he traveled in France and Italy in company with the young Duke of Portland; was called to the bar in 1730, and, settling in London, soon acquired almost a monopoly of a lucrative practice consisting of appeals from the Scottish court of sessions to the House of Lords. At the same time he cultivated the society of men of letters, especially of Pope, who often sang his praises, and being endowed with a fine presence, engaging manners, great oratorical powers, untiring industry, and keen judicial insight, he rose rapidly in his profession; was soon in the receipt of an annual income of £3,000; married in 1738 a daughter of the Earl of Winchelsea; was elected to Parliament in Nov., 1742, on the downfall of Walpole, and in the same month received the appointment of solicitor-general from the ministry of Lord Wilmington. The Jacobite rebellion of 1745, favored as it was by many of his relatives, exposed Murray to an accusation of disloyalty, which was presented to the cabinet and afterward to the House of Peers, but without result, his only reply being the energy, conjoined with moderation and impartiality, with which he conducted the prosecution against Lord Lovat and other noblemen who were convicted of treason. In 1747, and again in 1754, Murray was re-elected to Parliament, was in May of the latter year appointed attorney-general, and on Nov. 8, 1756, chief justice of the king's bench, with the title of Baron Mansfield and a seat in the cabinet. In 1757, while filling temporarily the post of Chancellor of the Exchequer, he effected the coalition between Pitt, Fox, and Newcastle which resulted in the formation of the ministry of the former. For more than thirty years Lord Mansfield presided over the chief British tribunal, gaining golden opinions for his promptness, decision, equity, and integrity, but gradually losing popular favor by his decided leaning toward Toryism and the "principle of authority." In the American troubles consequent upon the repeal of the Stamp Act he gave his opinion that the colonists must submit to the authority of Parliament before their grievances could be considered. In the trial of Woodfall, the publisher of Junius's letters, he held that the jury was competent only to pronounce upon the fact of publication and the "sense of the paper," not upon any question of law; and this view he steadfastly maintained. His best work, however, was done in the domain of mercantile law, which he reduced to a systematic and harmonious form. He was created Earl of

Mansfield in 1776; had his house in Bloomsbury Square sacked in 1780 during the Gordon riots, for which loss he refused all compensation; retired from the bench June 4, 1788, and died at Highgate, Mar. 20, 1793. Having left no issue, the barony expired with him; the earldom, with most of his large fortune, descended to his nephew, David Murray, Viscount Stormont. See his *Life* by Roscoe (1838), Lord Campbell's *Lives of the Chief Justices*, and Foss's *Judges of England*.

Mansfield, Mount: the highest of the Green Mountains; in Cambridge, Lamoille co., Vt. Its most elevated part is 4,389 feet above sea-level. The mountain itself presents a grand appearance, and the view from the summit is one of the finest in New England, embracing the Adirondacks and Lake Champlain, the White and Green Mountains, and in clear weather the mountains about Montreal, 70 miles distant.

Mansilla de García, măăn-seel'yăă-dā-gaăr-see'ăă, Eduarda (*Mansilla*): author; b. in Buenos Ayres in 1838. In 1855 she married Don Manuel R. García, a diplomatist. Her first novel, *El Médico de San Luis*, appeared in 1857, and was followed by *Lucia Miranda*; *Pablo ó la vida en las pampas* (published also in French at Paris), etc. She described Argentine national customs and historical episodes with considerable skill. Besides novels, she has written numerous short sketches, a drama, etc. H. H. S.

Manslaughter: at the common law, the unlawful and felonious killing of another without any malice express or implied; that is, without the intent to kill, either proved by direct evidence or inferred from the facts of the homicide, which raises the crime to murder. (See Malice.) It is commonly separated into two classes, the *involuntary* and the *voluntary*. Involuntary manslaughter is the accidental killing of another by one doing an unlawful act, not a felony, or the causing of another's death through culpable neglect of a duty; voluntary manslaughter arises when upon a sudden quarrel two persons fight and one kills the other, or when one greatly provokes another by personal violence, and that other immediately kills him. In both of these instances of voluntary manslaughter the element which characterizes it is the heat of passion under which the act was done, and the want of time for the anger to cool and for reason to resume its sway over the man. In most, if not all, the U. S. the crime is entirely defined and regulated by statutes, which, however, in general closely conform to the common-law principle, but add thereto a number of special cases found to be necessary by the exigencies of modern society, and reduce to manslaughter some modes of killing which at the common law would have been murder. While the common law knew no grades or degrees of the offense, the statutes separate it into several degrees, according to the amount of culpability. The highest degree generally embraces cases of accidental killing while the slayer is engaged in the commission of some crime which at the common law would have rendered the homicide a murder; and often some other particular offenses which were not specially provided for at the common law, such as killing in the act of procuring an abortion, and the like. The degrees then succeeding generally include all cases of unintentional killing while in a heat of passion, while the remaining grades cover all the particular instances of homicide through negligence and wherever not entirely excusable or justifiable. The punishment is imprisonment in the State prison for different periods of time, varying with the degree of the crime. For the details of their provisions the statutes must be consulted. See Homicide and Murder; also Wharton's and Bishop's *Criminal Law*; and Stephen's *Digest of the Criminal Law*.

Revised by F. Sturges Allen.

Manso: See Pueblo Indians.

Mant, Richard, D. D.: bishop and author; b. at Southampton, England, Feb. 12, 1776; was educated at Winchester School and at Trinity College, Oxford; became fellow of Oriel College 1798; was incumbent of several parishes in and near London; became Bishop of Killaloe 1820, of Down and Connor 1823, and of Dromore (in addition) 1842. D. at Ballymoney, Ireland, Nov. 2, 1848. He is chiefly known as one of the authors of an *Annotated Bible* (3 vols., 1814), known as D'Oyly and Mant's, which had an immense circulation in Great Britain, and was republished in New York, with additions by Bishop Hobart (2 vols., 1818–20). His *Bampton Lectures* for 1811 passed through several editions. His greatest work, *History of the Church of Ireland from the Reformation to the Revolution* (2 vols., 1840), passed to a second edition the year following. He is also the author of *Ancient Hymns, from the Roman Breviary, with Original Hymns* (1837). His annotated edition of the Book of Common Prayer was the basis of Bishop T. C. Brownell's *Family Prayer-book*, which has maintained its place in theological literature for upward of fifty years.

Revised by W. S. Perry.

Mantegazza, Paolo: physician and anthropologist; b. at Monza, Italy, 1831; studied at Pisa, Milan, and Pavia; made professor at Pavia in 1858, then Professor of Anthropology in the Instituto di Studii Superiori in Florence, and director of the Florence School of Anthropology. His principal works are *Fisiologia del Piacere* (Milan, 6th ed. 1890); *Fisiologia del Amore*; *Le Estasi Umane*; *Fisiologia del Dolore, Physiognomie et l'Expression* (French trans. Paris, 2d ed.). J. M. B.

Mantegna, măăn-tān'yăă, Andrea: painter; b. at Padua, Italy, in 1430; a pupil of Squarcione, who recognized his genius and adopted him as his son when he was quite a child. When a chapel in the Church of the Eremitani in Padua was allotted to Squarcione to paint, he intrusted the work to his two pupils, Andrea Mantegna and Niccolò Pizzolo. Mantegna's frescoes in the Eremitani received immediate recognition from all his fellow artists excepting Squarcione, who, incensed at his marrying the daughter of Jacopo Bellini, the head of the rival school of art, refused to see his adopted son after this. Mantegna then painted two saints on the principal door of the Basilica of St. Anthony, and a *St. Mark Writing the Gospel* for the Church of St. Justina, both in Padua. At this period of his career he went to Venice and painted with the Bellinis, thus acquiring a greater mastery over color. He returned to Padua, then went to Verona, where he worked in Sta. Maria degli Organi, and painted the altarpiece for San Zeno and other works. At the invitation of the Marquis Lodovico Gonzaga he went to Mantua, where he executed many important works for him, besides establishing a school of painting, and received a house and lands and the title of cavalier from the Duke of Mantua. Pope Innocent VIII. then required him to go to Rome to decorate the Belvedere chapel. He executed this work with infinite pains and increased his fame by its great beauty, though he had no reason to feel well satisfied by the pontiff's treatment of him. His love of the antique, which had always been great, increased after his sojourn in Rome. He returned to Mantua, which he never left after this, painting almost entirely for the duke, with the exception of small easel-pictures which he sent to his native city. Mantegna was also a skillful architect. He designed and built the Church of Sta. Maria della Vittoria in remembrance of the victory over the French at Fornovo, and decorated this temple with a commemorative picture of the event. He contributed greatly to the art of engraving, as he was one of the first in Italy to engrave on metal for printing. (See Engraving.) Mantegna's fame was great in his own time. Ariosto celebrated him together with Leonardo da Vinci and Giovanni Bellini. D. at Mantua, 1506. W. J. Stillman.

Manteuffel, maan'toi-fel, Edwin Hans Carl, von, Baron: field-marshal; b. at Magdeburg, Prussia, Feb. 24, 1809; entered the regiment of guard-dragoons in 1826, and became aide-de-camp to the king in 1848. He often held very important positions, especially of a diplomatic character, exercised a decisive influence on the reorganization of the Prussian army, and was made a lieutenant-general in 1861. He was very active in the negotiations between Austria and Prussia which ended with the convention of Gastein, and was in 1865 appointed governor of Schleswig. In 1866 he commanded the army of the Main. In the Franco-German war he drove Bourbaki across the Swiss frontier. In 1873 he was made a field-marshal, and in 1879 he was appointed governor of Alsace-Lorraine. D. at Carlsbad, June 17, 1885.

Man'ti: city (settled in 1849); capital of San Pete co., Ut. (for location of county, see map of Utah, ref. 5–M); on the Rio Grande, W. and the San Pete Val. railways; 80 miles S. of Provo, 120 miles S. of Salt Lake City. It is in an agricultural and sheep-raising region, and has an annual production of about 100,000 bush. of small grain and 500,000 lb. of wool. The city contains 3 Mormon churches, a Presbyterian church, Mormon seminary, Presbyterian seminary, 4 district schools, and a Mormon temple built on a hill of solid rock, begun 1877, completed 1888, cost about $1,500,000. The assessed valuation of taxable property in 1893

was $750,000. Pop. (1880) 1,748; (1890) 1,950; (1900) 2,408.
EDITOR OF "REPORTER."

Mantine'a (in Gr. Μαντίνεια): one of the oldest and most important cities of Arcadia, situated on the brook Ophis in the narrow part of the plain of Tegea. The plain is marshy and malarious, and the Ophis was always a source of danger to the city, and once was the cause of its capture. The city was formed in the fifth century B. C. by the union of five villages, into which the Spartans dissolved it again from 385–371 B. C. In 362 B. C. it became famous as the scene of the battle between the Thebans and the Spartans in which Epaminondas fell. From 222 B. C. up to the time of Hadrian the city bore the name of Antigoneia. Hadrian built here a splendid temple in honor of Antinous. The city was of great extent and the plan of its streets and the square of the theater could be seen even before the excavations that were made by the French, beginning in 1887. See *Bulletin de Correspondance Hellénique* (xiv., pp. 65–90 and pp. 245–271). J. R. S. STERRETT.

Mantiqueira, măăn-tēē-kā'-răă, SERRA DA: a mountain chain of Southeastern Brazil, trending N. E., parallel to the coast and 40 to 70 miles distant from it; extending from Paraná it crosses São Paulo, and separates Rio de Janeiro and Espirito Santo from Minas Geraes; after giving off a western branch, the Serra do Espinhaço, it subsides into hills and is lost in Bahia. Locally it has various names. In its culminating portion (lats. 24°–20° S.) it is separated from the sea by a lower chain, the Serra do Mar, the valley between the two being occupied by the river Parahyba. It divides rivers flowing to the Parahyba and Iguapé from those which flow to the Paraná. All the mountains mentioned are properly parts of one system, the Brazilian coast range, which in various subdivisions extends from Rio Grande do Sul to the river São Francisco. The Mantiqueira range is, on the whole, higher than any other of the division, and contains the highest peak in Brazil, ITATIAIA (*q. v.*).
HERBERT H. SMITH.

Mantis [Mod. Lat., from Gr. μάντις, prophet, seer]: a remarkable genus of large orthopterous insects, raptorial in their habits, and kindred to the *Phasmidæ*, or walking-sticks, from which *Mantis* and some four other genera have been separated and made a family, the *Mantidæ*. They are popularly called walking-leaves, race-horses, soothsayers, or prophets. When watching for their prey these creatures assume a sort of kneeling posture, doubling the great spiny fore legs under the thorax. Hence they were once believed to be engaged in prayer. The Hottentots regard the alighting of the local species, *M. fausta*, on any person as a token of saintliness and an omen of good fortune. There are numerous species. *M. argentina* of South America devours small birds. *M. carolina* is found in the U. S., where insects of the curious mimetic genus *Mantispa*, though neuropterous, have the appearance and habits of the true *Mantidæ*.

Mantis Shrimp: a peculiar form of Crustacea belonging to the *Stomatopoda*, and probably deriving its common name from a remote resemblance to the mantis insects. These forms, which belong to the genus Squilla, live in burrows in the sea-bottom and differ from most crustaceans in that they do not carry their eggs about with them.

Man'to (in Gr. Μαντώ): in Greek mythology, a daughter of Tiresias, the blind seer of Thebes. After the capture of Thebes by the Epigoni of the Seven Heroes, Manto fell to Alcmæon, son of Amphiaraus, by whom she became the mother of Amphilochus and Tisiphone. Alcmæon then presented her to the oracle at Delphi. According to another myth, both Tiresias and Manto were presented by the Epigoni to the Delphian Apollo, who sent Manto to Colophon, in Asia Minor, in order to found the oracle of the Clarian Apollo. Here she married the Cretan seer Rhacius, and by him became the mother of Mopsus, another distinguished seer. J. R. S. STERRETT.

Man'tua (Ital. *Mantova*): city of Northern Italy; chief city in the province of Milan, the strongest fortress of the celebrated Quadrilateral, and even of Italy (see map of Italy, ref. 3–C). It is in lat. 45° 07′ 45″ N., lon. 28° 27′ 33″ E., 8 miles N. of the Po, 95 miles E. S. E. of Milan, and 90 feet above the level of the Adriatic. This town is built on two islands formed by the Mincio, which here spreading out creates a lake that encircles the city. The channel or canal between the two islands dividing the city is called the *Rio*. Mantua, though its fortress and citadel are of immense strength, has a still more certain defense in the stagnant water that surrounds it, and that proves far more deadly to besieging armies than to those within the walls. The streets and squares are broad and regular, and the public and private buildings have a grand mediæval aspect, and are very rich in works of art. The town has five gates and a dockyard, called Porta Catena, whence there is navigable communication with the Po, making it an important port. The Cathedral of Mantua was designed by Giulio Romano, and contains fine frescoes. The Church of St. Andrea is magnificent, that of Santa Barbara very elegant. St. Martino and St. Egido are churches of the sixth century. The old ducal palace is very sumptuous, with frescoes by Mantegna, Giulio Romano, etc. Mantua was one of the political and religious centers of the Etruscans. Cæsar bestowed upon it the privilege of Roman citizenship. It was the birthplace of Vergil (70 B. C.). In 568 it was not yet surrounded by water. In the eleventh century it belonged to the celebrated Countess Matilda, and after her death passed to the Emperor of Germany. In 1328 the duchy was governed by Luigi Gonzaga, the first of an illustrious house that retained its power for 379 years. In 1708 it again fell to Austria, but was well governed only by Joseph II. Wurmser, the Austrian general, surrendered it to Bonaparte on Feb. 3, 1797, after which it became a part of the Cisalpine republic. In 1814, having changed masters several times meanwhile, it submitted again to Austria, and was treated with cruel severity until the treaty of Vienna (Oct. 1, 1866) made it a part of the kingdom of Italy. Pop. (1881) 28,048.
Revised by C. K. ADAMS.

Mánu, or **Menu** [Sanskrit *mánu-*, man, mankind, Manu]: a revered name in Indic literature. In its oldest usage the word denotes man primeval, representative man, Manu, father of mankind, a sort of *heros eponymos* of the race. More particularly, however, *Manu* is the name given to the legendary Hindu law-giver, a Minos of the Brahmans, and supposititious author of the *Mānava-dharma-çāstra*, the ordinances of Manu, or law-book of the Mānavans, the earliest and most important law-code of India.

The existence of Manu as a historical personage is now denied; the code bearing the name is regarded as a collection of institutions of "man," founded on Hindu tradition and usage from time immemorial. The growth of the idea of a personal and authoritative author for such a work is natural and is easy to conceive. Manu, to whom the code is ascribed, is looked upon in Indic literature as an actual figure. He is called *Svāyaṁbhuva Manu*, the self-existent Manu, and is regarded as the first of a series of Manus, each of whom presides over a period of time called *Manvantara*, cycle of Manu, consisting of myriads of years. Six of these ages of Manu are supposed to have elapsed; we are living in the seventh, which was instituted by *Vāivasvata Manu*; there are seven such ages still to come.

The *Mānava-dharma-çāstra*, institutes of Manu, or ordinances of the Mānavans, as above said, is claimed by tradition to be the work of a divinely inspired author and lawgiver, Manu. It is further asserted that this legislator imparted the code to Bhṛgu, who in turn became the promulgator to men. The fact presumably is that the collection of ordinances in question is based on the Dharma-sūtra of the Mānavan school, and is ultimately traceable back to the Sūtra works of the Vedic schools. In its present form the code consists of twelve books, and comprises 2,685 *çlōkas*, or metrical couplets, or more than 5,000 verses. The code treats of the duties of a Brahman in the different stages of his life; of marriage and ceremonial observances; the duties of a king; the mutual relations of the castes; of civil and criminal law; and of penance and expiation. The first book dealing with the origin of the universe, and the last book treating of philosophical principles and final happiness, are regarded as later additions to the work. As to the age of the code, Sanskrit scholars were inclined at first to assign to it a hoary antiquity; the consensus of opinion now does not place this work earlier than the Christian era.

The laws of Manu have often been edited and translated. The standard edition of the text at present is by Jolly, *Mānava Dharma-śāstra* (the Code of Manu, London, 1887); older text editions are by G. C. Haughton (London, 1825) and Loiseleur Deslongchamps (Paris, 1830). A number of native editions have also appeared in India. The oldest translation by a European is in English, by Sir William Jones (Calcutta and London, 1794–96). In French there is one by Loiseleur Deslongchamps, *Lois de Manou traduites* (Paris, 1833).

More recent are Burnell and Hopkins, *The Ordinances of Manu, Translated, with an Introduction* (London, 1884); Georg Bühler, *The Laws of Manu Translated*, with extracts from the commentaries, and with *Introduction* (Oxford, 1886). There are special treatises on the code by E. W. Hopkins, G. Bühler, Gr. Johaentgen, R. West, A. Weber, and others. The oldest native commentary on Manu is by Medhātithi, and is called *Manubhashya*; it is referred by scholars to the ninth century of our era.

A. V. Williams Jackson.

Manual Training: the training of the hand in the use of tools and in practical drafting, as a part of a system of general edueation. The work with the tools is done in such materials as wood, iron, brass, tin, clay, cardboard, and paper, and the drafting consists in the preparation of working drawings suited to such tool-work. The term manual training does not include kindergarten work, laboratory work in science, and illustrative teaching on the one hand, or the teaching of trades on the other.

Origin and Development.—At the time when tool-work and practical drafting were first introduced into a scheme for general education, trade schools, where the use of certain tools and mechanical processes were taught, were numerous in every country in Europe. The aim was in every case a particular trade, the methods were only those of a trade, and the result was craftsmen of a particular trade, whether hatters, weavers, basket-makers, locksmiths, machinists, etc. Similarly, on the other side, there were in every civilized land professional schools where drafting was taught, and where more or less tool-work was incorporated into the curriculum of engineers and occasionally of architects. All such training was regarded as "special" in both the higher and the lower grades. This was the state of things till 1876. It is true that in every country there were educators who claimed a general value for tool-training and for drafting, and that occasionally young men learned trades and even professions, not for the purpose of following them, but for the general value their discipline afforded. Moreover, an exceedingly important step forward had been taken in Russia by Victor Della Vos, director of the Imperial Technical School for Government engineers at St. Petersburg, as early as 1868. Possibly he got his idea from Uno Cygnæus, in Finland, where certain elementary work had been introduced into the lower schools as early as 1866. His improvement consisted in the discovery of the true scientific method of tool-instruction. Previously boys had learned trades by working at them, beginning with coarse work requiring no skill, taking their chances as occasion offered for learning new processes and the proper use of tools, with no systematic instruction or logical sequence of steps. Della Vos conceived the plan of first teaching the elements of a certain kind of tool-work systematically, by means of models and drawings and practice exercises, before any attempt should be made at the execution of trade work. His motto was "instruction before construction," as reported by Prof. J. D. Runkle, of Boston, who made a full report upon the Russian exhibit at the Centennial Exposition at Philadelphia in 1876. The discovery of Della Vos started a revolution in tool-instruction which is still going on. Its value consisted not so much in his analysis and in the special exercises he employed as in the principle that every tool, every process, and every material should be analyzed, and that the elements should be presented and mastered in order according to scientific principles.

Sloyd.—Thus far no mention has been made of Sweden's contribution to the origin of manual training, the *sloyd* (Swed. *slöjd*, skill, dexterity) system. This has been partly because in point of fact manual training was firmly established in the U. S. with no aid from Sweden, and partly because *sloyd* as it exists to-day is more the product of non-Swedish than Swedish thought and experience. In the beginning *sloyd* was essentially trade-work in the elementary schools. Gradually its general value was recognized, and a series of whittling exercises was evolved, each one of which led to an article of use in the pupil's home. A series of flower-sticks, handles, wooden spoons, etc., from twenty to a hundred, afforded opportunity to become skillful with certain tools and to secure considerable mental and moral discipline; but the system lacked both breadth and variety. In 1876 very few tools were used; no joints, the essential parts in constructive work, were taught, or very few; and no drawings were made or used by the pupils, but everything was made from models by comparison.

Since 1876 Otto Solomon, the director of the Normal School at Naas, has made great progress in developing genuine manual training. The number of tools has been greatly increased, the scope of exercises has been extended, and exact drawings have been introduced; for elementary classes this leaves little to be desired. The idea of use in every finished exercise is still retained, but the order in which elements are taken up and the care with which all details are attended to render the sacrifice of ideals to uses so small as to be scarcely worthy of attention. The fact that individual instruction is still in vogue in the best Swedish schools is by no means a necessary one, for the class method is entirely applicable. It is thus evident that by 1876 the time was ripe for a manual-training school.

The general method of tool instruction seemed to have been found, and there was a growing feeling in the public mind that education should touch practical life at more points; that a general acquaintance with the materials used in the arts and the tools and processes employed in industrial life was worth the getting. What was now necessary was that suitable tools and materials should be selected; that they should be classified into separate shops or laboratories; that all the elements of pencil, pen, and brush work which enter into the most elaborate drawings of constructive work should be progressively arranged; that this drawing and tool-work should be incorporated into a curriculum of science, mathematics, and language in such a way that neither feature should seem to be subordinate; and then, most difficult of all, that the community or individuals should be persuaded to furnish the money to establish and maintain such a school. This work was undertaken simultaneously in the Massachusetts Institute of Technology and at Washington University, St. Louis, in connection with high-grade technical schools. Prof. Runkle in Boston organized in 1877, in connection with the institute, a school for special students in the mechanic arts. In St. Louis, where all engineering students had had some shop-work for several years, three shops were organized in 1877, and an appeal was made for a manual-training school of secondary grade.

Encouraged by the success of summer classes of younger pupils and a class of some twenty boys from a preparatory school, as well as by the reports from apprentice schools in Paris and elsewhere, the St. Louis Manual-training School was established in the spring of 1879. Money for ground, building, equipment, and support was subscribed, and the school was opened the following year, Sept., 1880. Various experiments had been made with whittling-schools, and temporary classes in Massachusetts and elsewhere, as well as in St. Louis, previously to the establishment of this school, but no properly called manual-training school, in which a broad range of shop-work and a thorough course in drafting were required of every pupil, and where the object of the course was neither a trade nor a profession, but a general education, had ever been organized before.

Success of Manual-training Schools.—The St. Louis school has continued with increasing popularity and success. The building was enlarged in 1882, but is still far too small for the demand. The records of the graduates are a standing recommendation of manual training. The general desire to know what becomes of the graduates has led to the publication of *The Record of Alumni* of the St. Louis school.

The success of the St. Louis school quickly attracted the attention of educators, and papers were read at Saratoga before the National Education Association in 1882 and 1883, and afterward published in *The Popular Science Monthly*, giving the full theory and method and apparent results of the school. Interest was quickened in every quarter, and almost simultaneously manual-training schools were organized in Chicago, Baltimore, Toledo (in 1884), and Philadelphia (in 1885). In Chicago and Toledo the expense was borne by individuals or private corporations, as had been done in St. Louis; in Baltimore and Philadelphia the schools were integral parts of the systems of free public schools. All these schools have been successful beyond the most sanguine expectations. The Chicago school has been enlarged and supplemented by a manual-training high school, supported by the city. The Baltimore school has upward of 500 pupils, while Philadelphia has two manual-training high schools, and is planning for a third.

Since 1885 manual-training schools and manual-training courses in existing high schools have multiplied. Manual training is an integral part of the curriculum in every agricultural and mechanical college in the U. S. These colleges

include secondary instruction in connection with the manual training, and as the students are less intent upon trade and professional life than students in classical colleges, they may with propriety be said to take manual training as a feature in their education. There were seventy exhibits of shop-work and drawing in the Liberal Arts Building at Chicago, not counting the numerous Roman Catholic and foreign schools, and many schools (probably as many more) are known to have sent no exhibits.

The most remarkable manual-training high schools of recent organization are those of Louisville, Providence, Denver, Boston, the Drexel Institute of Philadelphia, Armour Institute of Chicago, and the still unfinished Teachers' College of New York city.

The Curriculum.—There is great uniformity in the curricula and methods of the regular manual-training schools. The conditions of admission are usually the same as for other secondary schools, i. e. the completion of eight years of primary and grammar school-work, making the minimum age of admission about fourteen years. The length of the course varies from three to four years. The curriculum generally includes parallel courses in—

I. *Mathematics.*—Algebra, geometry (plane and solid) trigonometry, and astronomy or mechanics.

II. *Science.*—Botany, chemistry (with laboratory practice), physics (with laboratory practice), geology, and some branch of biology.

III. *Language and Literature.*—Composition, rhetoric, history, civics, standard authors, with opportunities in some schools for French, German, and Latin. In some schools manual training enters largely into the classical courses.

IV. *Drawing.*—Free-hand (from objects); projections and sections, design (sometimes with clay modeling), lettering; instrumental lining, details, intersections, developments, isometrics, tinting, graining, shadows and shading, tracing, and perspective.

V. *Tool-work.*—Joinery, wood-carving, wood-turning, pattern-making, molding, casting (generally in plaster), forging iron and steel, brazing and soldering, chipping, filing, turning, planing, drilling, fitting and finishing metal-work.

The order of subjects differs slightly in different schools, but there is a substantial agreement. It is evident that the combination of IV. and V. makes the manual-training school unlike any other school and justifies the name. I., II., and III. are taken for granted in a manual-training school, just as mathematics, science, and modern languages are taken for granted in a "Latin school." The daily programme generally assigns two periods to shop-work, one to drawing, and one each to mathematics, science, and language. In all regular manual-training schools all departments are in full operation at all hours of the school day.

Method of Instruction.—Class instruction is given in the shops and drawing-room as well as in other subjects, and a series of extra exercises is drawn upon to meet the wants of rapid and skillful workers. The instruction is similar to a science lecture. Pupils must be seated so that they can both see and hear. The teacher explains the purpose of each exercise, what new steps are to be taken, what new tools or new uses of old tools are required, and illustrates all by actual work before his pupils. This full general instruction is supplemented later by such repetitions to individuals as may be necessary. The maximum sizes of working divisions in charge of a single teacher vary from thirty in wood-work to eighteen or twenty in metal-work. Experience does not seem to approve the plan of two instructors for one large class; it is better to divide the class. In drawing, instruction may be given to a large class and assistants may supervise the work in progress. In elementary shop-work in the Boston grammar schools the usual size of a working division is thirty, and instruction or demonstration has been given to classes of sixty.

Shop exercises are always made from drawings, usually made by the pupils themselves. The forms of the exercises or models for the shop and drawing-room vary in different schools, but the aim is substantially the same—viz., to embody in logical order, and without unnecessary repetition, all typical forms and processes, and to develop all the functions of the tools and instruments. Although these considerations are based on the nature of tools and materials and not particularly on the nature of the mental and physical powers of the pupils, the result gives general satisfaction.

Manual Training in the Grammar Grades.—No sooner was the highly educational character of manual training recognized than came the imperative demand for a manual training for the lower grades. It was argued, if manual training invigorates the mind, assists in the formation of habits of close observation and precise execution in secondary schools where the number of pupils is small, how important it is that it should be introduced in the grammar (some said in the primary) grades where the number of pupils is very great. The answer to this argument was twofold: secondary education was to be made so attractive and withal so valuable by means of manual training that pupils were to be drawn in increasing numbers to secondary schools; and, secondly, any attempt to engraft regular shop-work like that already described upon the grammar schools would partially fail. Nevertheless, the demand did not cease, and scores of people in all parts of the U. S. entered upon the work of devising exercises and specifying the appliances for elementary tool-work. It is needless to say that a large majority of such attempts have failed. The most conspicuous cause for failure has been the unwise effort to encourage the factory idea of producing articles of immediate value. The unwisdom of such efforts is easily shown. First, immediate utility is not sought for in other branches, such as arithmetic, penmanship, music, and science; the object in all such is to master fundamental principles and processes. The pre-eminent value of such training should never be jeopardized by the trifling value of a concrete product. Second, in the construction of a useful article as an educational exercise the attention which ought to be given to the mastering of details is absorbed by one's interest in the efficiency of the article or machine itself. Many a boy has been encouraged to construct a steam-engine with entire disregard (because he is entirely ignorant) of the proper treatment of joints, bearings, and fittings, and been flattered by unreasonable praise because "the machine would go."

The educational exhibit at the Columbian Exposition at Chicago contained several admirable representations of courses in elementary woodwork and specifications as to methods and appliances. Contributions from New York and Boston deserve special mention. It is safe to say that the problem of elementary manual training has been substantially solved, and that to this solution ideas from the Swedish *sloyd* have contributed much, though by no means the whole. For the Boston systems which have been subjected to the test of actual school use for two or three years, the reader is referred to the *Annual Report* of the school committee of Boston for 1892.

Needlework is often spoken of as a species of manual training, though it would seem to involve the mastering of no tools properly so called, and has no occasion for the construction of exact drawings. Needlework has been very thoroughly developed in the public schools of Boston and Philadelphia. Cooking has been extensively taught in connection with the grammar schools of Boston through the liberality of two ladies. The *Report* already mentioned speaks of "fourteen cooking-schools attended by public-school pupils." Many high schools and academies and regular manual-training schools have introduced light wood-work, drafting, sewing and fitting, and the elements of cooking into the training of young women. One of the most successful of these, as well as one of the earliest, is the Scott Manual-training School of Toledo. Much remains to be done before the elements of cooking can be so presented as to harmonize with the scientific method of teaching. The nature of the materials and the list of fundamental processes must be studied thoroughly before edible products are thought of.

Objections.—As would be expected, manual training has not gained its present foothold without a struggle. It was resisted at every step by several classes of people: first, by those who were unwilling to admit that the old system of schooling lacked any essential feature of an all-round education, and who believed that whether for mental or moral discipline, or as a preparation for the duties of life, it was sufficient. Second, others feared that the effect of the introduction of tool-work would be to dwarf and narrow the mind and to corrupt and lower the aims and ambitions of pupils. Third, not a few of the teachers, particularly those who were in charge of schools, felt that new and unfamiliar subjects were claiming admission as school subjects, which would at once place former teachers at a disadvantage. Ignorant, for the most part, of what manual training was and of what it aimed at, they opposed it naturally, and inevitably misrepresented it. It has fairly met and overcome all opposition. It has been abundantly shown that manual training has great educational and moral value. Testimony on this point lies all around us. Instead of lowering aims, it has saved many

a discouraged boy and lifted whole classes to a higher appreciation of life and its duties, and to a purer and more manly ambition. Now that teachers are trained in the theories and methods of correct manual training, selfish opposition is no longer to be anticipated. The high quality of its intellectual discipline, the wholesome effect upon habits, tastes, and aims, and its marked efficiency as a preparation for the duties and responsibilities of life—all these have again and again in many places been so clearly demonstrated that they are no longer to be denied. Though only a part of elementary and secondary education, manual training is destined to be recognized in every community as something that should enter into the education of every boy and girl. Among those not already mentioned who have, in their several centers, aroused interest and organized effort in the direction of manual-training work are Dr. Felix Adler, of New York; President James McAlister, of Philadelphia; and Col. Augustus Jacobson, of Chicago. In like manner the movement for manual training in England owes much to the leadership of Sir Philip Magnus, Lord Playfair, and William Mather, M. P. The literature of manual training is largely unwritten. Labor commissioners, State and national, have prepared extensive reports upon the theory and the practice of manual training, and the reports of the U. S. commissioners of education contain valuable statistics and discussions. Aside from these a few books have been published on the general theory or its details. The principal ones are *Manual Training*, by Charles H. Ham (New York); *How to Use Wood-working Tools* (Boston); *The Manual-training School*, by C. M. Woodward (Boston); *First Lessons in Metal-work*, by Prof. A. G. Compton (New York); *Tool-work*, by Prof. Goss, of Perdue University, Lafayette, Ind.; *Manual Training in Education*, by C. M. Woodward (London and New York). Very valuable papers on this subject have been published by Dr. Nicholas M. Butler, at one time president of the Teachers' College, New York city.

C. M. Woodward.

Manucode: a name for certain birds of paradise of the genera *Phonygama* and *Manucodia*. They are 15 to 18 inches in length, of a beautiful steel blue, and have the third and fourth toes united for some distance. The name was adopted by the English from the French, by whom it was used as an abbreviation of the Latin *Manucodiata*, this in turn being a Latinization of the Malay *manukdewata*—bird of the gods. Intended originally for the king bird of paradise and its allies, it was for 200 years applied to any bird of paradise, and is now bestowed upon species whose place in the family *Paradiseidæ* has been questioned.

F. A. Lucas.

Manuel, Juan, Don (Infante de España): prince and writer; b. at Escalona, Spain, May 5, 1282; d. in 1349. He was a nephew of Alfonso X. (*q. v.*) and a cousin of Sancho IV., by the latter of whom he was educated and admitted to great intimacy. His public life was a restless and turbulent one. Before he was thirty he had attained the highest offices in the state; and when Ferdinand IV. died, in 1312, leaving his son Alfonso XI., only thirteen months old, he was a prominent figure in the troubles that ensued. In 1320 he became joint regent of Spain, and managed affairs skillfully in the interests of the young monarch. The latter, however, when he came of age, showed little gratitude, and as a result Don Juan undertook to vindicate his position by arms. Alfonso yielded and made promises, which in 1327 he broke. This time Don Juan actually rebelled, and carried on war with the king till 1335, when the latter was completely victorious. The ideas of the time were such, however, that the beaten infante was able to return to the king's service, and even became commander-in-chief against the Moors, over whom he continued to win victories almost up to the moment of his death. The chief claim of Don Juan Manuel to remembrance comes not from his public career, but from the fact that he was one of the first and one of the best of Spanish prose-writers. Despite the agitations of his life, he wrote in a style of singular simplicity and charm; and few Spanish authors have succeeded so well in giving to their words the calmness, the weight, the richness which come only from long experience and reflection, and which we find everywhere in him. Two lists of his works drawn up by himself have come down to us, but they do not coincide, nor does either correspond exactly with the works themselves as we have them. In his edition in vol. li. of Rivadeneyra's *Bibtioteca de Autores Españoles* (Madrid, 1884), D. Pascual de Gayangos prints the following: *Libro det cabattero y del escudero*; *Tractado sobre las armas de su familia*; *Libro de castigos ó consejos para su hijo*; *De las maneras del amor*; *Libro de los Estados*; *Libro de los Frailes predicadores*; *Libro de Patronio* (more commonly known as *El Conde Lucanor*); *Tractado en que se prueba . . . que Sancta María está en cuerpo y alma en Paraiso.* Besides these we have *El libro de la Caza* (ed. by G. Baist, Halle, 1880). There exist also in manuscript, in the Biblioteca Nacionál at Madrid, two chronicles (a longer and a shorter) which have never been printed. The titles of several other works are preserved, but the works themselves have not yet been found. Of all the above, the *Conde Lucanor* has been by far the most popular, and is the most interesting. It is essentially a collection of tales (fifty in number) intended for edification, after the Oriental fashion. The model was probably the *Disciplina Clericalis* of Petrus Alphonsus (see Exempla-books), a collection of stories in Latin made some two centuries earlier. The Oriental influence is strong in both, though Manuel by no means confines himself to such material. Several of the latter's tales are models of brief and witty narration. The *Conde Lucanor* was printed first by Argote de Molina (Seville, 1575; later at Madrid, 1643). Of modern editions we have that of A. Keller (Stuttgart, 1839), that in the *Tesoro de Autores ilustres* (Barcelona, 1853), and that of Gayangos cited above. There is a German translation by J. von Eichendorff (Berlin, 1840, with Eng. trans. about 1886); a French by A. de Puibusque (with *Life*, Paris, 1854); and an English by James York, London, 1868; new ed. 1888)). See G. Baist, *Atter u. Textüberlieferung der Schriften D. Juan Manuels* (Halle, 1881).

A. R. Marsh.

Manuel I., Comnenus: Byzantine emperor; b. in 1122; succeeded his father, John II., in 1143. As he was surrounded by powerful and restless enemies, his reign was a succession of campaigns against Geisa II., of Hungary, the Servians, Roger of Sicily, the Egyptians, Raymond of Antioch, and the Seldjuk Turks. A valiant and sagacious soldier, generally successful in battle, he was an unscrupulous and oppressive sovereign. At Myriocephalus, in Pisidia, he suffered a terrible defeat from the Turks, over whom he afterward gained some successes, but a profound melancholy took possession of him; he abdicated and became a monk. He died in 1180.

E. A. Grosvenor.

Manuel II., Palæologus: Byzantine emperor; b. in 1348; succeeded his father, John V., in 1391. Little was left for him to rule over. The Byzantine empire had never recovered from its conquest by the Latin crusaders, and, though it had been restored by the Greeks, comprised at the close of the fourteenth century hardly anything more than Constantinople. The Ottoman power was rapidly extending. Baïezid I. had forced the timorous John V. to give him Manuel as a hostage, but on his father's death Manuel escaped from the Ottoman camp and was crowned. He made a journey (1400–02) to Italy, France, and England to entreat help against the Ottomans, but everywhere in vain. Soon after his return Constantinople was besieged by Baïezid; its capture seemed imminent, when the sudden invasion of Asia Minor by Tamerlane called off the besiegers. It was again attacked in 1423 by Mourad II., when cannon were used for the first time in siege, but was heroically and successfully defended by Manuel. Although Manuel was brave, generous, eloquent, intelligent, and patriotic, he had to contend all his life against desperate odds. It was impossible to resuscitate his empire, but he did his utmost in delaying its fall. D. in 1425.

E. A. Grosvenor.

Manure [from O. Fr. *manuvrer*, to cultivate by hand > Fr. *manœuvrer*; Lat. *manus*, hand + *opera*, work]: in the broadest sense, any substance applied to the soil for the purpose of increasing its fertility; in the narrower, ordinary use of the term, the excrements of farm animals, either mixed or unmixed with straw or other absorbents. The quantity, as well as the quality, produced per year and per 1,000 lb. of live weight of the various kinds of animals is extremely variable. The weight of the voidings of cows fed on succulent foods exclusively is equal to three-fourths the weight of the food consumed, while the voidings of animals which are fed on dry matter exceed the weight of the food two to three times.

Boussingault gives the following averages of manure production:

Yearly voidings of a horse	(900 lb.)	solids and liquids	$7\frac{1}{2}$	tons.
"	"	" cow	(1,460 ")	"	"	4	"
"	"	" sheep	(135 ")	"	"	$\frac{3}{5}$	"
"	"	" pig	(135 ")	"	"	$1\frac{1}{2}$	"

Extended experiments at the Cornell University agricultural experiment station gave the following results per day, per 1,000 lb. of live weight:

Sheep	34·1	lb.
Calves	67·8	"
Pigs	83·6	"
Cows	74·1	"
Horses	48·8	"
Fowls	39·68	"

Animals fed on a highly nitrogenous or narrow ration (as 1 : 4), as were the pigs at the Cornell station, consume large quantities of water and produce a large amount of manure, while those fed on a carbonaceous or wide ration (as 1 : 9) consume comparatively little water and produce less.

Some of the general conditions affecting the production of manure may be stated as follows. The value of manure produced by animals is from 30 to 50 per cent. of the cost of the food they consume. Young animals produce poorer manure than mature ones. The excrements of animals which give a product, as milk or young, are poorer than those from non-productive animals. The more abundant the ration used, the less complete will be the digestion and the greater the value of the manure produced. Concentrated and nitrogenous foods result in richer excrements than unconcentrated or carbonaceous foods. High salting and excessively succulent foods lower the value of the manure. The amount and kind of bedding affect not only the quantity but the value per ton very considerably. Animals kept in cold quarters drink little water, digest their food closely, and make a manure small in amount and poor in quality.

Value of Manures.—Rich manures are relatively more valuable per unit of contained fertility than poor ones, because the plant-food they contain is more readily soluble, hence more available for the young plant, which is benefited far more by extra nourishment in early than in later growth. Coarse, low-grade manures are often weathered or rotted, in order to improve their quality and solubility, though some loss of plant-food may occur. As a rule, a unit of plant-food in high-grade fertilizers or manures is worth more than one in low grades; if the quality of manure has been reduced by neglect, the value of each unit of fertility left is decreased.

VALUE PER TON.*

Kind of manure.	Value per ton.
Sheep	$3.30
Calves	2.17
Pigs	3.29
Cows	2.02
Horses	2.21

VALUE PER YEAR PER 1,000 LB. LIVE WEIGHT OF ANIMAL.

Kind of animal.	Value per year.
Fowls	$51.10
Sheep	26.09
Calves	24.45
Pigs	60.88
Cows	29.27
Horses	27.74

Waste of manure occurs from allowing it to be scattered over by-places and around the outer edges of large yards; from heating, which dissipates the nitrogenous compounds in the form of ammonia. Manures which have been broken down by heating may have parted with so large an amount of water that the value per ton may have been increased, though the total amount of plant-food may have been greatly diminished. When manures are exposed in the open yards or heaped out under the eaves of the building, their values are greatly reduced. In the northern and central parts of the U. S. the rainfall exceeds 30 inches per annum. Many of the modern barns cover a quarter of an acre of ground, and the barn-yards twice as much. An inch of rainfall means 100 tons of water upon each acre; 30 inches means 3,000 tons per acre, or 750 tons from the eaves of the farm buildings, and 1,500 tons on the open barn-yards per year. Experience shows the common and wasteful practice of heaping manures. The loss of manure exposed to heavy rains for any length of time is usually very great, the only exception being where they are too dry, as occurs sometimes where bedding is liberally supplied.

*Nitrogen is computed at 15, phosphoric acid 6, and potash at 4½ cents per pound respectively. The value of the manure produced per year is based on the value determined for the winter months. The amount and value of manure produced by pigs, given in the table, is at least a third larger than the usual average.

The average rainfall at Ithaca, N. Y., for six months, April to September, is 19·3 inches for 1882–94. The loss of value in manures exposed at Ithaca, in loose heaps of from 2 to 10 tons, during the six months was as follows:

1889, horse-manure	42	per cent.
1890, "	62	"
1890, cow-manure	30	"
1889, mixed compacted	9	"

Kainit, gypsum, dry earth, and salt are all used to prevent wasting of manures in the stable and when heaped. If they are spread as soon as made, upon land occupied by plants, little loss of fertility is sustained. If not immediately applied, manures should be kept under cover or in deep compacted heaps.

Uses of Manure.—Manures are used to furnish plant-food, to improve the physical condition of the soil, and to conserve and increase heat and moisture. From 10 to 40 tons of manure is usually applied per acre, by machine or by hand. Too liberal an application is wasteful, unless, as in early gardening, the object is to warm the soil and force the plants ahead of the season. Ten to twenty times as much food is sometimes given to plants as they can use.

Five tons of average barn manure contain: Nitrogen, 60 lb.; phosphate, 30 lb.; potash, 47 lb.

Twenty-five bush. of wheat with straw contain: Nitrogen, 45 lb.; phosphoric acid, 18 lb.; potash, 27 lb.

In general farming, economy requires that such culture be given that the plant can obtain more than one-half of its food directly from the soil without the aid of manures. The first crop recovers not more than half of the plant-food contained in a moderate application of them. Barn manures are relatively poor in mineral matters and rich in nitrogenous compounds; therefore they should be used in connection with potash and phosphoric acid. The plant-food contained in farm manures is less valuable by about one-third than that contained in high-grade fertilizers, because it is not so available. If considerable benefit is received from the physical action of the manures in addition to that realized from the plant-food they contain, then their value would probably equal that given in the above tables. Farm manures should be spread thinly in the autumn on the surface where plants are growing, thus following nature's modes of action. See FERTILIZERS. I. P. ROBERTS.

Manuscript [from Lat. *manuscriptum*, liter., a thing written by hand; *ma'nus*, hand + *scrip'tus*, perf. partic. of *scri'bere*, write; abbreviated MS., pl. MSS.]: any writing, usually a written book or document. Manuscripts are distinguished, on the one hand, from inscriptions, on the other, from printed books.

The oldest MSS. left us are Egyptian, and date from 2,500 years or more B. C. They are written in characters already alphabetic, with reed and ink, on papyrus. This substance, the standard writing material of antiquity and the prototype of our modern paper, was made from a rush (the *Cyperus papyrus* of Linnæus), then abundant throughout Egypt, as still in the upper Nile, by slitting its stem lengthwise into strips, placing one layer of these transversely over another, and pasting, hammering, and pressing the two into union and smoothness. Other materials—the leaves and bark of trees, tablets of wood or ivory, pottery, skins, linen cloth, sheets of lead—were in early use for writing, and have left us memorials in such familiar words as "library," "code," and "book"; but from Egypt the use of the more convenient papyrus spread, like the alphabet itself, to the other Mediterranean lands. One form of book, however, besides the papyrus MS., remained in use throughout the classical time, and indeed almost to modern days—the waxed tablet. It consisted of two, three, or more leaves of wood, joined at one edge like the leaves of a modern book, and held by rings serving as hinges. Each leaf had a raised margin, like a child's slate at the present day, and the sunken center was covered with wax, on which one wrote with a metal *stylus*, whose other end was flattened or rounded for rubbing out the writing by smoothing the wax. It was this form of book, used not only for memoranda and letters, but for accounts and legal documents, which was known as *codex* and which lent both form and name to the mediæval MS., the parent of the modern book. In antiquity the more common form, though even for the brittle papyrus the codex was not unknown, was that of the roll—*volumen*. The sheets of papyrus were pasted together, end to end, to any desired length, the

width of the roll varying from 6 inches, in the earliest times, to 10 or 15 in the later. In Roman times one end of the roll was affixed to a wooden or ivory roller, which thus became the core of the roll. A label bearing the title of the book was attached to the outside of the rolled-up MS.; and it was usual to provide the whole with a vellum case, often gayly colored. The lines of the writing ran not crosswise of the roll, but lengthwise, in narrow columns, exposed one by one, like pages, as one unrolled the MS. The right side of the MS., therefore, was that where the fiber of the papyrus ran lengthwise of the roll, guiding the pen of the scribe and making ruled lines unnecessary. At Alexandria under the Ptolemies, where book-making for commerce was first thoroughly systematized, and later at Rome and at Athens, the production of MSS. was carried on upon a large scale, trained slaves being employed by hundreds as copyists, correctors, and binders, and editions of 500 or 1,000 copies produced. From very early times, besides papyrus, skins were in use, even in Egypt, as a writing material; but not till the second century B. C. did the increasing demand for books and the competition of Pergamos with Alexandria as a literary center lead to such improvement in their preparation that they could rival papyrus. And it was yet several centuries before this "Pergamos paper," *carta Pergamena*, our *parchment*, as it was called from the town whence it came, became with the decline of Mediterranean commerce the usual material for MSS. throughout Europe. Papyrus did not disappear entirely indeed till in the twelfth century the cheaper *paper*, whose manufacture was then creeping westward from the Orient, crowded it from use and inherited its name. With the advent of parchment (or *vellum*, as it is indifferently called), the codex, or tablet, form of MS. gradually supplanted the roll.

The ordinary pen of the ancients was the reed, though metal pens were not unknown. The quill is first mentioned in the sixth century A. D., but from that time became the exclusive implement in the West. Ink has been much the same since the earliest times, that of the ancients deriving its black usually from soot, while in the Middle Ages gall-nuts were more often used. Colored inks were also early in use, and the custom of illuminating MSS.—i. e. of adorning them with variegated letters or with pictures—was known to the ancients, and never passed from use till its culmination in beauty in the closing centuries of the Middle Ages. It is from the favorite red (*rubrica*, *minium*), beloved both for head-lines and for initials, that we get our words *rubric* and *miniature*. See ILLUMINATED MANUSCRIPTS.

Introduced into the monasteries by Cassiodorius in the sixth century and adopted by the early Benedictines, the production of MSS. found there for ages its chief home. The Irish monks and their Northumbrian disciples had independently turned to the same form of activity, and with a zeal that outran that of the Continent. When the two impulses met in the convent schools of Charles the Great his vigorous encouragement gave to the work of transcription an impetus that never died out. Throughout western Christendom every abbey had its *scriptorium* or writing-room, and the copying of books was counted one of the most meritorious of monkish tasks, profitable for this world and for the next: but in the thirteenth century, with the rise of the universities, there grew up again a body of lay copyists, into whose hands the making and sale of MSS. gradually passed. It was not till nearly a century after the invention of printing that the work of these professional scribes ceased to compete with the cheaper but coarser products of the press. The scarcity and cost of parchment led often to the erasure of a writing with sponge, pumice-stone, or knife, and the use of the sheet for a fresh writing. Such rewritten MSS. are *palimpsests*. (See PALIMPSEST.) The science which treats of the decipherment of MSS. is palæography, the older name of diplomatics being now restricted to the science which verifies and interprets documents (diplomas). The best study on the book-making of the ancients is Birt's *Das antike Buchwesen*; on the work of the mediæval scribes, the exhaustive monograph of Wattenbach, *Das Schriftwesen im Mittelalter*. In English, not to mention older works, may be named Middleton's *Illuminated Manuscripts*; Madan's *Books in Manuscript*; Putnam's *Authors and their Public in Ancient Times*; and in French, Molinier's *Les Manuscrits et les Miniatures*. See also the works cited in PALÆOGRAPHY, especially Thompson's *Handbook*. See BIBLIOGRAPHY, BOOK, and PALÆOGRAPHY.

GEORGE L. BURR.

Manu'tius (Manuzio, Manuzzi, Manucci), ALDUS: head of a family of printers of the Renaissance period: b. at Sermonetta, in the territory of Bassano, Italy, in 1449 or 1450; studied in Ferrara and Rome; was for a time tutor in several ducal families of Italy; learned Greek in Verona under the celebrated Guarini; and in 1488 established a printing-house in Venice, from which issued no fewer than twenty-eight so-called *editiones principes* of classical authors, to all of which he wrote elaborate introductions. The first book ever printed in Greek letters issued from his press (1494). He also substituted for the then current Gothic or monk's type a new one, the so-called Cursive, more familiar to us under the name of Italics, which was first used in the edition of Vergil (1501), some credit for the successful innovation being also due to his skillful engraver, Francesco of Bologna. He died of wounds inflicted by an assassin Feb. 6, 1515. See Schück, *Aldus Manutius und seine Zeitgenossen* (Berlin, 1862); F. Didot, *Alde Manuce et l'Hellénisme à Venise* (Paris, 1875); Renouard, *Annales de l'imprimerie des Aldes* (3d ed. Paris, 1834).—PAULUS, son of the former, b. June 12, 1512, took charge of his father's printing establishment in 1533. D. Apr. 6, 1574. He is best known for his editions of the Church fathers and of the complete works of Cicero, as well as for numerous learned commentaries to that author.—ALDUS the younger, son of Paulus, b. Feb. 13, 1547, taught the classical languages for a time; then took up his father's business, but as he was more of a scholar than a practical printer, the famous house fell into decay after 908 editions of Greek, Roman, and Italian classics had gone forth from its presses. D. as the head of the Typographia Vaticana in Rome, Oct. 27, 1597. The Aldine editions, though at the present day not so highly prized by bibliophiles as formerly, are among the most beautiful specimens of the typographer's art. Their distinguishing mark is an anchor entwined by a dolphin with the motto *Sudavit et alsit* or *Festina lente*.

ALFRED GUDEMAN.

Manx, or **Manks, Language**: the old dialect of the Isle of Man, still spoken by about a quarter of the population. It is a Celtic language, and forms with the Irish and the Gaelic of Scotland the Irish-Gaelic branch of the Celtic family. From these sister dialects it is grammatically not far removed, but as it is written in a different orthography—one derived from the English—it appears in its external form quite distinct. The orthography became established through the most important literary work in the language, the Bible translation of 1771–75. Literary records from an earlier period than the eighth century do not exist. The Manx Society (since 1858) is seeking to rescue as much as possible of the language, which is yielding place to the English. This society has published Kelly's grammar (1859–70) and the *Manx Dictionary* (1866). The Christmas carols called *carrels*, sung on Christmas eve, form the chief constituent of the literature. A general summary of the remnants of Manx is given by Jenner in the *Transactions of the Philological Society of London* (1875). See CELTIC LANGUAGES.

R. THURNEYSEN.

Manzanillo, măn-zaă-neel'yō: principal port of the state of Colima, Mexico; on a bay of the Pacific Ocean; lat. 19° 3′ 14″ S., lon. 104° 19′ 49″ W. (see map of Mexico, ref. 7–F). Population about 2,000. The harbor admits large vessels, and there is an active trade with San Francisco, the principal exports being silver ore and agricultural products. It is united by railway with the city of Colima. H. H. S.

Manzanillo, town in Cuba: See the Appendix.

Manzoni, măn-zō'nĕē, ALESSANDRO, Count: poet and writer; b. at Milan, Italy, Mar. 7, 1785. His mother was Giulia, daughter of the Marquis Cesare Beccaria, author of the famous treatise *Dei delitti e delle pene*. He studied at Merate and Lugano, afterward at Milan and Pavia, at the last of which places he took his degree before he was twenty. In 1805 he went to Paris, where his mother had been living at the house of a friend, Carlo Imbonati. Shortly before Imbonati had died, and Manzoni wrote in his honor his *Versi sciolti* (1806). He found his mother intimate with the circle of Mme. Condorcet at Auteuil, the last group of adherents to the philosophy of the eighteenth century. With these men the young poet also became intimate, and for a time he shared their skeptical opinions. With Fauriel, in particular, he entered upon a friendship that long endured. At this time he wrote his *Urania* (1807). In 1808 he married Enrichetta Blondel, daughter of a Genoese banker and a Protestant. About the same time his opinions in regard to religion

began to change, and he finally came to be a firm Catholic, carrying his wife with him into his new faith. In his *Inni sacri*, written from 1812 to 1822 (1st ed. 1815), he is ardently Christian; and in his *Osservazioni sulla morale cattolica* (1819) he stoutly defends Catholicism against the attacks of the Protestant historian Sismondi. Established at Milan, Manzoni began in 1816 his first tragedy, *Il Conte di Carmagnola*, published at Milan in 1820, and dedicated to Fauriel. This, the first romantic drama in Italian, was received with small favor by the poet's countrymen; but the German Goethe, in an article in the Stuttgart review, *Ueber Kunst und Alterthum*, bestowed upon it and its author the highest praise. On the death of Napoleon in 1821, Manzoni wrote his famous ode, *Il cinque maggio*; and in the same year another almost as famous, *Marzo 1821*. In 1822 appeared a second tragedy, *Adelchi*, whose importance the Italians again failed to recognize at first. It was difficult for persons accustomed to dramatic successes due mainly to style and constructive skill to understand the purpose of an author who was endeavoring to depict the original facts of human emotion and experience—albeit sentimental facts—after the manner of the romanticists. In 1827 appeared the three volumes of the work that most closely associates itself with Manzoni's name, the romance *I Promessi Sposi* (Eng. trans., Bohn's Library, 1883). Though in appearance an historical novel like Scott's, this is really more nearly allied to Werther than to the Waverley novels. The interest is inward, psychologic, sentimental, rather than outward and picturesque. The briefer sequel *La Storia della Colonna infame*, written in 1829, has both an historical and a moral purpose, and is not properly a romance. After the appearance of these works, Manzoni became absorbed in critical and linguistic questions, especially in that always burning one of the true form of the language of Italian prose. Converted to the view that Tuscan is the proper model, he defended it in a series of essays, and in 1840 published a new edition (the third) of *I Promessi Sposi*, rewritten in pure Tuscan. This gave rise to violent discussions, which have not yet ceased. Manzoni's last years were spent at Milan in retirement, devoid of great literary enterprises. He took no active part in the politics of his country, though he sympathized with the efforts to bring about a united Italy. When this had been accomplished, he was made a life senator by the new Government (1860) and given a pension of 12,000 francs. D. at Milan, May 22, 1873. The first collected edition of his works was that with critical notes by N. Tommaseo (6 vols., Florence, 1828–29); and many have been published since, e. g. *Opere Complete* (2 vols., Milan, 1875–81). See also his *Opere inedite e rare*, edited, with a *Life*, by Bonghi (2 vols., Milan, 1883, *seq.*); his *Lettere*, edited by G. Sforza (3 vols., 1882, *seq.*); his *Poesie*, new edition by G. Mestica (1888); his *Scritti vari sulla lingua italiana* (1868); Sauer, *Alessandro Manzoni* (Prague, 1872); A. Stoppani, *I primi anni di A. Manzoni* (1874); de Gubernatis, *Alessandro Manzoni* (1879); C. Cantù, *Alessandro Manzoni: Reminiscenze* (2 vols., 1882); Stampa, *A. Manzoni, la sua famiglia, i suoi amici* (1885); Vismara, *Bibliografia Manzoniana* (Milan, 1875).

A. R. Marsh.

Maoris, maa'ō-reez [native name]: a Polynesian people of New Zealand, numbering (1891) 41,993, probably far less than half the population a century ago. Many of them live in that part of the North island comprising about 10,000 sq. miles, known as the King Country. This district was set apart for their use (1840) by Great Britain. The chiefs, seeing that their authority over the tribes diminished with the advance of European settlement, convened a great tribal gathering (1854), and it was decided that no land should be sold to the Government, that no roads should be made by Europeans within the area, and that a king should be selected to reign over the Maoris. These provisions were all carried out. While the Maoris are still scattered over a considerable part of North and Middle islands, the King Country in the W. of North island is exclusively occupied by them. As late as 1883 it was not considered safe for a white man to travel in their territory, though in that year J. H. Kerry-Nicholls explored the King Country for two months without incurring serious risks. They have now come to live on excellent terms with the white colonists. The Maoris are among the finest of the so-called savage races. Physically they were, when first known, among the finest specimens of the human race. Their half-savage, half-civilized mode of life, however, has caused rapid deterioration. The few tattooed warriors of the old school who are left are much superior, physically and mentally, to the younger natives. They have fallen a prey to some extent to the vices of civilization, and particularly to the immoderate use of tobacco, among both old and young. Formerly the most elaborately and beautifully tattooed of savage peoples, the practice has fallen into almost entire disuse. Their legends with regard to their migration to New Zealand are very detailed. They say that 400 or 500 years ago their fathers reached their present home from the island of Havaiki, which is supposed to be one of the Tonga group. Their physique, language, customs, and legends leave no room for doubt that they are pure Polynesian. Human remains, evidently of Papuan origin, have led to the conclusion that the Maoris were not the aboriginal people of New Zealand, but that they exterminated the people they found there when they took possession of the islands. Cannibalism and polygamy were once common. For further information see *Maori Mementos*, by Sir George Grey, governor of New Zealand (Auckland, 1855); also his *Polynesian Mythology* (London, 1855); *Mythology of the New Zealanders*, in Maori (London, 1854); *On the Native Songs of New Zealand*, by J. A. Davies (appendix to the foregoing); *The New Zealand Government and the Maori War of 1863–64* (London, 1864); *Important Information relative to New Zealand* (Sydney, 1839); *A Summer's Excursion in New Zealand* (London, 1854); *Konga Whakapepeha, etc., or Proverbial and Popular Sayings of the Ancestors of the New Zealand Race*, by Sir George Grey (London, 1857); *The New Zealanders* (London, 1830); *Voyages de M. l'Abbé de Rochon aux Indes Orientales* (Paris, 1783); Marsden's *Visit to New Zealand* (1820); Nicholas, *Voyage to New Zealand*; Kerry-Nicholls, *The King Country* (London, 1884).

C. C. Adams.

Map [from Fr. *mappe* in *mappe-monde*, map of the world < Lat. *map'pa mun'di*, liter., cloth of the world]: a graphic representation on a suitable scale and on a plane surface showing the relative distances and directions between known positions, or an illustration of physical, statistical, and other ascertained facts. If a map refers to the earth's surface and the points are sufficiently numerous, it will define the boundaries of the continents, the location of islands, cities, etc.; the courses of rivers, ranges of mountains, and other features that will depict truthfully the surface in miniature. If it illustrates the celestial sphere or represents statistics of population, commerce, natural history, physical phenomena, etc., it may be called a chart. The line between map and chart is not so clearly defined that it can always be understood, but generally those graphic representations that are plotted on a geographic basis from isolated or independent facts or points, as distinguished from interdependent points forming the outline of a continent, or from statistical data, are called charts, when the geographic basis alone would be designated a map. The representations of hydrographic surveys prepared for the use of the mariner in navigation are also called charts for analogous reasons. "Map" was originally the designation in English of all representations of facts shown graphically; but in modern practice the tendency is to confine the use of the word to representations of the land surface of the earth, and to distinguish illustrations of celestial, statistical, physical, hydrographic, and other classes of ascertained facts as charts. In other tongues, however, the word chart seems to have general application.

Map compilation is an art requiring skill and judgment only acquired through experience, that the map may give due prominence to the salient features in proportion to their importance, without impairing its perspicuity. The publications are issued in various forms that must depend largely on the purposes they are designed to serve. The properties of the projection, the representation of the meridians and parallels that measure geographic distances, is one of the first importance, as upon this projection rests the relative accuracy of the different parts. If form and area are mainly desired, a projection to satisfy these conditions is necessary. It is impossible to roll out the surface of a sphere on a plane, and only small areas of such a large sphere as the earth can be developed without sensible error; the projection tends to minimize the distortion of the parts of the representation, but it is impracticable to develop or represent an area of the earth's surface larger than one square degree without sensible distortion of some of the parts. All maps, therefore, covering such areas as a hemisphere or continent are only conventional representations of area, though

affording precise geographic data for all its parts. See PROJECTION.

The oldest map extant is believed to be a papyrus roll in the Turin Museum, supposed to represent a gold-mining district in Nubia, and which, it is estimated, was drawn about B. C. 1500. Anaximander of Miletus, a scholar of the Greek school of philosophy, who lived from B. C. 611 to 547, is reputed to be the first man who attempted to draw a map of the world. Dicæarchus of Messina, in Sicily, a pupil of Aristotle (B. C. 310), is credited with having drawn a map dividing the then known world into parts. He worked on the assumption that it was one and a half times as large as it was broad, and dividing it into two parts by a straight line made what may be considered the first representation of a parallel of latitude. Eratosthenes, the keeper of the Alexandrian Library, born at Cyrene, B. C. 276, is believed to be the first who tried to measure the magnitude of the earth and to collect into a scientific treatise the scattered information respecting places and continents. He improved on Dicæarchus in his division of the world, by drawing on his map additional lines parallel to the first, and others at right angles to the parallels, dividing the area into sections for convenience of description, but really constructing a primitive projection and practically instituting the system of reference that is still maintained, though of course greatly improved by our knowledge of the size and figure of the earth permitting the sections to represent definite measures. The astronomer Hipparchus of Bithynia (B. C. 150) criticised the work of Eratosthenes, and contended that the map of the world should be constructed from known positions determined astronomically. It does not appear that Hipparchus made any attempt to construct a map on the principle he enunciated; and there is no record that the utility of the method was fully appreciated until the second century of the Christian era when Claudius Ptolemy constructed his series of twenty-six maps, together with a general map of the then known world. Ptolemy's maps were a material advance, and though containing many errors and great exaggerations from an erroneous computation for the length of a degree of longitude, they exhibit more completely the geographic knowledge of the epoch than any other maps of prior or subsequent epochs to the sixteenth century.

In mediæval times the scientific mapping of Ptolemy seems to have been supplanted in Europe by sentimental representations in which the holy city of Jerusalem is made the central point of the world, with all other lands circling around it, and the ocean encompassing the whole on the outer margin. The Hereford map of the world, drawn on vellum by Richard de Haldingham about the end of the thirteenth century is perhaps the best example of this style of construction. The spirit of true geography during this period found a resting-place for a time with the Arabians. The treatises on geography and travels by Abulfeda, Edrisi, Leo Africanus, Ibn Batuta, and others, are still interesting and valuable; but the Arabians were divided into two schools, one advocating the compilation of itineraries describing routes and provinces without reference to geographic positions from astronomical observations, while the other confined the maps to a representation of the positions determined astronomically, ignoring the valuable information that might have been added from the itineraries, with the result that mathematical geography that had received an early place and made some advance was ultimately omitted altogether. Ibn Haukal (976 A. D.) is credited with the declaration that mathematical division only brought confusion into geography.

The Romans had little more than compilations of itineraries, and do not appear at any time to have attempted the scientific methods of construction. The Peutingerian table, of which alleged copies have been preserved, is supposed to have been made about 230 A. D. It is one of the most famous of historical maps, and exhibits the military roads of the empire and the whole world known to the Romans, from Britain to Farther India. Its original form is not well ascertained, but there is strong reason to believe it was either circular or oval, after the usual conception of the earth's boundaries. It can not be fairly called a map, for, though it was doubtless constructed to aid in the political and military administration, for which purpose all their maps seem to have been designed, and shows the names of places and distances between them by the routes of travel, it does not give the bearings or directions between the places. The Italians, however, introduced the compass map in the thirteenth century, marking an approach of the return to scientific map-making developed by the revival of Ptolemy in the sixteenth century. Since then there has been a generous rivalry among civilized nations to improve the methods and obtain the data to construct a map that shall be correct and mathematically true.

In the seventeenth century great strides were made in geography, and the volumes of maps published by private individuals excel in costly elaboration the publications of the present day. Fair examples of this style will be found in the nine folios of the great atlas of Joannes Blaeu, published at Amsterdam about 1560; that of de Wit, also prepared in Amsterdam about thirty years later; and the atlas of Sanson, geographer to the French king, published in three huge folio volumes in Paris between 1690–96. The survey of China, given out in the name of Bre du Halde, was among the most important geographic works published in the early years of the eighteenth century. It was the work of a number of Jesuit missionaries who gained admittance into China about the end of the fifteenth century; this great work was completed in 1718, and still forms the basis for maps of the interior of the empire. It should be mentioned, however, that native Chinese maps of high value existed previously to this Jesuit survey, and that in both China and Japan geography and map-making had made great progress independently of the advance in the science by the Mediterranean and European countries. The Japanese maps of the present day present a still greater advance, and are a mark of the aptitude of this peculiar people.

The improvements in map-making from the inception of the art to the artistic representations of the modern workman are very marked. The greater accuracy and more complete detail obtained in the surveys have exerted a decided influence on the style, especially in the nineteenth century. The first maps were necessarily compiled from itineraries of travelers, and though controlled in a measure by determinations of latitudes, were greatly in error in longitudes, even after the sphericity of the globe was recognized as a fact. The discovery of the magnetic needle and its application to navigation toward the close of the twelfth century marked a great improvement in the reliability of itineraries, and the system of trigonometric surveying introduced in the beginning of the sixteenth century furnished a still more reliable method of controlling distances and directions. In the eighteenth century (1761) the chronometer was invented, affording a ready means for ascertaining differences in longitude, and soon after the reconstruction of the map of the world was begun. Since then the electric telegraph has supplemented the chronometer for longitudes; new methods and improved instruments have simplified astronomical observations; the civilized nations have completed, or have well advanced, detailed surveys of their territories, and obtained the outlines of nearly all accessible regions with an accuracy so far surpassing former efforts that cartographers have experienced a confidence in the permanency of their compilations that has inspired them to publish their work in more artistic form, or when dealing with the detail of more limited areas to devise symbols that would render the representation at once perspicuous and the most useful. The publication of the map of France by the Cassinis in the eighteenth century (1750–93) attracted the attention of all civilized governments. It was the first extended map constructed upon a trigonometric base exemplifying the principles of scientific map-making, and presented the merits of the system so forcibly that the empirical methods formerly in use soon became obsolete.

Near the close of the eighteenth century surveying had been developed into a science, but it is only within the present century the methods of the science have been perfected so that they will permit a rapid and reliable determination of the features of a region for cartographic purposes. The explorer can now maintain an itinerary of his wanderings over the land with the ease the navigator can record the courses he has sailed over the waters of the ocean. The facilities for travel and maintenance of parties in the field are also so vastly superior that, especially within the present generation, exploration has made wonderful strides, and has so reduced the regions of hypothetical or unknown geography that there is left over the whole habitable world an area scarcely larger than the U. S. that has not been explored and mapped with reasonable fullness.

Terrestrial maps may be divided into two general classes, *geographic* and *topographic*; the former representing the salient natural features, as mountains and rivers, the politi-

cal divisions, etc., of a region, generally embracing a large area; and the latter representing the same features with the details thereof in addition, and the cultural details, such as the plans of towns and villages, the roads, farms, etc. Many attempts have been made to classify maps under these two heads by the scale upon which they are drawn; but the greater detail obtained in modern surveys renders a classification by this factor impracticable. It is manifest that to map a region of which we have a very imperfect knowledge, on a large scale, will not supply the detail requisite for a topographical map; and that many regions of comparatively little detail can be mapped with perfect clearness on a much smaller scale than other regions of an equal area but much greater detail. It is therefore preferred to designate all those maps that are generalizations, that show only salient features, as *geographic*, and those that show the actual form and detail as *topographic*—no matter how large the scale. A further division has been made to classify all maps on a scale larger than one ten-thousandth part of nature as *plans*, but this is also objectionable if the information depicted on the map is the criterion; there are drawings, however, sometimes showing topographic detail, that are properly and universally called plans.

The geographic map is usually the base for charts illustrating economic statistics, as population, industries, etc.; the topographic map for natural history and phenomena, especially when the elevation above the sea is an essential in the interpretation of the classifications, as in animal and plant life. Both classes are used in the construction of hydrographic charts, the selection having to depend upon the purpose the hydrographic data is to subserve.

The globe furnishes the fairest information of the relation of the geographic features of the earth's surface, and also of celestial geography; but it is cumbersome, and limits the scale to such a small proportion of nature that its use is necessarily restricted. Globes will usually be found from a few inches to 3 or 4 feet in diameter. The largest ever made was exhibited at the Paris Exposition in 1889. Its diameter was one-millionth part of the diameter of the earth, about 42 feet. Stairways and galleries were constructed to facilitate its examination. A section of a globe on the same scale, representing the U. S. and Territory of Alaska, was exhibited by the U. S. Coast and Geodetic Survey at the World's Fair, Chicago, 1893. It was also so large that a gallery was necessary. It differed from the Paris globe in that it represented the elevations of the surface of the earth above sea-level, illustrating most forcibly the comparative insignificance of the highest mountains.

Relief-maps are a form of illustrating geography that have found much favor. Their construction is laborious, and they are necessarily limited in their application and generally have their greatest value in physiography. As they show the irregularities of the surface they are also instructive to the student of geology, and when made in sections placed side by side, with the various strata colored on their edges to show the dips and formations below the surface in addition to the exposures, they convey a better conception of the earth's structure than any other method.

The undulations of the earth's surface, forming mountains, hills, and valleys, have generally been represented on maps by hachures, or some other shading developed from rays of light falling vertically, or in some instances at an oblique angle. Dufour's grand atlas of Switzerland represents the elevations in hachures, and is one of the finest examples of this system. On geographic maps the system is still very generally followed when mountain ranges or other material elevations are to be shown. Hachuring was also used on topographic maps until the early part of the nineteenth century, when the system of *curves of equal elevation*, or *contours*, as they are generally called, was introduced, and that has since become almost universal in its application. The contour system is the most valuable that has been devised for expressing the relief of the topography. Each contour must be conceived as representing a new shore-line on the supposition that water has risen on the hill-sides a given interval; assuming an interval of 20 feet, a hill of 100 feet height would thus be delineated by five contours; where the slope of the hill-side is gradual the contours would be comparatively far apart, where it is steep they would be close together, the horizontal distance between the contours being variable, depending upon the grade, while the vertical interval is a predetermined fixed quantity. Similarly the forms of ocean beds are brought out by contour lines representing depths of the water. All the great powers of the world have completed, or have well advanced, topographic surveys, based upon precise triangulation, and delineating with greater or less detail the natural and artificial (works of man) features within their boundaries. Unfortunately, the topographic surveys are not all of equal precision; it is very seldom that the features represented by contours are delineated with absolute truthfulness. Generally the topographers only attempt to represent a generalization of the natural forms that will be readily recognized and sufficiently precise to permit identification on the ground of any locality selected on the map; where such surveys have been made they form the basis of all maps, being reduced to the geographic and atlas forms for general information, but retained in forms nearly like the manuscript surveys for detailed information required for governmental, local, and economic purposes.

A small portion only of the world can be mapped with great precision; much the greater part of it, except the bare boundaries, is compiled from itineraries of explorers, military expeditions, reports of governors of provinces, and similar sources. The frequent revision necessary in adding the most recent explorations in the comparatively unknown regions is a constant source of annoyance to map-makers, from which they will not be relieved until the arts of civilization have conquered the whole world. There are few maps covering any considerable area more detailed than the geographic. Maps are published by the cartographers of many nations, and present the art of map-making in many forms; which may excel, it would be invidious to say, but the student will be amply rewarded who examines the more recent publications by the French; they have also produced some of the most artistic and intelligible topographic maps of recent date, combining the system of contours with shading and coloring that is most pleasing to the eye and intelligent expression of form. The ordinance survey of Great Britain has a standard system of representation for the very precise surveys that have been made on the British islands, in which the detail is given with great minuteness on the larger scales, and gradually eliminated by fixed rules through various scales to the geographic map with its bare outlines and salient features only. The Geological Survey of the U. S. has developed a system, by eliminating the detail not considered necessary for the purpose the maps are to subserve, that presents great clearness. The hills are shown by contours without any attempt to emphasize the declivities and accidents of the ground beyond the natural expression of the contours; all verdure is omitted, and only those artificial or cultural details are given that can be considered to have a public or corporate value. Celestial and economic charts are published in a great variety of forms by all civilized nations; the reports of the U. S. census present some of the best statistical charts. The U. S. Coast and Geodetic Survey and the hydrographic office of the U. S. navy publish hydrographic charts of artistic and practical merit. The British Admiralty is the most extensive publisher of nautical charts in the world, but the artistic merits of the sheets are subordinated to their practical usefulness.

An interesting example of the capabilities of modern workmen to reproduce will be found in the collection of old maps recently issued by the Geographical Society of Berlin in commemoration of the four hundredth anniversary of the discovery of America, illustrating that event by the reproduction of maps showing the early discoveries and development of the continental outlines.

Ancient maps on tablets of stone can be seen at Rome, and maps on vellum can be found in many national museums. In modern times the most valuable maps are engraved on copper, sometimes on stone, and those intended to meet only an ephemeral demand are drawn on paper and published by some of the cheap and expeditious methods that have been devised with the intermediary of photography.

HERBERT G. OGDEN.

Mapes, or **Map**, WALTER: archdeacon and poet; b. in England, probably in Herefordshire, about the middle of the twelfth century; studied in Paris; became a noted theologian; a favorite of Henry II., by whom he was sent on missions to the French and papal courts; was canon of St. Paul and of Salisbury, precentor of Lincoln, incumbent of Westbury, Gloucestershire, and Archdeacon of Oxford (1196). D. about 1210. He wrote many Norman-French and Latin poems on festive and romantic topics, as also in prose in both languages, but the authenticity of the poems now attributed to him has been seriously questioned. The

Latin Poems commonly attributed to Walter Mapes were edited by Thomas Wright for the Camden Society in 1841, and the prose work, *De Nugis Curialium*, in 1850.

Revised by H. A. Beers.

Maple [O. Eng. *mapol, mapolder*. Cf. O. H. Germ. *mazzoltra* > Mod. Germ. *massholder*]: a name given to trees of the genus *Acer* and family *Sapindaceæ*; natives of North America, Asia, and Europe. Many of them are noble shade and timber trees. The American species are the following: (1) The sugar-maple (*A. saccharinum*), called also hard or rock maple, and its variety, *nigrum*, the black maple. In Canada and the northern part of the U. S. great quantities of sugar of good quality are made by boiling the sap of this tree. It is a handsome park and forest tree, and is prized as firewood and timber. It is used extensively in making furniture, especially the peculiar forms of the wood called birdseye and curled maple. (2) The white maple or silver maple (*A. dasycarpum*), a fine shade tree; its soft and white wood is not of value as fuel or timber, but is used for making shoemakers' lasts. (3) The red or swamp maple (*A. rubrum*), which shares with the preceding the name of soft maple, the red blossoms of which appear considerably later, but before the leaves. The wood is like that of the silver maple. (4) The striped maple (*A. pennsylvanicum*), sometimes called moosewood, and (5) the mountain maple (*A. spicatum*) are small trees or tall shrubs of little importance, although the former is planted for ornament. Their flowers appear later than the leaves. These are the Atlantic U. S. species. In the Rocky Mountains occur (6) *A. glabrum*, a handsome small tree, and (7) *A. grandidentatum*, of larger size. Finally Oregon and California have two species—(8) the vine maple (*A. circinatum*), a small tree or large shrub which obtained its popular name either from a sarmentose habit which it affects in its native swamps or on low banks of streams, or from the rounded and many-lobed leaves, which may be likened to those of the grapevine; (9) the large-leaved maple (*A. macrophyllum*), a very handsome tree, but never very large; its timber hard and close-grained, and greatly valued in Oregon, this and an ash being the principal hard-wood trees of the region. To the foregoing may be added two species of box-elders now placed in this genus—(10) *A. negundo* of the Eastern U. S. and (11) *A. californicum* of the Pacific slope. The box-elders are often called ash-leaved maples. (See Box-elder.) Of European species, the species commonly planted in the U. S. for shade and ornament are the Norway maple (*A. platanoides*), a round-headed tree with bright green leaves, most like those of sugar-maple, and the sycamore maple (*A. pseudoplatanus*), in England called simply sycamore, known by its large leaves, long and reddish stalks, and the lobes acute and pointed, both hardy trees of rapid growth and good timber. The wood of the latter is much used in Europe for carving.

Revised by Charles E. Bessey.

Mapleson, James Henry: operatic manager; b. in London in 1832. At the age of fourteen he entered the London Royal Academy of Music, where he remained two years. In 1848 he played first violin in the orchestra of Her Majesty's theater in London. In the season of 1849 he went out as a manager into the provinces, having a company which contained among other artists Sontag, Lablache, and Thalberg. He spent some years in England cultivating his voice, but he was attacked by an affection of the throat, and after an operation found that the career of a vocalist would be closed to him. In 1856, after having acted as business agent and manager of several traveling companies, he translated into Italian for Lumley, of Her Majesty's theater, the libretto of Balfe's *Bohemian Girl*. In 1858 he became the recognized director of Italian opera in London at Drury Lane theater. The season of 1860 was prosperous financially, and Mapleson was at this time associated with the lessee of several theaters in London. In 1861 Adelina Patti appeared under Mapleson's management, and he lost £9,000 by the venture. The season of 1862 was spent in labor at Her Majesty's theater. He paid £4,000 as advance rent and another £4,000 as security, and began again. On June 11, 1863, he first produced *Faust* in London. His first tour in the U. S. was made in 1878. He made other visits in 1880, 1881, 1884, and 1885–86. Some of his new productions to English-speaking audiences were *Faust*, *Un Ballo in Maschera*, *Carmen*, *Hamlet*, and *Falstaff*. He wrote *The Mapleson Memoirs* (Chicago, 1888).

B. B. Vallentine.

Maple-sugar: See Sugar.

Maquet, mȧȧ′kā′, Auguste: novelist and playwright; b. in Paris, Sept. 13, 1813; d. Jan. 10, 1887. He was educated at the Collège Charlemagne, where in 1831 he was appointed professor. He turned later to literature, and became *collaborateur* with Alexandre Dumas in some of the latter's most famous novels and their dramatizations—*Les trois Mousquetaires*, *Monte Christo*, *La reine Margot*, *Vingt ans après*, *Les Quarante-cinq*, *etc.* The announcement of this fact in a sensational way by Eugène de Mirecourt in his *Maison Alexandre Dumas et compagnie* (1845) produced one of the worst literary scandals of the period. After his separation from Dumas, Maquet produced a number of novels, most of which he also dramatized—*La belle Gabrielle* (1853), with its continuation, *La maison du baigneur* (1856); *Le comte de Lavernie* (1855); *L'envers et l'endroit* (1858); *La rose blanche* (1859); the fanciful tales *Voyage au pays bleu* (1859). The dramatization of *La maison du baigneur* (1864) was particularly successful, as was also the play *Le Hussard de Bercheny*.

A. R. Marsh.

Maquoketa, ma-kō′kĕeta: city; capital of Jackson co., Ia. (for location of county, see map of Iowa, ref. 4–L); on the Maquoketa river, and the Chi. and N. W. and the Chi., Mil. and St. P. railways; 40 miles N. of Davenport. It is in a timber, grain-growing, and live-stock region; contains the Boardman Library Institute, a national bank with capital of $50,000, 3 private banks, and 4 weekly newspapers; and has manufactories of flour, woolen goods, machinery, and cigars. Pop. (1880) 2,467; (1890) 3,077; (1900) 3,777.

Marabou Stork [Fr. *marabout*]: a large stork (*Leptoptilos marabou* or *crumenifer*) of Western Africa, having a huge bill and an enormous pouch on the neck. This is not, as is commonly supposed, a crop, but is an air sac, and has no connection with the gullet. The marabou is a good scavenger, and is valued for its services. The marabou feathers of commerce are the axillaries (?) and under tail coverts of this bird and of the East Indian adjutant (*L. argala*).

F. A. L.

Marabouts [Arab. *Morābit*, steadfast]: a kind of half priestly caste in the N. W. of Africa, descendants of the Almoravide sovereigns of Spain and Morocco. They profess to exercise miraculous powers, and are greatly revered by the common Mussulmans. They preside in all popular assemblies, and decide intertribal and important questions. Though dependent upon alms, they are very liberally supported. The French in Algeria have many times felt their power. Pilgrimages are made to their tombs and sacrifices and prayers offered. The famous sheik Abd-el-Kader belonged to their number.

E. A. Grosvenor.

Maracaibo, mȧȧ-raȧ-kī′bō: capital and principal city and port of the state of Falcon, Venezuela; on the west side of the passage or strait connecting Lake Maracaibo with the ocean, at the northern end of the lake; lat. 10° 35′ N., lon. 71° 45′ W. (see map of South America, ref. 1–C). It is built on low land, and has a picturesque appearance, due to the numerous cocoanut palms around it; the streets are badly paved and gloomy, owing to the high houses, and the heat is intense, the mean being 83° F. Water is obtained from cisterns, and is often bad. The pleasant suburb of Hatitos, to the S., contains many of the finest residences. Maracaibo is the center of trade not only for the lake towns, but of a large portion of the states of Falcon and Los Andes and of Eastern Colombia. The most important article of export is coffee, most of which goes to the U. S.; other exports are cacao, hides, dyewoods, cattle, cocoanut oil, and drugs. The harbor is good, but as large vessels can not reach this point a railway is projected to Cojoro, a seaport near the Colombian frontier. Alfinger, in 1529, had a slave-trading station at this point. A settlement made in 1568 was destroyed by Corsairs, but it was rebuilt by Pacheco in 1571. The prosperity of the port dates from the destruction of Gibraltar, by the pirate l'Olonais, at the south end of the lake (1668), the commerce of that place finding this new outlet. Maracaibo was long the literary center of Venezuela, and was especially renowned for its Jesuit college. Its inhabitants are still noted for their intelligence, and the place has several educational institutions. Pop. (1889) 34,284.

Herbert H. Smith.

Maracaibo, Gulf of, or Gulf of Venezuela: an inlet of the Caribbean Sea; in the coast of Northwestern Venezuela; between the peninsulas of Paraguaná on the E. and Goajira on the W. At its southern end it receives the outlet of Lake Maracaibo, which lies in the same depression, and is

only separated from it by islands and points of alluvial land. H. H. S.

Maracaibo, Lake: a great sheet of water in Northwestern Venezuela, lying principally within the state of Falcon, but at its southeastern end bordering on Los Andes. Area (according to L. Vincent, 1890), 8,392 sq. miles. Its outlet, opposite the city of Maracaibo, is 8½ miles wide; below it broadens, but 20 miles from Maracaibo is again shut in by several islands, between which it communicates with the Gulf of Maracaibo. Strictly speaking, the so-called lake is a deep gulf, but owing to its narrow entrance and to the numerous small rivers which discharge themselves into it, the water is fresh, becoming brackish or salt in the northern part during high tides or with long-continued northerly winds; ordinarily the effect of the tides is only observable in a slight rise and fall of the waters. The depth in parts reaches 500 feet, but vessels drawing more than 10 feet can not enter, owing to sand-bars in the passages between the above-mentioned islands. Lake Maracaibo occupies an extensive basin which has been partly filled in with alluvium, leaving numerous swamps and small lakes, which communicate with the larger one. The banks are low, in parts of difficult access, owing to the shallows, and about the southern end very unhealthful. Toward the outlet the land is somewhat higher and free from malaria, but the heat in all parts of the basin is very great. Small steamers now ply regularly on the lake. The waters abound in fish. The entrance to the lake was discovered in 1500 by Rodrigo de Bastidas and Juan de la Cosa. They found villages of the Indians built on piles in the shallow water, and, fancifully comparing them with Venice, called the region Venezuela, a name which has been extended to a much larger territory. Indian houses on piles are still found in this region.

HERBERT H. SMITH.

Ma'ragha: town; in the province of Azerbijan, Persia; on the Safi, whose waters are conducted through canals over a large territory and employed for irrigation (see map of Persia and Arabia, ref. 1–F). The raisins of this vicinity are considered the best in Persia. The manufactures of glass are considerable. Close by are the famous Maragha marble-pits, where the marble is cut in slabs so thin that it is nearly transparent. It is much appreciated throughout Persia. This place was the capital of the possessions of Holagoa, grandson of Genghis Khan. It was also the residence of the astronomer Nassiredin of the thirteenth century. He had an observatory here with which he fixed the geographical position in close accordance with modern determinations. Pop. (1885) 13,250.

Revised by M. W. HARRINGTON.

Marais' des Cygnes River [Fr., swans' marsh]: a stream which rises in Wabaunsee co., Kan., flows in a tortuous E. S. E. course, 125 miles to the Missouri line, near Fort Scott, and takes the name of OSAGE RIVER (*q. v.*). It receives numerous streams and drains a fertile region.

Marajó, măă-raă-*zh*ō′ (on old maps sometimes called **Joannes**): a large island of the state of Pará, Brazil; on the southeastern side of the mouth of the Amazon, between that river and the Pará, and separated from the continent on the S. W. by a network of channels, through which a portion of the Amazonian water flows to the Pará. Length about 120 miles, breadth from 80 to 100 miles; area, about 10,000 sq. miles. The surface is perfectly flat and, in great part, of alluvial formation, but traces of an older framework of rock are seen along the southern and western sides, and hence this is not, strictly speaking, a delta island, as are many smaller ones adjoining it. During the period of heaviest rains (February to June), and at the time of the annual river-floods, large portions of the surface are overflowed, though only to a small depth. About one-third of the island on the S. W. is covered with forests and abounds in rubber-trees, but is very unhealthful. It is, however, the seat of the principal settlements, and supports several thousand rubber-gatherers, who live miserably in the swamps. The remainder of the island consists of open lands varied with occasional groves and, in the northern part, with extensive swamps called *mondongos*. The grass-lands are generally healthful, and afford excellent pasturage; large herds are kept on them, though for weeks together the cattle are obliged to wade over the flooded lands in search of food. Horses, formerly numerous, have nearly disappeared, owing to the ravages of a disease common on low and wet ground. There are a number of navigable rivers, or, rather, drainage channels; the largest, called the Arary, leads to a small lake of the same name almost precisely in the center of the island. In this lake there is an artificial island of prehistoric origin, well known to archæologists from the large number of interesting objects obtained on it. Marajó abounds in game and fish. See Penna, *A Ilha de Marajó* (1870); Edwards, *A Voyage up the Amazon* (1857).

HERBERT H. SMITH.

Maranhão, măă-raăn-yowñ′, in old books **Maranham**: a northeastern state of Brazil; bounded N. by the Atlantic, S. E. by Piauhy, and W. by Goyaz and Pará; area, 177,533 sq. miles. Most of the interior is included in the Brazilian plateau, which is much broken by deep river valleys, so that the surface is very irregular; there are no true mountains, and probably the highest portions of the plateau do not attain 3,000 feet. Adjoining the coast there is a strip of low land from 20 to 50 miles wide. In the northern and coast regions there are extensive forests, continuous with those of the Amazon. The southern part is more open, and its climate resembles that of Ceará, having a well-marked dry season; the periodical droughts which are so destructive farther E. are also felt here, but are less severe than in Ceará. Besides the Paranahyba, which separates this state from Piauhy, and the Tocantins, which divides it from Goyaz, there are a number of considerable rivers flowing to the Atlantic; of these the Itapecurú, Pindaré, Mearim, and others are navigable. The only harbor of importance is the Bay of Saõ José or Maranhão. The climate is warm, but in most places healthful. The soil of the coast region and valleys is very rich, giving excellent crops of sugar, rice, and cotton, which constitute the principal exports. Grazing is a prominent and growing industry in the interior. Large areas in the southern and western parts of the state are inhabited only by wild Indians. Maranhão, though lying within the region claimed by Portugal, was first settled by the French in 1612. They were driven out in 1615 by the Portuguese, who retained possession of the region except from 1641 to 1644, when it was in the possession of the Dutch. In 1621 Ceará, Maranhão, and Pará were erected into the state of Maranhão, independent of Brazil, and only subject to Portugal. Ceará was subsequently detached; the state was divided into various captaincies which by suppressing and changes were reduced to four, Piauhy, Maranhão, Pará, and Rio Negro (now Amazonas); these correspond to the modern states. The state of Maranhão was suppressed in 1774, the captaincies becoming subject to the viceroyalty of Brazil; the captaincy of Maranhão, with some changes in the boundary, became a province under the empire, and finally a state in 1891. Pop. of state (estimated, 1894) 550,063. Capital, Maranhão. Caxias, Alcantara, and Itapecurú are considerable towns. See C. A. Marques, *Diccionario historico geographico da provincia do Maranhão* (1870) and *A provincia do Maranhão* (1876); Wells, *Three Thousand Miles through Brazil* (1886); and the historical works of Berredo and Candido Mendes de Almeida. HERBERT H. SMITH.

Maranhão: capital, principal city, and port of the state of Maranhão; on the northwest side of the island of São Luiz, which is situated at the entrance of the Bay of São José and is separated from the mainland on the S. by the Bay of São Marcos and a narrow channel (see map of South America, ref. 3–G). The city is on two low hills, and the streets are very steep, but they are wide and the town is substantially built. The climate is warm (maximum, 92° F., minimum, 76°) but healthful; yellow fever is seldom prevalent. The port is good, but the entrance is somewhat difficult, and very deep-draught vessels can not pass it. Small steamers ply on the neighboring rivers. Maranhão was founded by the French in 1612. Pop. (1892) with the immediate vicinity, 38,000. HERBERT H. SMITH.

Marañon, măă-raăn-yōn′: the name given by Peruvians to the Amazon. Geographers generally restrict the name to the Upper Amazon beyond the limits of Brazil. See AMAZON.

Maraschino, măă-raă-skee′nō: See LIQUEUR.

Mars'mus [Mod. Lat., from Gr. μαρασμός, a quenching, a dying away, deriv. of μαραίνειν, put out, quench (of fire), pass, go out, die or waste away]: a general wasting of the entire body, including all the tissues and organs, dependent on one or more of many causes. Two general classes may be described.

1. Premature marasmus—a decline, as above, due to any disease which may reduce the general strength and nutri-

tion for a long-continued period, by virtue of mal-assimilation or too rapid tissue disintegration; the causative factors being so varied necessarily indicates that there must be many phases of this condition. In the new-born infant marasmus may result from premature birth, exhaustive hæmorrhages, hereditary syphilis, suppuration, chronic diarrhœa, or early occurrence of an infectious disease. Most frequently, however, it is seen somewhat later, as the result of insufficient and improper nourishment (not an actual lack of food) generally in bottle-fed infants, especially those with poor hygienic surroundings, causing a disturbance in the absorption of the nutritive elements in the intestine. In these cases, when not too far advanced, much can usually be done by careful attention to the proper articles of diet and general management. In adults this condition sometimes follows chronic diseases in which the system is drained, such as recurring hæmorrhages, prolonged suppuration, chronic diarrhœa, long-continued fevers, as in tuberculosis, syphilis, diabetes, malignant tumors, and some diseases of the blood. It may also be brought about by some forms of mental disease as well as by continued privation or the excessive use of intoxicants. Among its symptoms may be mentioned a marked loss of flesh and strength, general weakness, with a pale and shriveled skin. The hair falls out and often turns gray. The nails do not grow. In severe cases the blood may coagulate in some of the veins. The outlook for these cases depends on the cause of the condition, but is usually grave, as it generally is the precursor of death. Treatment of this condition must also vary and is decided by the physician on the merits of each case.

2. Senile marasmus is a similar condition seen in old age; the seventieth year is said to be the time of its most frequent occurrence. No direct causes for this wasting are necessary, as it is the result of natural decline in the vitality of the tissues, etc., and therefore must occur to some extent at an earlier or later period, not being due to any irregularity in assimilation or disintegration. It is usually seen earlier in the poorer classes of society—people who have done very hard work and at the same time have had poor nourishment and bad hygienic surroundings; in these, well-marked senile decay may often be noted at the age of fifty. These changes are seen in all the tissues and consist in an atrophy of the parts, and at the same time more or less fatty and calcareous degeneration. This condition need not exist in the same measure throughout all parts; some organs may be exempt. The calcareous degeneration is frequently seen in the arteries (atheroma), changing their walls and resulting also in a lack of elasticity. In this state they are more liable to rupture especially in the brain, allowing hæmorrhages (apoplexy) and consequent paralysis. In the bones this increase of calcareous matter is also noted, making them more liable to fracture. A fatty change is observed in the muscles and in the heart, accounting for the loss of power, etc. The hair falls out. The digestive glands atrophy. In the same measure retrograde changes to a greater or less degree are observed in all other parts of the body.

A. Jacobi and F. E. Sondern.

Marat, maa'raa', Jean Paul: French revolutionist; b. at Boudry, Neuchâtel, Switzerland, May 24, 1744, of Protestant parents; studied physical science and medicine, read much, acquiring miscellaneous knowledge; traveled for several years, and practiced as a physician in London, where he published an *Essay on Man*, a sharp attack on the philosophy of Helvetius. In 1774 he published at Edinburgh *The Chains of Slavery*, translated into French in 1792 under the title of *Les Chaines de l'Esclavage*; settled in Paris in 1775; practiced as a physician with considerable success; wrote several books on optics and electricity, and at last entered the service of the Count of Artois, afterward Charles X., by whom he was appointed brevet physician to the guards. The Revolution drew him from his profession and turned him into a political fanatic. His dominant motives seem to have been a fierce hatred of all inequalities in the social or political system, and a constant suspicion of the ruling powers. This naturally drew to his side the worse elements in the state, over whom he soon gained an extraordinary influence. His paper, *L'Ami du Peuple*, begun under the title of *Le Publiciste Parisien* and continued as *Le Journal de la République Française*, was a power in France during its whole lifetime, from Sept. 12, 1789, to July 14, 1793. The virulence of his attacks, his continual cry of treachery on the part of the government, brought upon him the anger of all parties. In 1790 he was forced to take refuge in London, but returned to Paris two months later and continued to publish the *Ami du Peuple*. He was at this time hiding in the cellars and sewers of the city, where he contracted a painful skin disease. These hardships further embittered him, and he grew more violent than ever against royalists and Girondists. The guilt of the September massacres rests in great measure upon him, but this served only to enhance his power in the commune. He was elected to the Convention, where he was soon involved in a life and death struggle with the Girondists. The latter were at first successful, and Marat was brought before the Revolutionary Tribunal, but he was acquitted, returned in triumph to the Convention, and led the movement which resulted in their downfall. He did not, however, live to see his enemies brought to the guillotine. The disease contracted in the sewers of Paris was closing his life, and he would probably not have lived more than a few days, when he was stabbed (July 13, 1793) by Charlotte Corday. His body was brought to the Pantheon, his portrait hung in the hall of the Convention, and a pension was voted to his mistress, but hardly two years elapsed before this enthusiasm gave way to general indignation and disgust. His portrait and his body were transferred to other and more proper places. See F. Chevremont, *Jean Paul Marat, esprit politique, accompagné de sa vie scientifique, politique, et privée* (1881).

F. M. Colby.

Mar'athon (in Gr. Μαραθών): a plain on the coast of Attica; about 6 miles long, 1½ miles wide, and 22 miles E. N. E. of Athens. The river Charadrus runs through it, and two little hamlets (Vrana and Marathona) are on its western edge, under the hills. The battle fought there in Sept., 490 B. C., is one of the most important in history. Ancient accounts of it, however, are inexact and contradictory. On the Greek side there were 9,000 or 10,000 Athenians and 1,000 Platæans; on the Persian side at least 100,000, and perhaps 200,000. There fell of the Persians 6,400, and of the Greeks only 192, who were buried under the mound which still remains. The mound was partially excavated by Schliemann in 1884; but he did not dig deep enough, for in the excavations made by the Greek Archæological Society in 1890 a quantity of burnt bones were found, as well as a number of vases which certainly belong to the fifth century B. C., and prove that the burnt bones are those of the 192 Athenians.

Revised by J. R. S. Sterrett.

Marathon: village; Cortland co., N. Y. (for location of county, see map of New York, ref. 5-G); on the Tioughnioga river and the Del., Lack. and W. Railroad; 30 miles N. of Binghamton, 50 miles S. of Syracuse. It is in a farming and dairy region, ships large quantities of butter, cheese, and live stock, and has a large tannery and several manufactories. Pop. (1880) 1,006; (1890) 1,198; (1900) 1,092.

Marat'ta, Carlo: painter; b. at Camerino, near Ancona, Italy, in 1625; studied art in Rome. A *Nativity* painted in 1650 attracted public attention to his talent. Alexander VII. employed him, as also succeeding popes up to Clement XI., who made him a Knight of the Order of Christ, and intrusted many works to him both in Rome and Urbino. Maratta was also named painter in ordinary to Louis XIV. of France. It was he who restored the Raphael frescoes in the Vatican and in the Farnesina. He decorated the cupola of the cathedral at Urbino with frescoes of his own, which were destroyed by the earthquake of 1782, but preferred painting pictures of the Madonna. His most important works are *St. Carlo*, in the Church of St. Carlo in Rome, and the *Baptism of Jesus Christ*, at the Certosa, which has been repeated in mosaic at St. Peter's. Many of his works remain in Rome, where he directed a school of painting till he died, in that city, in 1713. He also painted on glass, and was an architect and engraver.

W. J. Stillman.

Maravatio, maa-raa-vaa-tec'o: a town in the northeastern part of the state of Michoacan, Mexico; 40 miles E. N. E. of Morelia; on the Mexican National Railroad; 6,612 feet above the sea (see map of Mexico, ref. 7-G). It lies in a broad, grassy plain, surrounded by mountain ridges. In the rainy season extensive marshes are formed in the vicinity. Pop. about 9,000.

H. H. S.

Marbach, Johann: theologian; b. at Lindau, on the Lake of Constance, Aug. 24, 1521; studied theology at Wittenberg; and was in 1546 appointed pastor of the Church of St. Nicholas, in Strassburg; afterward also Professor of Theology and director of the church convention; and died there Mar. 17, 1581. He was one of those Lutheran theolo-

gians who by their exclusiveness and jealousy caused so much disturbance in the Protestant churches. Strassburg had originally adopted the Swiss Reformation, but Butzer's long residence there, and his zeal for a reconciliation between Calvinism and Lutheranism, had given its church a decided stamp of toleration. Nevertheless, as soon as Marbach settled in the city, confusion and persecution began. Butzer's catechism was supplanted by Luther's, the Reformed hymns were struck out of the hymn-book, etc. Some of the Reformed pastors and professors left the city, and those who wished to remain were compelled to subscribe to the *Confessio Augustana.* Revised by S. M. Jackson.

Marble [M. Eng. *marbel*, *marbre*, from O. Fr. *marble*, *marbre* < Lat. *mar'mor*, from Gr. μάρμαρος, stone, marble; originally connected, probably, with μάρναμαι, to fight, Sanskr. *mṛṇâti*, smite, dash in pieces, but afterward interpreted as related to μαρμαίρω, sparkle, and thought of as the "sparkling stone"]: any stone composed essentially of carbonate of lime alone, or the carbonates of lime and magnesia in varying proportions, which, owing to its color and texture, is sufficiently beautiful for a high grade of building material, or for monumental or decorative work. Geologically such marbles differ from ordinary limestones and dolomites only in that the metamorphic action to which they have been subjected has been just sufficient to develop in them the essential color and structural features. As a matter of fact many marbles are less metamorphosed than are other stones to which the name limestone is still applied. The term is, indeed, a popular or commercial one, and is lacking in scientific precision. The essential qualities of a marble, together with other facts relative to texture and color, have already been given in the article Building-stone (*q. v.*), and need not be repeated here.

The principal sources of marbles in the U. S. are the beds of Palæozoic limestone and dolomite bordering the Appalachian Mountain system. Important belts extend in a general north and south direction throughout Western Vermont, Massachusetts, and Connecticut. The product is, as a rule, white or deep blue-gray in color, the finest grades occurring in Vermont, where the quarrying industry is an important feature, particularly in and about the towns of West Rutland and Proctor, in Rutland County. This State alone now produces some 60 per cent. of the entire output of the quarries in the U. S. A compact siliceous dolomite of a chocolate-red and white variegated color, and of Cambrian age, occurs at Mallett's Bay on the shore of Lake Champlain, and is utilized for flooring tiles and general interior decoration; it is known commercially as Winooski marble. A black, highly fossiliferous stone occurs on Isle La Motte in the same lake, and is used for similar purposes. The marbles along this belt in Massachusetts and Connecticut are all dolomitic, of a white color and granular texture, and best suited for building purposes. A coarse, snow-white Archæan dolomite, occurring in Westchester co., New York, has in times past been extensively used for general building under the name of snowflake marble. Another coarse building marble, but of a gray color and belonging to this same geological horizon, occurs at Gouverneur, in St. Lawrence co., N. Y. Colored, highly fossiliferous marbles, well adapted for furniture and interior decoration, are found at Plattsburg and Chazy, in Clinton County, in this same State. White and blue-gray building marbles occur in the Lower Silurian beds of Montgomery co., Pa. Prior to 1840 these were much more extensively utilized than at present.

Isolated areas of crystalline granular dolomite, of a white color, in Baltimore co., Md., furnish an excellent building marble, but this, on account of its color and texture, is not well adapted for decorative work. A coarse, calcareous conglomerate. of Triassic age, outcropping in Frederick County, has been used as a marble in the columns of the old Hall of Representatives in the Capitol building at Washington, but the cost of working is too great to make it of any practical value. At various points throughout the valley of East Tennessee beds of limestone, belonging to the Trenton and Nashville series, furnish the highest grade of decorative marble at present known in the Eastern U. S. The colors are gray, pink, chocolate-red and brown, the latter varieties being varicgated with white, and highly fossiliferous. Quarries in Pitkin and Cherokee Counties, in Northern Georgia, furnish unlimited quantities of white, blue-gray, and flesh-pink marble, admirably adapted for general structural purposes, but rather too coarse in texture for a high-grade decorative stone. In the Rocky Mountain region are many important sources of marble which are beginning to attract attention, but which, with one or two exceptions, are too little developed. A granular dolomite of a white color, occurring near the town of Keeler, in Inyo co., California, has been put upon the market as a marble for both building and decorative work. Other stones, the value of which is yet to be decided, occur at various points in Washington, Idaho, Colorado, and Arizona.

The so-called onyx marbles are in reality travertines or cave deposits. That is, they result not from the metamorphism of beds of calcareous organisms, but are chemical deposits from the waters of springs and streams. Such are among the most beautiful of all marbles, as well as the most expensive, bringing sometimes as much as $20 a cubic foot in the rough state. The colors are pearly white, amber, yellow, red, and green, often flecked, veined, and mottled in figures of marvelous beauty. Stones of this type have been in use from a very early period in human history. Mention is made of them in the writings of Herodotus and Pliny, and abundant traces of their extensive utilization are found in ruins of Egyptian and Roman civilization extending back some thousands of years prior to the beginning of the Christian era. In literature the stone is known under various names, as *onyx*, *onychites*, *alabaster*, *alabastrites*, and *Oriental alabaster*—names which are misleading, inasmuch as the true onyx is a banded variety of chalcedony, while alabaster is a variety of gypsum.

The derivation of the name is interesting, but can be only briefly touched upon here. The original Greek word from which our word alabaster was derived was ἀλάβαστρος, and is said to have been derived from ἀ-, not, and λαβή, a handle, or λαβεῖν, to hold, in allusion to the little handleless, phial-like, or amphora-shaped perfume vessel constructed from it. The word after a time passed from the thing made to the substance of which it was made, though Pliny mentions an Egyptian town called Alabastron, where the manufacture of the vessels was carried on. Be this as it may, the name alabaster, as now used by all authorities, applies only to a white though sometimes variously mottled and veined variety of gypsum, a calcium sulphate, while the onyx marbles are of calcium carbonate, and mineralogically mainly calcite.

Stones of this type, derived mainly from caverns and clefts in Eocene limestones near Cairo, were early made use of by the Egyptians for making small articles, such as jugs, bowls, spoons, canopic vases, and amphoræ, employed to hold offerings to the gods, the ashes of the dead, and for other religious and domestic purposes. We find it thus utilized as early as the second dynasty, or shortly after the arrival of Abraham in Egypt (1920 B. C.). The collections of the New York Historical Society, the British Museum, and various continental museums contain many objects of this nature taken from Egyptian as well as Greek, Roman, and Etruscan ruins. The same material was also used for statuettes, sarcophagi, wainscotings, and even for the construction of exterior walls, as in the celebrated "alabaster mosque" near Cairo.

The ancient sources of stones of this class seem to have been mainly the stalagmitic deposits in the Eocene limestones of Egypt, and travertines in the province of Oran, Algeria. More recently deposits near Lake Oroomiah, in Persia, and from various caverns in Italy have furnished considerable quantities of material for local use. The principal American sources are Southern Mexico, particularly sporadic areas in the state of Puebla; the peninsula of Lower California, S. of San Quentin; San Luis Obispo co., Cal.; and Yavapai co., Ariz. The prevailing color of the Arizona stone is green, with shades of yellow, brown, and opaque red. That of California is white, veined with red and brown or injected with smoky clouds. The Lower California stone is pearl white, greenish, or rose colored, beautifully veined and translucent. That of Mexico proper all shades of white, gray, green, yellow, and brown. The American material is now used mainly for furniture tops, lavatories, and wainscotings. The stalagmitic deposits in caves sometimes yield small blocks of fairly good marble, which is also called onyx. The stone is, however, as a rule, so defective and so poor in color as to be of little commercial importance.

The verdantique marbles, so called, are serpentinous rocks, usually variegated with more or less calcareous and ferruginous matter. The prevailing colors are green or oil-yellow, often streaked and blotched with white, brown, red, or black. Though very beautiful, and susceptible of a high, lustrous

polish, the colors are cold, and do not readily harmonize with their surroundings. Their use is therefore very limited, being confined mainly to columns for statues and small objects of art. The stone occurs naturally in a badly jointed condition, weathers poorly when exposed, and is therefore suitable only for interior work. There are several large deposits of this material within the limits of the U. S., upon which quarries have from time to time been opened. The result has in nearly every instance been financially disastrous for the reasons already mentioned. The more important localities which have thus far been operated upon in the U. S. are at Deer Isle, Me.; Roxbury, Vt.; Lynnfield, Mass.; Milford, Conn.; Essex co., N. Y.; Harford co., Md.; on the Gila river in New Mexico; and near the town of Victor, in San Bernardino co., Cal. The principal foreign sources of the stone are the Lizard district, Cornwall, England; County Galway, Ireland; and Genoa, Italy. It is from the last-named source that is obtained almost the entire supply of such stone in the markets of the U. S.

Below are given the statistics of marble production in the U. S. from 1895–99.

STATE.	1895.	1897.	1899.
Arkansas	.....	.....	$3,410
California	$22,000	$48,690	6,500
Colorado	.....	99,600	10,776
Georgia	689,229	598,076	742,554
Idaho	2,250	5,000	.....
Iowa	13,750	.....	.....
Maryland	145,000	130,000	77,000
Massachusetts	2,000	79,721	59,416
New York	207,828	354,631	338,816
Pennsylvania	59,787	62,683	139,506
Tennessee	362,277	441,954	384,705
Utah	.....	.....	2,355
Vermont	1,321,598	2,050,229	2,241,806
Washington	.....	.....	4,837
Totals	$2,825,719	$3,870,584	$4,011,681

The following list includes the principal foreign marbles: *Bardiglio*: a high grade of marble of a blue-gray color, traversed by dark lines; from Montalto, on the southern borders of Tuscany, Italy. *Black and Gold*: a compact black limestone with gold-colored veins; also from Italy. *Bougard*: a dark-gray and white stone variously mottled and clouded with yellow, pink, and brown; from Nassau, Germany. *Brocatelle*: a light-yellow stone traversed with veins and blotches of dull red; from the French Pyrenees. *Campan*: a pale yellowish-green stone mottled with white; a dark-green variety containing red blotches is known as Campan rouge, from the Hautes-Pyrénées. *Carrara*: a general name given to any of the white or blue-gray marbles from Carrara, Italy. *Caunes*, see GRIOTTE. *Cipolino*: a white crystalline marble with veins of greenish mica; from Italy. *Fior di Persicor*: a whitish stone injected with veins and clouds of red or purple; from Albania. *Egyptian alabaster*: a cave deposit, see ONYX. *Fire marble*. *Formosa*: a dark-gray and white stone mottled and blotched with pink, yellow, or red; from Nassau, Germany. *Giallo antico*: antique yellow; a yellow marble used by the ancient Greeks and Romans; the source is supposed to have been Algeria. *Griotte*: a brilliant red marble from the French Pyrénées. *Irish black*: a high grade of black marble from near Galway, Ireland. *Landscape marble*: a limestone injected with metallic oxides in such a manner that when cut along certain planes an effect is produced closely simulating a landscape. *Languedoc*: a brilliant red or scarlet marble from the Montagne Noire, in the French Pyrenees. It is usually blotched with white. *Lumachelle*: an indurated shell limestone in which the shells still preserve the pearly lining, whereby a beautifully iridescent effect is produced on a polished surface. *Lisbon yellow marble*: a compact yellow marble somewhat resembling the deeper-colored varieties of the Siena, but less beautiful; from Estremoz, Portugal. *Mischio*: a calcareous breccia of a violet or reddish color; from Serravezza, Italy. *Nero Antico de Prato*, or *Verde di Prato*: a deep-green serpentinous marble; obtained from Tuscany, Italy. *Numidian marble*: a general name for an extremely variable type of marbles found in the provinces of Africa and Mauritania, in Algeria; the prevailing colors are pink, yellow, and red, but all intermediate shades occur; many varieties are true breccias, and others conglomerates. *Oriental alabaster*: a name erroneously given to certain travertines and cave deposits used by the ancients in the manufacture of small objects of art; the stone is presumably identical with the so-called onyx from Egypt and Algeria. *Paonazza*: also called pavonazetta and Phrygian marble; so called from its resemblance to the plumage of the peacock; a compact siliceous limestone of green verging upon blue and gray colors, and with alternating bands of white. *Parian*: a white granular statuary marble from the island of Paros: one of the most esteemed of ancient statuary marbles. *Parmazzo*: a white marble variegated by a coarse network of dark lines; from Northern Italy. *Pentellic*: a famous statuary marble from Mt. Pentellicus, near Athens. *Petit Granit*: a compact bluish limestone, a polished surface of which shows innumerable fine white points or asterisks caused by fossil crinoids and polyps; from the Ecausines, Belgium. *Portor*, see under *Black and Gold*. *Rosso Antico*, or *Rouge antique*: a dull-red marble said to have been obtained from Cynopolis and Damaristica, and used by the Etruscans and Romans. *Ruin marble*: a brecciated limestone of a light color; from Florence, Italy; it takes its name from a fancied resemblance of the markings on a polished surface to ancient ruins. *St. Anne*: a Belgian marble of a deep blue-black color diversified with white lines. *St. Baume*: a yellow marble with brown and red veins; from the province of Var, France. *Sarrancolin*: a beautiful stone of a prevailing deep-red color, with white, brown, green, and orange in veins and blotches; from the province of Aure in the French Pyrenees. *Siena*: a compact limestone of a prevailing yellowish color, though often diversified with drab and purple in veins and dashes; it is one of the most esteemed of foreign or domestic marbles for interior decoration. *Statuary*: any marble of a pure-white color and granular texture such as fits it for making statues; the ancients obtained their choicest varieties from Mt. Pentellicus and the island of Paros; nearly all that is now to be had is from quarries near Carrara, Italy, though a small amount has been produced from the quarries in Rutland, Vt.

GEORGE P. MERRILL.

Marble, MANTON: journalist; b. at Worcester, Mass., Nov. 16, 1835; graduated at the University of Rochester in 1855; became a writer for newspapers in Boston and New York; took part in founding *The New York World* in 1860, and became its editor and proprietor in 1862. Retiring from the editorial management of the paper in 1876, he went to Europe as delegate to the bimetallic congress in 1885. In 1878 he published *A Secret Chapter of Political History*, for the purpose of defending the claims of Samuel J. Tilden to the presidency; and in 1888 was elected to the presidency of the Manhattan Club in New York.

Marblehead: town; Essex co., Mass. (for location of county, see map of Massachusetts, ref. 1–I); on Massachusetts Bay, and the Boston and Maine Railroad; 3 miles E. of Salem, 4 miles N. E. of Lynn. It has a deep and spacious harbor, nearly landlocked, and was for many years a noted fishing-port, but this industry is practically extinct, and the principal business is the manufacture of children's shoes. The town is a popular summer resort and the yachting center of New England, and has two national banks with combined capital of $240,000, a savings-bank, and a weekly newspaper. Abbott Hall contains a public library, free reading-room, and an art gallery in which are a number of celebrated paintings, including Willard's *Yankee Doodle*. Pop. (1880) 7,467; (1890) 8,202; (1900) 7,582.

EDITOR OF "MESSENGER."

Marbois: See BARBÉ-MARBOIS.

Mar'burg, Germ. pron. maar'boorch (anc. *Matiacum*): town; in Hesse-Nassau, Prussia; on the Lahn; 48 miles S. W. of Cassel (see map of German Empire, ref. 5–D). It is a quaint old town, climbing the sides of a hill whose top is crowned with a castle dating from the thirteenth century, formerly the residence of the landgraves of Hesse, afterward a prison, and now a kind of historical museum. The Church of St. Elizabeth is a fine building erected in 1235–83 by the grand-master of the Teutonic order and containing the tomb and silver sarcophagus of St. Elizabeth of Hungary. The town is the seat of a university founded May 30, 1527, and attended by about 840 students. It was the first university established without papal confirmation. Its library contains 140,000 volumes. Manufactures of leather and earthenware are carried on. Pop. (1891) 14,520.

Marburg, The Conference of: a conference which took place Oct. 2–5, 1529, between the Swiss and the German Reformers, and was brought about by Landgrave Philip of Hesse for the purpose of putting an end to the controversy concerning the Lord's Supper. Zwingli was anx-

ious for reconciliation and deeply moved, but Luther was cold and stubborn, and refused Zwingli's hand of brotherhood. Yet at the conclusion both parties signed a common confession which set forth their agreement upon everything save the presence of Christ in the Eucharist, and upon that they agreed to differ. The assertion of this substantial unity was the significance of the conference. The agreement prepared the way for the Augsburg Confession. See the full account in Schaff's *Church History*, vol. vi., 629, *sqq.* Revised by S. M. Jackson.

Marcantonio: engraver. See Engraving and Raimondi.

Marceau, măr'sō', François Séverin des Graviers: general; b. at Chartres, France, Mar. 1, 1769; studied first law, but enlisted in 1785 in the army; became noted for his valor and magnanimity; fought with great distinction in 1792 in the army of the Ardennes; was made a general of division in 1793; commanded with success in the Vendée in 1793; decided the victory at Fleurus, June 26, 1794; took Coblentz in 1794, and Königstein in 1796, but was mortally wounded on a reconnoissance at Altenkirchen in Rhenish Prussia, Sept. 20, 1796, and died three days after. Monuments in his honor were raised both in Chartres and Coblentz. In 1889 his remains were deposited in the Pantheon.

Marceline: town; Linn co., Mo. (for location of county, see map of Missouri, ref. 2–F); on the Atch., Top. and S. Fé Railway; 106 miles N. E. of Kansas City. It is in an agricultural and mining region, and has a semi-monthly and two weekly newspapers. Pop. (1890) 1,977; (1900) 2,638.

Marcelli'nus, Saint: a bishop of Rome who succeeded Caius on June 30, 296, and died Oct. 25, 305. The *Liber Pontificalis* states that under an outburst of persecution Marcellinus became a *thurificatus*—that is, a Christian who sacrificed incense on the altar of some idol in order to escape persecution; but later he repented of his action, and was "beheaded and crowned with martyrdom," and the statement is accepted even by Roman Catholic writers.

Marcel'lus: the name of a plebeian family of ancient Rome, belonging to the *gens Claudia*. The earliest member of it to attain distinction was (1) Marcus Claudius Marcellus, b. about 268 B. C. His military successes began with the victory over the Insubrian Gauls in 222, in his first consulship, when, having slain the leader of the enemy with his own hand, he dedicated for the last time in Roman history the *spolia opima* to Jupiter Feretrius. After the battle of Camral he did efficient service against Hannibal as prætor and proconsul; but he is chiefly remembered as the conqueror of Sicily. In 214 B. C., when consul for the third time, he went over to Sicily to make headway against the Carthaginian successes there, and after taking Leontini directed his operations against Syracuse, which was defended by the engineering skill of the famous Archimedes. His efforts to storm the city proved unavailing, and the assault was changed into a siege which lasted two years, when it was finally captured. The town was plundered by the Romans, and many of its art treasures were removed to Rome. He continued to be one of the leading generals placed in the field against Hannibal, in a battle with whom, near Venusia, he was defeated and slain in 208 B. C., being in his fifth consulship. Hannibal caused his body to be burned and all due rites to be performed over it. "His posterity continued in great splendor down to (2) Marcellus, the son of Gaius Marcellus and Octavia, the sister of Augustus. He died very young, in the office of ædile, soon after he had married Julia, the emperor's daughter. To do honor to his memory Octavia dedicated to him a library, and Augustus a theater, and these public works bore his name." (*Plutarch.*) Augustus had destined the young Marcellus thus referred to by Plutarch to be his successor, and great hopes had been entertained of him. A famous and touching passage of the sixth *Æneid* is devoted to his memory. He died in the year 23 B. C. at the age of twenty.
G. L. Hendrickson.

Marcellus I., Saint: a Roman; said to have become Bishop of Rome in 308, and to have been forced by Maxentius the emperor to become a slave in his stables. D. 310. —Marcellus II., Pope (*Marcello Cervini*), was cardinal-legate of Julius III. at Trent; became pope, retaining his own name. D. May 1, 1555, after a pontificate of twenty-two days.

March [from O. Fr. *march*, *mars* > Mod. Fr. *mars* < Lat. *Martius* (sc. *mensis*), March, liter., the month of Mars (*q. v.*)]: the third month of the year, consisting of thirty-one days. In the ancient Roman year it was the first month, and was so reckoned in many European countries until the adoption of the Gregorian calendar.

March (Lat. *Ma'rus*, Slav. *Morawa*): the principal river of Moravia. It passes by Olmütz, forms for some distance the boundary between Hungary and Moravia and Austria proper, and enters the Danube 7 miles above Presburg. It is navigable 50 miles from its mouth. The plain between the lower March and the Danube has often been the theater of war; here were fought the battles of Aspern and Essling and of Wagram.

March, Auzias: Catalan poet. The date of his birth is unknown, but he died well on in years, at Valencia, Nov. 4, 1458, (or Mar. 3, 1459). His family was a wealthy and eminent one, and he was given an education befitting his rank. He shows familiarity with many of the authors of antiquity, and he was well acquainted with Italian poetry. His life was spent in association with persons of distinction, one of his chief friends being the Prince D. Carlos de Viana. He seems to have taken part in the conquest of Naples by Alfonso V. By general consent he is the best poet in the whole history of Catalan literature. Though he was acquainted with the decaying poetry of the troubadours, he came under the influence of the Italian Petrarch, and, as a consequence, he abandoned that which was conventional and trivial in the older style. At the same time, he was not a servile imitator of his new master. There is much freshness and sincerity in his manner, though he is not free from obscurities. We have from him ninety-three love songs, *Cants d'amor*; eight laments, *Cants de Mort*; fourteen moral poems, *Cants morals*; a beautiful devotional poem, *Cant espiritual*; and a *Demanda feta á la Senyora Na Tecla de Borja.* The fame of Auzias March was great even during his lifetime, and his influence was strong on the poets of neighboring Spain. The Marquis of Santillana praised him, and, in the early sixteenth century, Boscan, Garcilaso de la Vega, and Mendoza were all under obligations to him. He was twice translated into Spanish—by Baltasar de Romani and Jorge de Montemayor, the former version appearing in 1539, in the same year with the *editio princeps* of the original. In the seventeenth century he was rendered into Latin by Vicente Mariner (*Op. omn. poetica et oratoria V. M.*, Tournay, 1633). Besides five editions of the original during the sixteenth century, we have one by Francesch Pelayo Briz (Barcelona, 1864); another by F. Fayos y Antony (Barcelona, 1884); and a critical text is promised by Amédée Pagès. See also J. Rubió y Ors, *Ausias March y su época* (Barcelona, 1864); Helfferich, *Raymond Lull u. die Anfänge der catalanischen Literatur* (Berlin, 1858); Denk, *Geschichte der altcatal. Literatur* (Munich, 1893); A. Pagès, *Documents inédits relatifs à la vie d'Auzias March* (in *Romania*, xvii., p. 186, *seq.*). A critical *Life*, with German translation of the poems, is announced by Denk. A. R. Marsh.

March, Francis Andrew, LL. D., L. H. D.: philologist; b. at Millbury, Mass., Oct. 25, 1825; graduated at Amherst College 1845; was tutor in Amherst 1847–49; was admitted to the bar in New York State 1850; was tutor 1855–56; Adj. Professor of Belles-Lettres and English Literature 1856–57; lecturer on Constitutional and Public Law and the Roman Law 1875–77; librarian; Professor of English Language and Comparative Philology 1857—all in Lafayette College; was president of the American Philological Association 1873–74; and has been president of the Spelling Reform Association since 1876. He succeeded James Russell Lowell as president of the Modern Language Association of America in 1891. He is a member of a number of learned societies in the U. S. and in Europe. He is the author of *The Relation of the Study of Jurisprudence to the Origin and Progress of the Baconian Philosophy* (1848); *Hamilton's Theory of Perception and Philosophy of the Conditioned* (1860); *A Method of Philological Study of the English Language* (1865); *A Parser and Analyzer for Beginners* (1869); *Comparative Grammar of the Anglo-Saxon Language* (1870); *Anglo-Saxon Reader* (1870); besides numerous articles on philosophy and philology in periodicals and cyclopædias. Editor of *Latin Hymns*, etc. Director of the American workers for the *Historical English Dictionary* of the Philological Society (England, 1879); D. C. L., Oxford, 1896. C. H. Thurber.

March, John: colonial soldier; b. in Newbury, Mass., June 10, 1658; served as captain under Sir Edmund Andros in the campaign against the French and Indians in 1688;

commanded the fort at Pemaquid 1692–95; as major he commanded the troops raised in 1697 to meet the forces under Count de Frontenac, and won the famous battle of Damariscotta. He served with distinction in the wars of 1703 and 1707, and commanded the ill-advised and unsuccessful expedition sent by Gov. Dudley against the fort at Port Royal, now Annapolis, Nova Scotia. He died in 1725. He was esteemed the foremost military leader in New England up to the time of the Port Royal expedition, the failure of which may fairly be charged in part to the Governor who sent him out, and to the officers of the Deptford which was the convoy of the expedition. C. H. THURBER.

Marchand, măr'shăn', FELIX, M. D.: pathologist; b. at Halle, Oct. 22, 1846; graduated M. D. at the University of Berlin in 1870; served in the medical corps of the German army from 1870 to 1876; was assistant in the Halle Pathological Institute from 1876 to 1879, and in that of Breslau from 1879 to 1881; in 1881 became Professor of Pathological Anatomy and General Pathology in the University of Giessen; subsequently was called to the same chair at Marburg. He is the author of numerous papers on pathological topics published in current medical journals. S. T. ARMSTRONG.

Marchand, FÉLIX GABRIEL, Lit. D.: Canadian statesman; b. at St. Johns, province of Quebec, Jan. 9, 1832; was educated at St. Hyacinthe College, and admitted a notary in 1855. He has been a member of the Legislative Assembly, province of Quebec, since 1867; provincial secretary 1878–79, when he was appointed commissioner of crown lands; resigned the same year; and was Speaker 1887–92. In 1897 he became Premier and Treasurer. He was in command of a brigade of militia during the Fenian excitement in 1870; holds from the Government of France the decoration of officer of Public Instruction; was for several years editor and proprietor of *Le Franco-Canadien* newspaper. He is the author of *Fatenville*; *Les Faux Brilliants*; *Faquino*; *Comédies*; and *Manuel et Formulaire du notariat.*

Marchand, JEAN BAPTISTE: See the Appendix.

Marchesi, MATHILDE DE CASTRONE: See the Appendix.

Marchetti, FILIPPO: See the Appendix.

Marchiafava, măăr-kĕĕ-ăă-faa'vaă, ETTORE, M. D.: pathologist; b. in Rome, Italy, Jan. 3, 1847; graduated M. D. at the University of Rome; in 1872, after graduation, was assistant in Tommasi Crudeli's pathological laboratory; in 1882 was appointed Professor of Pathological Anatomy in Rome, subsequently leaving that chair to take that of Hygiene. He is particularly known by his studies of the ætiology of malaria, at first accepting Tommasi Crudeli's and Klebs's *Bacillus malariæ*, but subsequently acknowledging that Laveran's *Hæmatozoön malariæ* was the true cause of paludal poisoning. He is the author of a number of papers on pathological topics published in current journals.

Marching [from O. Fr. *marcher*, walk, march < Lat. **marca're*, deriv. of *marcus*, hammer]: in military tactics, the movement of troops in ranks or files, in lines, columns, or other tactical arrangements. On long marches the *route step* is employed, an ordinary walk, the men preserving their places in the ranks. In musters, reviews, parades, drills, and the like, the cadenced step, in common, quick, or double-quick time, is employed. Music, preferably that of the drum and fife, assists in keeping the time and step. Marshal Saxe has the credit of being the first general in modern times to perfect the system of marching, but many improvements have been made upon his system.

Mar'cion: Gnostic philosopher; the son of a bishop of Sinope in Pontus; was excommunicated by his father on account of his heretical views; went to Rome about 140; associated with the Syrian Gnostic Cerdon; formed a new Gnostic system and founded a sect, the Marcionites, which found many adherents in Syria, Egypt, and Palestine, and continued as a separate sect till the sixth century. Some maintain that he established the first known canon of sacred books, from which, however, he excluded many writings which now belong to the New Testament. He hated Judaism, and the great object of his theological speculation was to eliminate from the doctrinal system of Christianity all those Judaizing elements which had crept in by tradition, but the absolute breach which he endeavored to establish between the New and the Old Testaments aroused a most decided opposition; all the great Christian teachers of the time wrote against him. It was not the merely speculative portion of his system which fascinated people, but its practical, moral portion, its austere asceticism. Not only flesh and wine, the circus and the theater, were forbidden, but everything ornamental, the very elegance of refined social forms, was looked upon with contempt, if not with horror. Marriage was rejected, and martyrdom set forth as the true crown of human life. Concerning the so-called Marcion's Gospel, see the respective writings of F. C. Baur, Hilgenfeld, and Volkmar.

Marcoman'ni [liter., border-men; cf. Germ. *mark*, boundary]: a German tribe, first settled in the regions between the Neckar and the Main; accompanied Ariovistus when in the time of Cæsar he invaded Gaul, but were later on led by their own chief, Maroboduus, into the land of the Boii (Bohemia), which they conquered, and where they maintained a standing army of 70,000 fighting men. Maroboduus's rule was of short duration, however; he was compelled to flee from his country, sought refuge with the Roman emperor, Tiberius, and died at Ravenna. The Marcomanni continued, nevertheless, to be the ruling people in Bohemia, and soon they began to push forward toward the Danube. Marcus Aurelius was occupied in war with them during almost his whole reign, from 161 to 180, and prevented them from effecting a settlement in Italy, but not from occupying the lands along the Danube, whence they made repeated incursions into the frontier province of the Roman empire. About 270 they invaded Italy, but with varying success. From this time their name seldom appears in history, and in the following century the traces of the tribe are lost.

Marco Polo: See POLO, MARCO.

Marcou', măăr'koo', JULES: geologist; b. Apr. 20, 1824, at Salins, in the department of Jura, France; studied geology; received in 1847 employment at the palæontological collection of the museum of the Sorbonne; made extensive scientific travels in the U. S. 1848–50, 1853–54, and 1860; was appointed Professor in Geology at Zurich in 1855. As results of his explorations in the U. S., partly undertaken in connection with Agassiz, he published in English *Geological Map of the United States* (1853) and *Geology of North America* (1855). He also published *Drias et Trias* (1859); *Carte géologique de la Terre* (1862); *Derniers Travaux sur le Drias et le Trias en Russie* (1870), etc. D. in Cambridge, Mass., Apr. 18, 1898.

Mar'cus: bishop of Rome; came to that dignity in 336, and died Oct. 7 of that year. He is said to have initiated the custom, still maintained, in virtue of which the new pope is consecrated by the Bishop of Ostia. It was already the custom at the beginning of the fifth century.

Mar'cus Aure'lius Antoni'nus: See ANTONINUS, MARCUS AURELIUS.

Marcy, HENRY ORLANDO, A. M., M. D.: surgeon; b. at Otis, Mass., June 23, 1837; received his preliminary and classical education at Wilbraham Academy and Amherst College; graduated M. D. at Harvard Medical School in 1863; entered U. S. volunteers as assistant surgeon immediately after graduation, and was eventually promoted to the rank of medical director; after the close of the civil war studied in Europe; in 1880 removed to Boston, where he has since resided. He was president of the American Academy of Medicine in 1882, and of the American Medical Association in 1892, and is a member of many medical societies. He translated from the Italian Ercolani's work *The Utricular Glands of the Uterus* (1880). He is the author of many journal papers and of *The Anatomy and Surgical Treatment of Hernia* (New York, 1892). S. T. ARMSTRONG.

Marcy, RANDOLPH BARNES: soldier; b. in Greenwich, Mass., Apr. 9, 1812; graduated at West Point in 1832; became first lieutenant Fifteenth Infantry 1837; during the Mexican war fought at the battles of Palo Alto and Resaca de la Palma May, 1846; promoted to a captaincy May 18, 1846; he was engaged for several years in the exploration of the Red river country, in operations against the Seminoles, and in the Utah expedition 1857–58; became paymaster, with the rank of major, 1859; was inspector-general, with the rank of colonel, Aug., 1861; was chief of staff to Gen. McClellan (his son-in-law) in West Virginia, on the Peninsula, and in Maryland, and was appointed brigadier-general of volunteers Sept. 23, 1861; he was engaged principally in inspection duty until the close of the war; was appointed brigadier-general and inspector-general U. S. army Dec. 12, 1868; retired Jan. 2, 1881. D. at Orange, N. J., Nov. 22, 1887. He published *Exploration of the Red River in 1852* (1853); *The Prairie Traveler* (1859); and *Personal Recollections* (1866). Revised by JAMES MERCUR.

Marcy, William Learned: statesman; b. at Southbridge, Mass., Dec. 12, 1786; graduated in 1808 at Brown University; was for a time a teacher, but became a lawyer in Troy, N. Y.; served as an officer of volunteers in the war of 1812–14, capturing at St. Regis, Canada, the first prisoners and the first flag taken on land in the war; became in 1816 recorder of Troy, and for a time conducted the Troy *Budget*, then a leading anti-Federalist organ. He was a member of the "Albany regency," and showed skill as a practical politician. He was made comptroller in 1823; a judge of the State Supreme Court in 1829; and was chosen U. S. Senator in 1831, but resigned this office in 1833 upon being elected Governor of New York, to which position he was twice re-elected, but defeated in 1838 by W. H. Seward. In 1839 President Van Buren appointed him commissioner to adjust the Mexican claims, and in 1845 President Polk selected him as Secretary of War. During his term of office the war with Mexico occurred, in which he displayed great ability, as well as in the settlement of numerous intricate diplomatic questions. In 1853 President Pierce appointed him Secretary of State, in which capacity he added to his already established reputation as a statesman of a high order. Many of his state papers are masterly productions. He retired on the accession of Mr. Buchanan to the presidency, and died at Ballston Spa, July 4, 1857.

Marcy, Mount: called by the Indians *Tahawus*, or the "cloud-splitter"; the highest land in New York State; is in the town of Keene, in Essex County, in a cluster containing several of the highest of the Adirondacks. It is 5,379 feet in altitude.

Mardi Gras: See New Orleans, La.

Mardin, maar-deen′: town of Asiatic Turkey, in the district of Diarbekir (see map of Turkey, ref. 6–I). It is built on the steep sides of a rock whose top is crowned with a castle, and presents a very picturesque aspect. It is difficult of access, and has long been a place of refuge for persecuted religionists. About half the population is Christian of various, now unusual, sects and recent Roman Catholic and Protestant converts. The Jews possess there a very ancient synagogue, and the Kurds are Mohammedans. The town is full of mosques and chapels, and the sects mingle harmoniously. It is the seat of a Jacobite library and several Jacobite institutions, and carries on a considerable trade. Pop. 15,000. Revised by M. W. Harrington.

Mardo′nius (in Gr. Μαρδόνιος): a son of Gobryas, one of the Seven Persians. He married Artazostra, the daughter of Darius Hystaspis. He was commander-in-chief of the Persian expedition of 493 B. C. against Greece, but the destruction of the fleet by a storm off Mt. Athos as well as reverses by land induced him to return to Asia. He was relieved of his command by Darius because of his ill-success. After the death of Darius he was restored to royal favor, and in 480 B. C. we find him one of the trusted generals of Xerxes in his expedition against Greece. After the disastrous battle of Salamis, Mardonius persuaded Xerxes to return to Asia and leave him behind with 260,000 Persian troops to complete the subjugation of Greece. He wintered in Thessaly, and sent Alexander I., King of Macedonia, to treat with the Athenians separately, offering them great freedom in return for submission to Persia; but failing to win or to frighten the Athenians, he marched against Athens in the spring of 479 B. C. with an army of 300,000, and ravaged the city for the second time. Upon the approach of the Spartan army from the Peloponnesus, he retired into Bœotia followed by the combined Greek forces, amounting to 110,000. In the battle of Platæa, in Sept., 479 B. C., the Persian army was utterly routed, and Mardonius himself was killed while fighting bravely.

J. R. S. Sterrett.

Maréchal, mă′rā′shăl′, Pierre Sylvain: atheistical writer; b. in Paris, France, Aug. 15, 1750; studied law, and was admitted as an advocate, but soon devoted himself exclusively to literature; acquired by his earlier verses some reputation and the appointment of sub-librarian at the Collège Mazarin; took Lucretius as his model; published some "fragments of a moral poem on God" (1781), in which he avowed atheistical opinions; wrote a parody upon the Psalms, purporting to be translations from an ancient MS. (1784), for which he was dismissed from his post; issued an *Almanach des honnêtes Gens* (1788), in which a calendar of his own invention replaced the usual lists of saints; wrote, besides other works, hymns in honor of the goddess of reason (1795); the *Voyages de Pythagoras* (1799); and, with the astronomer Lalande, a *Dictionnaire des Athées anciens et modernes* (1800). D. at Montrouge, near Paris, Jan. 18, 1803.

Mare Island: an island in the N. E. part of San Pablo Bay, near Vallejo, Solano co., Cal., with which it is connected by ferry. It has a U. S. navy-yard, sectional floating dock, and naval arsenal.

Marek, maa′rek, Jan Jindřich (*Jan z Hvězdy*): novelist; b. at Liblin, Bohemia, Nov. 4, 1801; studied theology; was ordained priest in 1826; officiated in various parishes. D. at Kralovice, Nov. 3, 1853. His literary career extends from 1820 to 1846. *Básně* (Poems) appeared at Prague, 1823; then followed *Konvalinky* (Lilies of the Valley, 2 vols. of novels, Prague, 1824, 1826). From 1826 till 1843 he contributed poems and novels to several Bohemian periodicals. During the years 1843–47 he published his collected works, *Zábavné spisy*, in ten volumes, at Prague. The first two volumes contain ballads, legends, and short poems; the other eight, novels: *Známosti z průjezdu* (Acquaintances from the Arcade); *Harfenice* (The Harper); *Čechové v Prusích* (The Bohemians in Prussia); *Nocleh na Kačerově* (A Night at Kačerov), etc.; and two historical romances: *Jarohněv z Hrádku* (3 vols.) and *Mastičkář* (The Quack, 2 vols.). His patriotic romances found many readers, and some were translated into German. An unjust criticism of his *Mastičkář*, published 1846, so impressed him that he gave up all literary work. J. J. Král.

Marem′me (anc. *Ora Mari′tima*): a name applied to a vast, marshy, unhealthful territory in Italy, bordering on the Tyrrhene Sea, from the mouth of the Magra to that of the Volturno. It covers about 1,000 sq. miles, and is divided into the Tuscan Maremma and the Roman Maremma, these being again subdivided. This great tract is covered with stagnant water or immense deposits of seaweed, interspersed with thorny thickets, wild forests, and verdant meadows. During the winter it is frequented by Apennine shepherds and haunted by lawless persons. In summer the fertile portions are cultivated on a large scale by peasants who descend from the mountains of Lucca, from the Sabine Hills, and the Abruzzi to plow and sow, then return home to wait for the harvest, when they redescend for as short a time as possible. Even this costs hundreds of lives every year. There are few villages, or even roads, in the Maremme, and the pestiferous exhalations extend even to the more elevated portions. They are, however, least felt on the slopes descending to the Arno and the Tiber. In Etruscan times this region was densely populated, and excavations show that an elaborate system of drainage was in use. Draining on a large scale, with careful cultivation and extensive planting of trees, may in time overcome the malaria, and the effects which have already followed wherever such efforts have been made are encouraging. The railway opened along the Tyrrhene shore has produced very favorable results. Revised by M. W. Harrington.

Marenco, Carlo: playwright; b. at Cassolo, Italy, May 1, 1800. His parents lived at Ceva, and the poet always regarded this as his native place, as his youth was spent there. He studied jurisprudence at Turin, and received his degree at the age of eighteen. He was more attracted to the drama, however, than to law, and early began to try his hand at writing plays. In 1827 he had his first success with the tragedy *Buondelmonte*, brought out at Turin. In this, as in his succeeding plays, Marenco's manner is essentially that of Alfieri, though he was much influenced also by Manzoni. His characters are severe, grandiose, and remote from the actual world; while religious and patriotic feeling finds expression in eloquent, but at times somewhat bombastic, sentences. Of his subsequent tragedies the following were actually played: *La famiglia Foscari*, *Adelisa*, *Manfredi*, *Giovanna I.*, *La Pia de' Tolomei* (based upon Dante, *Purgatorio*, V., 130, *seq.*, and Marenco's greatest success; Engl. trans. by T. Williams, London, 1856), *Berengario*, *Arigo di Svevia*. He wrote also, but never produced upon the stage, *Corso Donati*, *Ezzelino Terzo*, *Ugolino*, *La Guerra de' Baroni*, *Arnaldo da Brescia*, *Cecilia da Baone*, and *Corradino*. D. at Savona, Sept. 20, 1846. See his *Tragedie inedite, con l'aggiunta di alcune poesie, etc.* (Florence, 1856). A. R. Marsh.

Marenco, Leopoldo, Count: poet; son of Carlo Marenco; b. at Ceva, Piedmont, Italy, Nov. 8, 1831. At the age of twenty he brought out with success the tragedy *Isabella*

Orsini. The same year (1851) he obtained a position in the ministry of finance, but found himself unfitted for such employment. Later he taught Italian literature in Bologna (1860–64) and in Milan (1864–71), but found this also little to his taste, and devoted himself to a literary career at Turin. His *Picarda Donati*, in which Ristori acted, then his *Saffo* and *Speronella*, established his reputation. Subsequently the lyric and idyllic elements in his genius became more prominent, and his plays seemed for a time likely to indicate a new direction for Italian dramatists. In his *Celeste, idillio campestre* he took his material from the life of the fields; in his *Il ghiacciajo del Monte Bianco*, from that of the mountaineer; in his *Giorgio Gandi*, from that of the seafarer. In *Il falconiere di Pietro Ardena*, and others, he reverted to the knightly period of the Middle Ages. He has also written many comedies: *Un malo esempio in famiglia*; *Letture ed esempi*; *Lo spiritismo*; *Supplicio di Tantalo*; *Gli amori del nonno*; *Quel che nostro non è*, etc. A collected edition of his dramatic works in twenty volumes appeared at Turin (1883, *seq.*). A. R. Marsh.

Maren'go: a village of Italy, in the province of Alessandria; famous for the battle fought here between Napoleon and the Austrians. This battle closed one of Napoleon's most brilliant campaigns. While Moreau engaged the attention of the Austrians in South Germany, Napoleon, who in the spring of 1800 had secretly gathered a second army in the south of France, suddenly crossed the Alps at the Great St.-Bernard, and appeared in the plains of Lombardy, in the rear of the Austrian general Melas, who, not expecting an attack from that quarter, had advanced to Genoa. Completely cut off from retreat, Melas joined battle with the French at Marengo, June 14, 1800, and suffered a crushing defeat. Owing to the advantageous position of the French, this single action decided the campaign, and the Austrian general was at once forced to make terms.

Marengo: city (settled in 1835, incorporated as a town in 1857, and as a city in 1893); McHenry co., Ill. (for location of county, see map of Illinois, ref. 1–F); on the Chi. and N. W. Railway; 66 miles N. W. of Chicago. It is in a farming region devoted almost exclusively to dairying and fruit-culture; has a steam-foundry, stove-works, and canning-factory; and contains 6 churches, water-works, electric lights, and 2 weekly newspapers. Pop. (1880) 1,264; (1890) 1,445; (1900) 2,005. Editor of "Republican."

Marengo: city; capital of Iowa co., Ia. (for location of county, see map of Iowa, ref. 5–I); on the Iowa river, and the Chi., Rock Is. and Pac. Railway; 27 miles S. W. of Cedar Rapids, 30 miles W. N. W. of Iowa City. It is the center of a large prairie region, and has two weekly newspapers. Pop. (1880) 1,738; (1890) 1,710; (1900) 2,007.

Marenholz-Bülow, maa'ren-hōltz-bü'lō, Bertha von Bülow, Baroness: the principal apostle of Froebel's kindergarten idea, and the foremost authority on it; b. Mar. 15, 1816. In 1849 she made the acquaintance of Froebel, and through her intercession the injunction laid against his institution by the Prussian Government was removed. In 1855 she held meetings in her own parlors at Paris, and had the support of Michelet, Quinet, Abbé Michaud, and other distinguished people. Her lectures were in substance published, and went through two editions. She assisted personally in the establishment of kindergartens in Germany, Switzerland, Holland, Belgium, England, and Italy (aided in Florence by the influence of Mrs. George P. Marsh); in Berlin she lectured gratuitously during three years in a normal school for the education of kindergartners. Her lectures in Italy were condensed into a pamphlet, which was translated from the French into English, and printed in *The Circular of Information* (U. S. bureau of education), for July, 1872. Other works are *The Kindergarten, The Educational Mission of Woman, The Child and its Being, Work and the New Education According to Froebel's Method*, and *Die Erscheinungen der Zeit und die Aufgaben der Erziehung* (Dresden, 1879). She became chief lecturer in the new college for kindergartners in Dresden, and wrote reminiscences of Froebel in the monthly magazine *Erziehung der Gegenwart*, which were translated into English and published in the U. S. by Mrs. Horace Mann (Boston, 1877).

Elizabeth P. Peabody. Revised by C. K. Adams.

Mareo'tis, Lake, or **Birket-el-Mariut** [Arab., Lake of Maryut]: a salt lake or marsh in Lower Egypt, in the western part of the Delta, 30 miles long, 15 miles broad; separated from the Mediterranean by a narrow isthmus of sand. It had been perfectly dry for three centuries, when in 1801, during the war between England and France, the English, ascertaining that the tract of land lay below the level of the sea, and having some military purpose in view, dug through the isthmus and let in the waters, resulting in the submergence of forty villages and hamlets and a decrease in the salubrity of Alexandria. This passage was closed by Mehemet Ali, but the spot is yet an uninhabitable marsh.

Revised by M. W. Harrington.

Maret, Hugues Bernard, Duke of Bassano: diplomatist; b. at Dijon, France, May 1, 1763; at the beginning of the Revolution edited the *Bulletin* (afterward the *Moniteur Universel*), which reported the proceedings of the Constituent Assembly; in 1792 was appointed to the ministry of Foreign Affairs, and in the following year was sent as ambassador to Naples, but on the way fell into the hands of the Austrians, who held him prisoner till 1795, when he was exchanged for the daughter of Louis XVI. Under the consulate and empire his influence rapidly increased, owing to the favor of Napoleon, who made him general secretary of the consulate in 1799, Secretary of State in 1804, and employed him on many important missions. In 1811 he was made Duke of Bassano, and appointed Minister of Foreign Affairs. During the Hundred Days he was again Secretary of State, but on the restoration of the Bourbons was banished from France. Under the Orleans monarchy he was recalled, regained his peerage in 1831, and in 1834 was for a short time president of the cabinet. D. in Paris, May 13, 1839. See Ernouf, *Maret, Duc de Bassano* (Paris, 1884). F. M. C.

Maretzek, Max: conductor, composer, and teacher; b. in Brünn, Moravia, June 28, 1821; graduated at the University of Vienna; studied medicine for two years, and music under Jeyfried. Composed an opera, *Hamlet*, in 1843, which was produced at Brünn and other places. He conducted the orchestra in Germany, France, and England, and was assistant to Balfe in London in 1844. Removed to the U. S. in 1848 and was manager of Italian opera in New York from 1849 to 1878. Afterward he devoted his time to teaching. He composed the opera *Sleepy Hollow* in 1879 to a libretto by Charles Gayler, and also some chamber and orchestral music, piano pieces, and songs. D. at Pleasant Plains, N. Y., May 14, 1897.

Marey, maa'rā', Étienne Jules: physiologist; b. at Beaune, in the department of Côte-d'Or, France, Mar. 5, 1830; studied medicine in Paris; appointed Professor in Natural History at the Collège de France in 1869. His *La Machine Animale* was translated into English, entitled *Animate Mechanism* (New York, 1874). He has also written *Physiologie expérimentale* (1875–80): *La méthode graphique dans les sciences expérimentales* (1878–84); *La circulation du sang* (1881); and *Le vol des oiseaux* (1890).

Marey Tambour: See Recording Apparatus, Psychological, in the Appendix.

Marfo'ri, Carlos: favorite of Queen Isabella II. of Spain; b. in 1818, the son of an Italian cook; obtained an office in the Spanish civil service through the influence of Gen. Narvaez. He afterward became a deputy and counselor in the administration of various financial associations, and was known to Queen Isabella, who held him in high esteem. Always in association with Narvaez, who soon learned to appreciate the value of his friendship, he by degrees obtained political influence, and in 1866, when Narvaez became minister, Marfori was appointed governor of Madrid and chief of the royal household. Hated and scoffed at by the people, he was overloaded with honors by the queen. He contributed more than all her political mistakes to undermine her position. In 1868, when the revolution broke out, she was told from all sides, even by Napoleon III., that the dismission of Marfori was the only means of preserving the throne, but she remained faithful to her favorite, and sacrificed her crown. During her exile in Paris and other places Marfori continued to be the *maître de la maison* of the queen. He returned to Spain in 1875. D. June 2, 1892.

Mar'garet, Queen of Scotland (called The Saint): b. in Hungary about 1040; was grand-niece of King Edward the Confessor and daughter of Edward, son of Edmund Ironside, who was driven into exile by Canute. She resided at the English court at the time of the Norman conquest, when she accompanied her brother, Edgar Atheling, in his flight to Scotland. She there attracted the admiration of King Malcolm Canmore, whom she married in 1069 and earned canonization by her efforts in diffusing Christianity, and especially by connecting the Scottish with the Roman Church.

D. in Nov. 1093, a few days after the death of her husband, who was killed in battle while fighting against the English. She was canonized in 1251, and adopted as the patron saint of Scotland in 1673.

Margaret of Angoulême: See MARGUERITE D'ANGOULÊME.

Margaret of Anjou: queen of Henry VI. of England, and daughter of René, Count of Provence; b. at Pont-à-Mousson, Lorraine, Mar. 23, 1429; married Apr. 22, 1445; became unpopular in England on account of the cession of the provinces of Maine and Anjou, then in the hands of the English, to her father. The king being subject to protracted periods of imbecility, she soon became the real ruler of the kingdom. The opposition of the Duke of York, who claimed the throne by an elder line of descent, gave rise to the Wars of the Roses, which opened with the battle of St. Albans in 1455, and which continued thence for several reigns. Margaret was forced to flee to Scotland, but her party soon rallied. She invaded England, killed the Duke of York at Wakefield (1460); released her captive husband by the second battle of St. Albans Feb. 17, 1461; was herself defeated at the great battle of Towton Mar. 29, and forced to escape to Scotland and France; made another unsuccessful invasion 1462; succeeded by the aid of Warwick the "king-maker" in momentarily reinstating Henry upon the throne 1470; but Warwick being killed at Barnet, Margaret was defeated and captured at Tewkesbury May 4, 1471, her only son, Prince Edward, being killed, and the king put to death soon after. Margaret was put in prison in the Tower or at Windsor until 1475, when she was ransomed by Louis XI. of France at the cost of the independence of Provence, ceded to that monarch by her father. She lived in strict seclusion thenceforth at Reculée, near Angers, and died at Dampierre, Aug. 25, 1481.

Margaret of Denmark: queen-regnant of the three Scandinavian kingdoms; b. in Copenhagen in 1353, a daughter of Valdemar IV. Atterdag, King of Denmark, and married in her tenth year (Apr. 9, 1363) to Haco VIII., King of Norway, to whom she bore in 1371 a son, Olaf. In 1375 Olaf succeeded his grandfather as King of Denmark, and in 1380 his father as King of Norway. During his minority Margaret conducted the government of both countries, and this difficult task she fulfilled with so much discretion and vigor that on the death of Olaf in 1387 the estates of both kingdoms chose her queen-regnant, and left to her to appoint her successor. In Sweden a large party was strongly opposed to the king, Albert of Mecklenburg, and opened negotiations with Margaret; and as Albert always had shown himself very hostile to her, she sent her general, Ivar Lykku, into Sweden with an army. On Feb. 24, 1389, the combined Danish-Swedish army defeated Albert's German mercenaries at Falköping. The king himself was captured, and detained in prison for seven years, and after a short struggle with his party Margaret was acknowledged queen-regnant also of Sweden. She combined in her person a high degree of womanly fascination with a rare force of character. She was courageous, but she was also shrewd, and in her political actions she was led probably less by personal ambition than by plans of far-seeing statesmanship. On July 20, 1397, she promulgated an act of union between the three Scandinavian kingdoms, the so-called Calmar Union, drawn up and agreed upon by emissaries from all three countries; and this act shows that her idea was not to get possession of as much land as possible, but to form a powerful Northern empire. During her lifetime her plan succeeded in spite of the jealousies of the three peoples, but her successor, Eric of Pomerania, was an inefficient ruler, and soon after her death (Oct. 28, 1412) the Calmar Union became the source of many calamities to the three Scandinavian countries. Her vigorous and able rule has caused her to be ranked among the great queens of history, and to be known as "the Semiramis of the North."

Margaret of Navarre: See MARGUERITE D'ANGOULÊME.

Margaret of Parma: a daughter of Charles V. by Margaret van Gheenst; b. in Brussels in 1522; was educated at the court of Mary, Queen Dowager of Hungary, whom she somewhat resembled. She was first married in 1536 to Alessandro of Medici, Duke of Florence (who was assassinated in the following year), and then in 1542 to Ottavio Farnese, Duke of Parma and Piacenza, to whom she bore a son, the celebrated general, Alexander Farnese. She was masculine both in her appearance and in her tastes. With a somewhat imperious temper she united kindly and honest spirit, great shrewdness in judging character, and skill in handling political affairs. In 1559 Philip II. made her regent of the Netherlands, which position she filled for eight years, attempting the well-nigh impossible task of reconciling the principles of Philip II. and the instincts of the Dutch. Her regency marks the beginning of the revolt of the Netherlands. She had some sympathy for the Netherlanders, and in 1564 she dismissed Cardinal Granvella, immediately after which her relations to Philip II. became desperate. In 1567 she retired to Italy, richly endowed by the king, and not unregretted by the people. D. at Ortona in 1586. A fine delineation of her character and history is found in Prescott's *Philip II.* See also Motley, *Rise of the Dutch Republic.*

Margar'ic Acid and **Margarine** [from Lat. *margari'ta* and Gr. μαργαρίτης, pearl; so called from its crystallizing in pearly scales]: By the action of potash on cyanide of cetyl (margaronitrile) there is produced, besides cetylic ether, cetylic aldehyde, ammonia, and other products, a potassic salt of an acid which has the composition $C_{17}H_{34}O_2$, intermediate between palmitic acid, $C_{16}H_{32}O_2$, and stearic acid, $C_{18}H_{36}O_2$. This acid exhibits all the properties of a pure fatty acid. It melts at 59·9°C., and can not be resolved into acids differing in melting-point. This is the only process by which margaric acid can be prepared. The acids obtained from natural oils and fats by saponification, to which the name and formula of margaric acid were applied, were mixtures of stearic acid with palmitic acid or other acids of lower melting-point.

IRA REMSEN.

Margarita, măär-găă-ree'tăă [Span., pearl]: an island of Venezuela; in the Caribbean Sea, 15 miles N. of the peninsula of Araya; between 10° 50′ and 11° 10′ N. lat., and 63° 50′ and 64° 30′ W. lon. Area about 450 sq. miles. It consists of two mountainous masses, almost cut off from each other by a lagoon; the highest point, called Macanao, is 4,500 feet above the sea. The climate is warm, but equable and very healthful, and it is much recommended for persons suffering from pulmonary complaints. Much of the soil is sterile, only the valleys being available for agriculture; the principal industries are the excellent fisheries of the vicinity, and salt-making. The small islands of Cubagua and Coche, to the S., and several neighboring islets are united with Margarita in the province of Nueva Esparta. The group was discovered by Columbus in 1498; shortly after rich pearl-banks were found in the vicinity, and the Spanish pearl-fishers founded Nueva Cadiz on Cubagua about 1515, this being the earliest European settlement of the coast; it was abandoned in 1519, but a fort was built on Margarita in 1525. The pearl-banks are now unproductive. The islands suffered greatly during the war for independence (1810–22), owing to their attachment to the patriot cause. Pop. nearly 40,000, largely composed of civilized Guayquerie Indians. Principal town, Asuncion.

HERBERT H. SMITH.

Margarito'ne: sculptor, painter, and architect; b. at Arezzo, Italy, the date being stated as 1212, 1216, and 1236. Before Cimabue and Giotto, he was the most esteemed painter of his day. After working in the Byzantine manner, he formed a style of his own. He painted many frescoes in Arezzo that have been destroyed. There still exists a *Madonna and Christ* in the Church of St. Francis, and another work at the convent of Sargiano, as also one in the Church of Santa Croce of Florence. He painted on canvas, and decorated his figures with halos and diadems of raised gesso, which he gilded and toned. His architectural works are the palace of the governor, and the Church of San Ciriaco at Ancona. He also worked on the cathedral of his native town, designed by Arnolfoda Lapo. He sculptured in the bishop's palace, Arezzo, a monument to Pope Gregory X., which is very simple and realistic in certain details. His later years were embittered by Cimabue's successes, which decreased his own popularity. D. at Arezzo about 1290.

W. J. STILLMAN.

Margate: a seaport-town on the isle of Thanet, Kent County, England; 74 miles E. by S. of London (see map of England, ref. 12–M). Its fisheries are important, but it is best known as a fashionable watering-place, much frequented during the summer. It has two old churches, an asylum for the deaf and dumb, a sea-bathing infirmary, assembly-rooms. a theater, zoölogical gardens, and a pier 900 feet in length, Pop. (1891) 21,369.

Marganx, măär'gō': village; in the department of Gironde, France; on the left bank of the Gironde; 14 miles

N. W. of Bordeaux. Near it is the Italian villa Château Margaux, which gives its name to a fine red wine. Pop. (1891) 1,915.

Marghilan, maăr-gĕĕ-lăn′: capital of the Russian province of Ferghana, Turkestan, Central Asia; 40 miles E. S. E. of the old capital, Khokan, 1,475 feet above sea-level; lat. 40° 28′ N., lon. 71° 43′ E.; pop. (1887) 26,080 (see map of Asia, ref. 4–E). This place was chosen as capital because of its salubrity, though the Russian town of New Marghilan is actually 10 miles S. of the old. The inhabitants are mostly Sarts, with some Tajiks and a few Jews. The chief industry is the manufacture of camel's hair and woolen stuffs and of silks. The climate is severe; in 1881 the maximum temperature was 104°, the minimum was 2° F.; the rainfall was 10 inches, and there were two days of snow. Marghilan is a very ancient city, and contains many monuments of antiquity. A tradition says that Alexander the Great died near by and was buried here. MARK W. HARRINGTON.

Margoliouth, maăr-gō′lĕĕ-oot, MOSES, Ph. D.: divine and author; b. at Suwalki, Poland, Dec. 3, 1820, of Jewish parents; was converted to Christianity in 1838, while on a visit in Liverpool; studied at Trinity College, Dublin; took orders in the Church of England 1844, and after holding benefices in Liverpool and Glasnevin, became assistant minister of St. Paul's, Onslow Square, Kensington, London, and in 1877 vicar of Little Linford, Buckinghamshire. He wrote much upon the religious prospects of the Jewish race, contributed to Cassell's *Bible Dictionary*, wrote a *History of the Jews in Great Britain* (3 vols., London, 1851); *Fundamental Principles of Modern Judaism Investigated* (London, 1843); *A Pilgrimage to the Land of my Fathers* (2 vols., 1850); *The Lord's Prayer no Adaptation of existing Jewish Petitions* (1876); *Some Triumphs and Trophies of the Light of the World* (1882). D. in London, Feb. 25, 1881. See his autobiography in his *Fundamental Principles*, and his memoir in *Some Triumphs*. Revised by S. M. JACKSON.

Marguerite d'Angoulême, maăr′greet′ dăăn′goo′lem′, known also as MARGUERITE DE VALOIS, de-vaa′lwăă′, MARGUERITE D'ALENÇON, -dăă′lăăn′sōn′, and MARGUERITE DE NAVARRE, -de-năă′vaar′: daughter of Charles d'Orléans, Count of Angoulême, and elder sister of Francis I.; b. Apr. 11, 1492. She had great natural gifts of mind and person, loved study, and learned Greek, Latin, Italian, Spanish, English, and even Hebrew. In 1509 she was married to Charles III., Duke of Alençon, but the marriage was not happy. Her husband perished in the battle of Pavia. She made the difficult journey to Madrid to be near her brother Francis in his captivity, and was largely instrumental in effecting his release. In 1527 she married Henri d'Albret, Count of Béarn and King of Navarre, by whom she had one daughter, Jeanne, mother of Henry IV. At her court at Nérac she extended a large and liberal tolerance, if not sympathy, to Protestant ideas, protected Marot and other refugees from religious persecution, and was herself accused of heresy. She surrounded herself with scholars and poets and was a generous patron of art and letters, rivaling if not surpassing Francis I. in furthering the movement of the Renaissance. She cultivated literature industriously. Her best-known work is the collection of *Contes de la Reine de Navarre*, stories inspired plainly by those of Boccaccio, and cast in the same form as the *Decameron*; they purport to be told by a company of ladies and gentlemen to while away the time during which they are detained by a freshet in the Pyrenees. The work was interrupted by the mourning into which she was plunged by the death of Francis I. (1547), when she had completed only seventy-two tales, or seven of the ten days of which it was to consist; hence its common name, the *Heptameron*. These stories, while sufficiently marked by the gay and frank sensuality of the Renaissance, have a more delicate sentiment than those of Boccaccio, and are the pretext for subtle discussions on questions of morals or courtesy. She wrote also a large number of poems and other works, some of which appeared in 1547 with the title *Marguerites de la Marguerite des Princesses*, and *Lettres* and *Mémoires* that reflect the graces of her mind and character. D. Dec. 21, 1549. The *Heptameron* has been best edited by Leroux de Lincy (3 vols., 1853–54); the *Lettres* by Genin (2 vols., 1842–43); the *Marguerites* by F. Frank (4 vols., 1873–74). A. G. CANFIELD.

Marguerite de Valois, de-vaă′lwăă′, known also as MARGUERITE DE FRANCE, -de-frăăns′, and MARGUERITE DE NAVARRE: daughter of Henry II. and Catherine de' Medici; b. at St.-Germain-en-Laye, May 14, 1552. She was married to Henry of Navarre, afterward Henry IV., only a week before the massacre of St. Bartholomew (1572). While Henry fled she remained at court till 1578, when she rejoined him at Nérac. In licentiousness of morals she rivaled her husband, with whom she did not long remain, going to occupy the castle of Usson in Auvergne. After Henry's accession as Henry IV. her marriage was annulled by Clement VIII. (1599). In 1605 she removed to Paris, where she cultivated the society of scholars and men of letters. D. Mar. 27, 1615, the last legitimate Valois. She left *Lettres* and *Mémoires* of considerable value, published by Guessard, 1842. The *Mémoires* were also published by Lalanne in 1858. A. G. CANFIELD.

Marheineke, maăr-hī′ne-ke, PHILIPP KONRAD: theologian; b. at Hildesheim, Hanover, May 1, 1780; studied at Göttingen; became Professor of Theology in 1805 at Erlangen, in 1807 at Heidelberg, in 1811 at Berlin, where he was also appointed pastor of Trinity church, and where he died May 31, 1846. One of his principal works is his *Grundlehren der christlichen Dogmatik*, of which the first edition (Berlin, 1819) is based on the philosophy of Schelling, the second (1827) on that of Hegel. The attempt to mediate a full harmony between the data of science and the doctrines of Christianity by raising both into a higher, ideal, speculative sphere, the sphere of truth, is here undertaken with great ingenuity, but the enthusiasm with which the book was received has waned, and the standpoint from which Marheineke wrote his philosophical works, and even his sermons, has been given up as barren. His *Geschichte der deutschen Reformation* (4 vols., 1816–34) is of lasting worth.

Revised by S. M. JACKSON.

Mari'a Christi'na: Queen of Spain; b. at Naples, Italy, Apr. 27, 1806; a daughter of Francis I., King of the Two Sicilies; was married, Dec. 11, 1829, to Ferdinand VII., King of Spain, his fourth wife. On Mar. 29, 1830, when the queen declared herself pregnant, the king abolished the Salic law of inheritance, to which the Bourbons had conformed, and according to which only the male members of the family could inherit the throne, and reintroduced, by a pragmatic sanction, the old Castilian law, according to which the crown could be inherited also by females. On Oct. 10, 1830, the queen bore a daughter, Isabella (afterward Queen Isabella II.), and immediately the court and the country became divided into two parties, the Carlists and the Christinos, the former headed by Don Carlos, brother to the king, heir-presumptive to the throne according to the Salic law, and supported by the Ultramontane clergy and the absolutists—the latter headed by Maria Christina, vindicating the throne for her daughter according to the pragmatic sanction, and supported by the liberals. On the death of the king (Sept. 29, 1833) the two parties took up arms, and a civil war began which lasted till 1840, devastating the country and demoralizing the people. Meanwhile Maria Christina, who was appointed regent during the minority of Isabella II. soon lost the popularity she had gained by her alliance with the liberals. She was intrinsically indifferent in political matters, but her instincts were absolutist rather than constitutional. Her subserviency to the policy of Louis Philippe placed her in opposition to the progressists or radicals, who found much sympathy in England; and her personal relations gave general scandal; she bore ten children to one Fernando Muñoz, a member of her body-guard, created Duke of Rianzares, to whom she was not publicly married until Oct. 13, 1844. On Oct. 12, 1840, she was compelled to abdicate the regency to Espartero and leave the country. She resided for some years in Paris, but returned after the fall of Espartero in 1844 to Spain, and although Isabella II. had been declared of age in 1843, Maria continued to meddle with the government, until she was once more expelled in 1854. For ten years she lived in France, Italy, and England, and returned in 1864 to Spain, whence, by the revolution which dethroned Queen Isabella, she was again expelled in 1868. She returned after the accession of her grandson, Alfonso XII., to the throne, in 1876. D. Aug. 22, 1878.

Revised by C. K. ADAMS.

Mariager, P.: novelist; b. in Denmark in 1827. In 1853 he published an anonymous tale, and in the following year translated Balzac, Scribe, etc., and a number of popular scientific works from the French and German, the first being Flammarion's *Inhabited Worlds*, now in its fourth edition. *Fra Hellas: Fem antike Fortællinger* (From Hellas: Five Antique Tales, 1881) marks a new departure in Danish literature, being an attempt to reproduce Greek culture similar to Eber's to reproduce Egyptian. It met

with immediate success, and was translated into several languages. It was followed by *Den sidste Lamia, og andre antike Fortællinger* (The Last Lamia, and Other Antique Tales, 1884); *Magthaveren paa Rhodos* (The Potentate of Rhodes, 1885); *Sybaris*, a drama; *Dronningen af Kyrene, og andre antike Fortællinger* (The Queen of Cyrene, and other Antique Tales, 1891); and *Et Bryllup i Katakomberne* (A Marriage in the Catacombs, 1893). D. K. Dodge.

Maria Louisa: Empress of the French; b. Dec. 12, 1791; a daughter of the Archduke Francis of Austria; was married Apr. 2, 1810, at Paris, to Napoleon I., who had obtained a divorce from his wife, the Empress Josephine, for the sake of this connection with Austria, and bore him a son Mar. 20, 1811. During the campaigns of 1812 and 1813 she was appointed regent, and her actions under the difficult circumstances were marked by ability and dignity. She was not allowed to follow her husband when he abdicated and went to Elba. She took up her residence in Schönbrunn, near Vienna, where she remained also during the Hundred Days. By the Peace of Paris, Parma, Piacenza, and Guastalla were given to her. After the death of Napoleon she contracted a marriage with Count Niepperg. D. Dec. 18, 1847. See *Famous Women of the French Court*, by Imbert de Saint-Amand, translated by Thomas Sargeant Perry (New York, 1890–91).

Mariana, maă-rĕe-aa'naă, Juan, de: historian; b. at Talavera, Spain, in 1537; educated at the University of Alcala; joined the Society of Jesus in 1554; was Professor of Theology in the Jesuit College at Rome 1561–65; was afterward a lecturer on divinity in Sicily and in Paris 1569–74; settled at Toledo 1574; wrote a treatise, *De Rege et Regis Institutione* (Toledo, 1599), which was burned by the hangman in Paris on account of its justification of tyrannicide; published various works on theological and political topics, and a *General History of Spain* (1592–1609; Eng. trans. London, 1699, 2 parts). D. at Toledo, Feb. 6, 1623.

Revised by S. M. Jackson.

Marianna: a town of the state of Minas Geraes, Brazil; 5 miles E. S. E. of Ouro Preto: at the northeast base of the Itacolumí Mountain (see map of South America, ref. 6–G). It was founded in 1699 by gold-miners, and during the eighteenth century was one of the richest mining-towns of Brazil. The washings are now almost abandoned, and the town is important only as being the seat of the Bishop of Minas. Pop. about 8,000. H. H. S.

Marianna: village (incorporated in 1874); capital of Lee co., Ark. (for location of county, see map of Arkansas, ref. 3–E); on L'Anguille river at the head of navigation, and on the St. L., Iron Mt. and S. Railway; 45 miles W. of Memphis. It is in a corn and cotton growing region; is an important cotton-shipping point; and has 2 public and 3 private schools, several churches, and 2 weekly newspapers. Pop. (1880) 627; (1890) 1,126; (1900) 1,707.

Editor of "Index."

Marianne Islands: See Ladrones.

Mari'a There'sa: Archduchess of Austria, Queen of Hungary and Bohemia, and Empress of Germany; b. in Vienna, May 13, 1717; a daughter of the Emperor Charles VI.; was declared sole heir of all the possessions of the house of Hapsburg by the Pragmatic Sanction (*q. v.*), and married (Feb. 12, 1736) to Francis Stephen, grand Duke of Tuscany. On the death of her father (Oct. 20, 1740) she ascended the throne, and on Nov. 21 in the same year appointed her husband coregent, but in spite of the pragmatic sanction claims to various parts of her inheritance were raised immediately from different sides, a formidable alliance was formed against her between Spain, France, Bavaria, Saxony, and Prussia, and the Austrian War of Succession (see Succession Wars) was opened by the invasion of Silesia by Frederick II. The heroic resoluteness of the young empress, however, and the chivalrous enthusiasm of the Hungarian people, saved her crown, and by the Peace of Aix-la-Chapelle (Oct. 18, 1748) she lost only Parma and Piacenza to Spain and Silesia to Prussia, while her husband was recognized as Emperor of Germany; but the loss of Silesia she could never forget. In 1753 Prince Kaunitz, in whom the empress soon learned to put entire confidence, became Austrian chancellor, and he succeeded in forming an alliance between Austria, France, Saxony, and Russia for the humiliation of Prussia. Maria Theresa even stooped so far, in order to obtain revenge on Frederick II., as to write a letter to Madame de Pompadour and address her as "My dear cousin;" but the Seven Years' War (*q. v.*), although conducted by Austria with great vigor and some success, brought no result; the Peace of Hubertsburg (Feb. 15, 1763) left Silesia a Prussian possession. On Aug. 18, 1765, the Emperor Francis I. died, and Maria Theresa took her eldest son, Joseph, as coregent. His policy was decidedly one of aggrandizement, and it was probably due to his influence that she participated, though not until she received the consent of the pope, in the first partition of Poland (Aug. 5, 1772), which brought Galicia and Ludomeria under the Austrian dominion. Turkey was compelled to cede Bukowina (Feb. 25, 1777), but the plan of annexing Bavaria was foiled, and the Austrian influence in Germany received a severe check by the formation of the so-called *Fürstenbund* under the auspices of Frederick II. In the interior her government was successful, and marked with great energy and wisdom. The finances, the weakest point in the Austrian household, were improved by the emperor and Count Haugwitz. The army, previously an ineffective and disorderly mob, was organized and strengthened by Joseph and Count Lasey. Servitude and torture were abolished, a number of schools of different grades established, and a better criminal code was introduced; improvements partly due to the exertions of Van Swieten. Although she was a pious Catholic, and not disposed to be indulgent to her Protestant subjects, Marie Theresa had an open eye for the abuses of the Roman Church, and stopped them at many points. She forbade the priests to be present at the making of wills, and any person, male or female, to take monastic vows before his twenty-fifth year, and in 1773 she expelled the Jesuits. D. at Vienna, Nov. 29, 1780, leaving four sons, of whom the oldest, Joseph II., succeeded her, and six daughters, of whom the next to the youngest was Marie Antoinette. Even Frederick II. of Prussia, her great adversary, bore testimony to the purity and nobleness of her personal character, writing to d'Alembert on the occasion of her death: "I have shed tears at her death—sincere tears. She was an honor to her sex and to the throne. I have waged wars against her, but I have never been her enemy." See Duller, *Maria Theresa und ihre Zeit* (1843–44, 2 vols.); Wolf, *Oesterreich unter Maria Theresa* (Vienna, 1855); Lotheisen, *Oesterreich unter Maria Theresa* (1860).

Mariaz'ell: a village of Styria, Austria-Hungary, about 60 miles S. W. of Vienna (see map of Austria-Hungary, ref. 5–E); celebrated for its mineral springs, and a favorite place of pilgrimage. It is situated in the Styrian Alps, on the Salza, a tributary of the Enns, an affluent of the Danube, 2,927 feet above the sea. Pop. 11,000. It is annually visited by about 100,000 pilgrims, the object of veneration being an image of the Virgin, dating from 1157, in a chapel erected in 1363, which has been incorporated into a church built in 1644. Near by are important iron-foundries.

M. W. H.

Maricopa Indians: See Yuman Indians.

Marie, pseudonym of Antoinette Meyn: a Norwegian writer, whose latest books have been published under the new pseudonym *Holger Birch*. The first book of this author, *I Tusmørket* (Between the Lights, 1875; 3d ed. 1881), won her many friends, and her popularity steadily increased. She is a fluent but not a great writer. Most of her books have been translated into Swedish and German. They include *Gjennem Kamp* (Through Struggles, 1876); *Fra Min Födeby* (From my Native Town, 1877); *I det Stille* (In the Home Circle, 1878); *Ved egen Kraft?* (By her own Power? 1879); *Hjemmet* (At Home, 1881); *I ensomme Timer* (During Lonely Hours, 1883); *Fra Fars og Mors Tid* (From Father's and Mother's Time); *Dyoeckes Hus* (The House of Dyocke: a Dream, 1885); *Pressede Blomster* (Dried Flowers, a manuscript, 1889); *Dröm og Virkelighed* (Dream and Real Life, 1891); *Svunde Tider* (From Times Gone By, 1893). P. Groth.

Marie Antoinette, maă'ree'aăn'twaă'net': Queen of France; the fifth daughter of Maria Theresa and Francis I.; b. in Vienna, Nov. 2, 1755; married at Versailles, May 16, 1770, to the dauphin (afterward Louis XVI.), to whom she bore four children, of whom two died in infancy; the other two were Louis XVII. and the Duchess of Angoulême. Her position at the French court was difficult from the very first, and it soon became dangerous. There was a difference of character between her and the people among which she had come to live which proved fatal in the end. Her morals were perfectly pure, and her heart full of noble and generous instincts; but she felt a haughty independence of eti-

quette, ceremonies, public opinion, etc., and in her character gay levity and impulsive caprices were singularly mixed up with innocence, virtue, and elevated purposes. At the French court every vice was committed, but none was shown; an elegant hypocrisy covered the rottenness. It was evident that such a character under such circumstances could not escape slander and intrigue, and after the affair of the diamond necklace in 1785 the young queen was completely overwhelmed and ruined by them. The indolence of her husband and the desperate state of affairs compelled her to meddle with polities. The character of her husband prevented him from following her influence, and the result was a series of half measures which became blunders, and of violence which ended in weak submission. At the outbreak of the Revolution she was actually hated by the French people, and after the unfortunate attempt at flight (June 21, 1791) her doom was certain; but her character developed with the situation, and under the horrors which surrounded her she grew heroic. Although broken both in body and mind, when placed after a long imprisonment before the Revolutionary Tribunal (Oct. 13, 1793), she flung back the accusation of having seduced her own son with an indignation which made every heart in the room tremble; and during the two hours' ride to the scaffold on Oct. 16, between rows of stern soldiers and under the execrations of a furious mob, she preserved her dignity to the last. See *Mémoires*, by Weber (1822); Lafont d'Ausonne (1824); Mme. Campan (1826); *Histoire*, by Goncourt (1859); and *Famous Women of the French Court*, by Imbert de Saint-Amand, translated by Thomas Sargeant Perry (New York, 1890–91).

Revised by C. K. Adams.

Marie de Médicis: Queen of France; b. at Florence, Apr. 26, 1573; daughter of Francis I., Grand Duke of Tuscany; was married Dec. 16, 1600, to Henry IV., King of France, to whom she bore in the next year a son, afterward Louis XIII. She was beautiful, passionate, ambitious, but singularly low and mean; Henry always avoided her, and she was not crowned until the day before his assassination (May 13, 1610). From this time she conducted the government together with her favorites, the Concinis, till the conspiracy of de Luynes (Apr. 14, 1617), after which she was confined in the Castle of Blois. On the death of de Luynes (Dec. 14, 1621) she returned to the court and took her place in the king's council, having been reconciled to him by Richelieu; but, jealous of the growing power of the new minister, she began intriguing against him, too, and was sent once more from the court in 1630, and confined in the Castle of Compiègne. Thence she escaped, wandered several years in England and the Netherlands, and died at Cologne, July 3, 1642, in miserable circumstances.

Marie Galante, măă-ree'gaă-laant' (Span. *Marigalante*): one of the French West Indian islands; 17 miles E. S. E. of Guadeloupe, of which it is a political dependency. Area, 63 sq. miles. It is nearly circular in form, mainly of calcareous formation, and the greatest elevation is 675 feet. The climate is dry, and there are few streams. The principal product is sugar. There are whale-fisheries of some importance off the coast. Pop. (1890) 13,850. The principal town is Grand Bourg. H. H. S.

Mariel: See the Appendix.

Marienbad, măă-ree'en-băăd: a small town of Bohemia; 18 miles S. of Carlsbad; picturesquely situated among wooded hills at an elevation of 2,057 feet, and much frequented as a watering-place and on account of its saline springs (see map of Austria-Hungary, ref. 3–C). The waters resemble those of Carlsbad, but are cold and contain more purgative salt. They are used both internally and externally in cases of gout, skin diseases, rheumatism, etc. The permanent population is about 2,000.

Marienburg, -boorch: town of Prussia, on the Nogat; 27 miles S. E. of Dantzic (see map of German Empire, ref. 2–J). Its castle, a magnificent and imposing edifice of Gothic architecture, was erected from 1274 to 1341 by the knights of the Teutonic order, whose grand-masters resided there for several centuries. At the time the building was one of the strongest castles in Europe. Under Polish rule it was allowed to fall into decay, but it was carefully restored in the beginning of the nineteenth century. The town has a normal school, several chemical-factories, important cattle, horse, and wool markets, and a considerable trade in grain, linen, feathers, brushes, etc. Pop. (1890) 10,279.

Marienwerder, văr-der: city of West Prussia; 45 miles S. S. E. of Dantzic (see map of German Empire, ref. 2–J). It is a handsome city, with many fine buildings, among which is the cathedral from the fourteenth century, and the castle built by the knights of the Teutonic order in the thirteenth century. It has many benevolent and educational institutions, and some manufactures. Pop. (1890) 8,552.

Mariéton, măă'ri-ā'tōñ', Paul: poet and critic; b. at Lyons, France, in 1862. He has been an ardent participator in the recent literary movement in Southern France, and a friend of Mistral, Aubanel, and the other poets of the new Provençal school. He is chancellor of the Society of Felibrige, and was in 1891 majoral of the Society for Provence proper. He is also director of the *Revue felibréenne*, the Parisian organ of the school. He has published three volumes of verse—*Viole d'amour*, *Hellas*, and *Souvenance*. Also a large number of articles and books devoted to the interests of his friends. Among these may be mentioned *Bonaparte Wyse* (1882); *Auguste Fourès* (1883); *Un félibre limousin* (1883); *Théodor Aubanel* (1883); *Le mouvement flamand* (1884); *Discours sur la jeunesse provençale* (1884); *Josephin Soulary et la pleïade lyonnaise* (1884); and particularly *La terre provençale* (1890). A. R. Marsh.

Mariet'ta: city (founded in 1833); capital of Cobb co., Ga. (for location of county, see map of Georgia, ref. 2–G); on the Marietta and N. Ga. and the W. and the Atlantic railways; 20 miles N. of Atlanta. It is in an agricultural and stock-raising region, and has several marble-mills, flour and paper mills, knitting and chair factories, iron-foundry, sash, door, and blind mills, and paper, twine, carriage, and excelsior works. Pop. (1880) 2,227; (1890) 3,384; (1900) 4,446. Editor of "Journal."

Marietta: city (settled in 1788); capital of Washington co., O. (for location of county, see map of Ohio, ref. 7–H); on the Ohio river, at the mouth of the Muskingum, and on the Balt. and O. S. W., the Cleve. and Marietta, the Toledo and O. Cent. Ext., and the Zanesv. and O. railways; 80 miles S. E. of Zanesville, 115 S. E. of Columbus, 175 S. of Cleveland. It is in the great oil region of Ohio and West Virginia, and within a few miles of rich coal and iron deposits; is principally engaged in manufacturing and river commerce; and has flour, planing, and saw mills, carriage, tub, bucket, and chair factories; foundries and machine-shops; tanneries, breweries, car-shops, oil-works, boat-yard, and tool-works. The city is the seat of Marietta College. There are 2 national banks with combined capital of $200,000, a private bank, and 3 weekly and 2 other periodicals. The limits of the city were enlarged in 1890 by the annexation of the village of Harmar. Pop. (1880) 5,444; (1890) 8,273; (1900) 13,348. Editor of "Register."

Marietta: borough; Lancaster co., Pa. (for location of county, see map of Pennsylvania, ref. 6–H); on the Susquehanna river, and the Penn. Railroad; 25 miles E. of Harrisburg, 81 miles W. of Philadelphia. It has iron-furnaces, rolling-mill, foundry and machine-shop, saw and planing mills, hollow-ware and enameling works, and agricultural-implement factory; is the Eastern market for the timber and lumber brought down the river, and contains a national bank with capital of $100,000, a private bank, a lyceum of natural history (founded in 1872), with library, and two weekly newspapers. Pop. (1880) 2,503; (1890) 2,402; (1900) 2,469.

Marietta College: an institution at Marietta, O.; located where the first settlement of the "territory northwest of the river Ohio" was made Apr. 7, 1788. The college was founded by the sons of the pioneers, among whom were many graduates of Yale and Harvard. It was opened for instruction in 1833 as the Marietta Collegiate Institute and Western Teachers' Seminary, but in 1835 a new charter was obtained, under the name of Marietta College. In its course of study and general arrangements the college has adhered to the New England type. The college is independent alike of ecclesiastical and of State control, having a self-perpetuating board of trustees. Though not denominational, its affiliations are rather with the Congregational and Presbyterian bodies. There are two courses of study, of four years each, leading to the degrees of B. A. and B. Ph. The latter course substitutes the modern languages for the Greek. The first class graduated in 1838, and the whole number of graduates to 1900 was 811. In 1900 the college had 252 students and a faculty of 19. In cabinets, apparatus, etc., the college is well fitted for its work. The number of volumes in the college and society libraries is about 65,000. The library is

specially rich in works of American history and of the early history of the Northwest, including many valuable manuscripts. The president is (1894) J. W. Simpson, D. D., LL. D.

Revised by C. H. THURBER.

Mariette, măă′rĕĕ-et′, AUGUSTE ÉDOUARD: archæologist; known as Mariette Pasha; b. at Boulogne-sur-Mer, France, Feb. 11, 1821; became professor in the college of his native place at the age of twenty. Having become interested in Egyptology, he removed to Paris in 1848, where he taught the science for two years. Seeing no propitious opening at home he secured an appointment in 1850 to visit Egypt upon a mission of excavation and research. During the following thirty years he devoted himself to similar pursuits, working principally at Saqqarah, the Serapeum at Memphis, at Abydos, Thebes, Edfu, Denderah, and Tanis. The founding of the Egyptian Museum at Bulak (afterward at Gizeh, and soon to be placed in a suitable and special building) was due to his efforts, and of it he was long the director, as well as inspector-general and guardian of the national monuments. He died at Cairo, Egypt, Jan. 18, 1881. He was principally noted as an archæologist, not as a decipherer of the hieroglyphic writing. His publications were largely at the expense of the khedive, and related principally to the historical materials which he discovered. The following are among his best-known books: *Choix de monuments* (Paris, 1856); *Deir el Bahari* (Leipzig, 1877); *Karnak* (Leipzig, 1875); *Abydos* (Paris, 1880); *Denderah* (4 vols. and supplement, Paris, 1869–80); *Monuments of Upper Egypt* (London, 1877; Boston, 1890). C. R. GILLETT.

Mar'igold: a popular name for various yellow-flowered plants, but especially for those of the genera *Tagetes* and *Calendula*, of the order *Compositæ*. The so-called African and French marigolds are of the first-mentioned genus. Both are South American. The true marigold (*Calendula officinalis*), indigenous to the south of Europe, has long been cultivated in gardens, and is prized in domestic medicine. It is sometimes employed in flavoring soups. See CALTHA.

Mari'na, called by the Indians *Malintzin'*: mistress of Hernando Cortés; b. in Goazacoalco (Campeche) about 1501. Accounts of her early life vary, but for some reason she was sold into slavery among the Maya Indians of Tabasco; in 1519 the Tabascan chief gave her, with other girls, to the Spaniards of Cortés's expedition. She soon acquired the Spanish language, and owing to her knowledge of Mexican she was of great assistance to Cortés as an interpreter. Marina followed Cortés to Mexico, was present during the siege, and is a prominent character in the events of that period. Of the children whom she bore to Cortés, one, Martin, became prominent in later history. In 1524 she was married to Juan Jaramillo, a Spanish captain, who subsequently held lucrative offices in Mexico; Marina was living there as late as 1550, but the date of her death is unknown.

H. H. SMITH.

Marine City: city (founded in 1836); St. Clair co., Mich. (for location of county, see map of Michigan, ref. 7–K); on the St. Clair river; 20 miles S. of Port Huron. It contains 4 ship-yards, 4 mills for sawing lumber and ship timber, 2 salt-blocks, stave and heading, hoop, planing, and flour mills, foundry and boiler and machine shops, and sash, door, and blind factories. There are 2 savings-banks with combined capital of $75,000, and 2 weekly newspapers. Pop. (1880) 1,673; (1890) 3,268; (1900) 3,829.

EDITOR OF "MAGNET."

Marine Glue: See GLUE.

Marine Insurance: the system by which owners of vessels are insured against pecuniary loss caused by shipwreck or other disaster at sea.

History.—Marine insurance may be regarded as a necessity of commerce; it has ever followed in its wake. It probably had its origin when maritime ventures were specially exposed to the depredation of pirates. In its inception it seems to have partaken more of the character of loans, still known, but practiced under different conditions, as bottomry and respondentia, the first meaning mortgage of a ship, and the second loan on the cargo. Large premiums were paid for these loans to cover interest for use of the money as well as for the maritime risk, because in case of shipwreck or capture the lender lost the money loaned. Suetonius refers to the Emperor Claudius as probably the contriver of marine insurance. It is stated that at a time of corn famine in Rome (A. D. 43) Claudius encouraged the merchants to send ships for supplies, guaranteeing to pay for the value of vessel and cargo in the event of wreck or capture. Further record gives the use of the same system in Italy in 1194. An ordinance of Barcelona indicates that marine insurance was known in Spain prior to 1435.

Policies appear to have been first issued in Florence in 1523. The development of marine insurance into a system may be traced to the commercial activity of the Mediterranean states. Its introduction into Northern Europe was doubtless through the Hanseatic League, whose early operations at Wisby, and later at Bruges, gave an impetus to the practice. The latter place was one of the great marts of the league, and indeed was acknowledged as the metropolis of the world's commerce; in it, it is stated, a chamber of insurance was established as early as 1311. The merchants of the steel-yard located on the Thames, London, were the representatives of the league in England. It is interesting to follow the record of their operations, and to notice the extent of their influence on the commercial activity of that country. For several centuries they seem to have held sway and had enormous privileges accorded to them by the various sovereigns. International intercourse through them doubtless gave marine insurance its foothold in England. In the reign of Elizabeth the steel-yard was closed, and the merchants were expelled from the kingdom. The first statute regarding marine insurance was passed by the English Parliament in 1601.

While the merchants of the steel-yard introduced marine insurance in England, it is to the Lombards who emigrated there the middle of the thirteenth century that the practice owes the rules and regulations handed down to this day. The form of policy now generally used is substantially the same as one arranged by them, drawn from the original forms used in Florence, Pisa, Venice, and Barcelona. Originating in such an early period, its language is quaint and somewhat incoherent, but, as has been remarked by a learned judge, through a prolonged series of judicial decisions it has "obtained a clear and definite meaning"; and again, "every word of it has been weighed in the judicial balances and assigned its proper value." The decisions of the learned Lord Mansfield have specially contributed to that end.

Origin of Lloyd's.—The business of marine insurance was originally done by individual merchants and moneylenders. The one seeking protection to his venture filled up the policy and submitted it to the one whose protection he sought; if the risk was accepted by the latter he underwrote the policy, i. e. signed it, and thus became the *underwriter*.

In the latter part of the seventeenth century coffee-houses were numerous in London, and they were the resort of merchants and underwriters. One of these houses, located in Tower Street and kept by Edward Lloyd, became famous on account of information concerning ships and maritime matters furnished by Mr. Lloyd. In the summer of 1696 he began to publish a small sheet called *Lloyd's News*, which was suppressed by the Government after seventy-six numbers had been issued. In 1726 the publication was revived in an enlarged and improved form, and has continued, changing its title only, to *Lloyd's List*. In this humble beginning originated the extensive system of individual underwriting known as "Lloyd's" in London and copied in various forms throughout the commercial world. Marine insurance at Lloyd's increased largely. (See LLOYD'S.) In 1810, during the war, one risk on treasure laden on the frigate Diana, valued at £656,000, was insured there from Vera Cruz to England at 4 per cent. premium.

Insurance by joint-stock companies originated with the Dutch in connection with their trading companies, but at first it did not meet with much favor in England. Through the efforts of Lord Chetwynd and Lord Onslow in 1720 two companies were chartered—the London Assurance and the Royal Exchange—for each of which the large sum of £300,000 was paid to the Government; the companies were granted a monopoly of the business of marine insurance; under their charters all but private underwriters were excluded from becoming insurers in the future. In 1810 a parliamentary investigation of the conduct of the business of those companies was made and strong appeals presented for the repeal of the monopoly to enable the incorporation of a large company, but the effort failed, mainly through the influence of individual underwriters. In 1824 the repeal was accomplished, and the large company was chartered. In the investigation referred to it was discovered that out of a total estimated value of £162,538,900 insured in the kingdom in 1809, the chartered companies had insured an

insignificant part, nearly the whole having been insured at Lloyd's.

Scope and Definition of Policy.—First, as to the scope of the policy. The risks insured against are fully set forth in the body, and may be epitomized as "perils of the sea," and include all marine hazards resulting from the violent action of the elements, all casualties as distinguished from the ordinary *undisturbed* prosecution of the voyage; they are such as the ordinary agency of man may not prevent. The policy does not assume liability for loss or injury arising from causes *inherent* in the article insured. Second, policies are distinguished by different names. A voyage policy is one covering a specific voyage, as from New York to Liverpool. A time policy is one covering a designated period of time, for example, on a ship for one year. An open policy is one in which an amount is insured without expressed *value* of the goods, that being left to be determined by the invoice, as "on 100 cases merchandise." The same designation is given to a form of policy common in the U. S., particularly in New York. It is issued to avoid multiplying policies, and made for a nominal amount, and insures only such risks as are accepted and indorsed on it by the underwriters upon application of the merchant. This latter is also sometimes called a general policy. A special policy is one insuring a specific risk, with name of vessel, etc. A floating policy is one insuring by vessel or vessels. A wager policy is one that shows on the face of it the assured has no interest in the property. This class of insurance, i. e. without interest, was quite common in England, but modern legislation has ever aimed to eliminate a gambling element from marine insurance. Under statute 19 George II., insurances without interest were declared illegal. In many States of the U. S. similar enactments exist. Insurances are, however, still made "policy proof of interest," but recovery for loss under such policies is not encouraged by the courts. It is important to observe that an interest in the property insured is an indispensable condition in all marine insurances.

It has been seen that the printed policy has been clearly defined by judicial decisions. The original conditions are, however, frequently modified or changed by clauses written, or printed in *red*. For example, the risk of capture or seizure is included among the perils enumerated as covered, but invariably a clause, commonly called "war clause," is inserted exonerating the underwriter from loss occasioned by those perils. When they are assumed the clause is waived, for which, in case of war, a considerable advance in premium is charged. In like manner the measure of liability for loss in respect to other perils may be increased or curtailed by clauses, as may be agreed upon by the assured and assurer.

It should be observed that written conditions supersede anything in the printed wording to which they are opposed.

Definition of Terms.—The word "average," frequently occurring in connection with marine insurance, is a name applied to certain descriptions of loss. There are two kinds of average: particular average and general average. The first means damage or partial damage to the ship or to the particular subject to which it relates. The second comprehends all loss arising out of a voluntary sacrifice made of any part of the ship or cargo to prevent loss of the whole, or to rescue the whole adventure from unusual peril. All extraordinary expenses incurred for the general good are likewise included in that definition. The main principle of general average has been derived from the "Rhodian law," but all commercial nations have endeavored to bring its practice within the highest rules of equity. Several international congresses have been held on the subject, notably those at York, England, in 1864, and at Antwerp in 1877; a new code was adopted and designated York-Antwerp rules. This code is frequently referred to as a basis of agreement in general average questions. An insurance made free of particular average excludes partial loss or damage. In English policies, however, it is invariably qualified by the clause "unless the vessel be stranded, sunk, burnt, or in collision." Some American companies have modified the qualification by making it "unless *caused* by stranding, sinking, burning or collision *with another vessel.*" In the latter form the element of uncertainty as to the cause of damage is removed. Insurances made free of general and particular averages reduce the liability under the policy to total loss only. There may be an actual as well as constructive total loss. Actual when the property insured is absolutely lost or destroyed by the perils insured against. Constructive when by any of those perils the voyage can not be performed, or the property is so damaged as to be of little value.

Under the head *memorandum* the policy excludes claim for particular average on certain articles and those which are perishable in their own nature. It also names the per centum of average at which others are insured. Thus grain, being one of the articles excluded, would not be insured against particular average unless specially provided for in writing.

Duration of the Risk.—Insurance on a ship begins at the port from which insured, and continues until moored at anchor for twenty-four hours in good safety at the port to which insured. Insurance on cargo begins immediately following the loading of it in the vessel, and continues until the discharge of it at the port of destination. If it is the custom of the port to convey goods in lighters from the ship to the shore, they are insured until so landed. Insurance on freight, i. e. earnings of the ship for transporting the cargo, begins and terminates simultaneously with the insurance on the cargo. When an insurance is made on chartered freight, i. e. freight to be earned under a charter, the policy attaches as soon as the vessel sails on the voyage covered, although she may be destined to a distant port for cargo.

Marine Underwriting in the United States.—There is no evidence that marine insurance was practiced to any extent in the North American colonies, nor for some time after the establishment of the Government of the U. S. There were a few individual underwriters, and associations were also formed for underwriting; but it was not until 1793 that the General Assembly of Pennsylvania chartered a company with the title Insurance Company of North America. The first company chartered by the State of New York was the New York Insurance Company in 1798, with a capital of $500,000. During the nineteenth century twenty-six companies have been chartered by that State, of which one only continues in active business; the others have failed or liquidated. There are also in New York two underwriting associations conducted by attorneys for the benefit of subscribers, one of which is named United States Lloyd's.

Mutual Companies.—A company chartered in New York in 1834 to do insurance on a mutual basis met with unexampled success at first, and drew a large part of the business from the stock companies. The profits of the latter companies accrued to their stockholders, while in this new method the profits reverted to the dealers, thus giving them their insurance at cost. The latter system became at once popular. Many of the stock companies liquidated in 1842, and reorganized on the mutual plan. Among the number was the Atlantic, now known as the Atlantic Mutual, a company that presents an interesting phase in marine underwriting, both in respect to the system by which it is characterized and the development of its business. American companies in the seaports of the U. S. have passed through the same experience as those in New York, and the business of marine insurance is now largely done through the agencies of British companies.

Probably on no other commercial subject has there been so much written as on marine insurance. The subjoined list gives some of the more important works on the subject: Phillips, *A Treatise on the Law of Insurance*; Arnould, *A Treatise on the Law of Insurance and Average*; Benecke, *A Treatise on the Principles of Indemnity in Marine Insurance*; Emerigon, *A Treatise on Insurance*, translated from the French, with notes; Duer, *The Law and Practice of Marine Insurance*; Parsons, *A Treatise on the Law of Marine Insurance*; Martin, *A History of Lloyd's and of Marine Insurance in Great Britain*; Park, *A System of the Law of Marine Insurance.*

A. A. Raven.

Marine'o: town in the province of Palermo, Sicily; in a grain, vine, and olive bearing district, about 15 miles S. of the city of Palermo (see map of Italy, ref. 9–E). In a little country church near Marinco are some very fine frescoes of the fourteenth century. Ficuzza, an old feudal seat and a favorite summer retreat of Ferdinand III., is in this vicinity. Pop. about 9,600.

Mariner's Compass: See Compass.

Marines [from Lat. *mari'nus*, pertaining to the sea, marine; deriv. of *mare*, sea]: troops enlisted for service on board men-of-war and at naval stations. Considered in the light of infantry serving afloat, marines are, as a distinct corps, coeval with navies. Among the Greeks they were known as *epibatæ*, a class described by historians as the fighting men who served exclusively on board ships of war.

Though armed like the infantry on shore, they were yet distinct from the land troops, and entirely unlike the rowers or mariners who served in the fleet. The number of epibatæ assigned to each vessel bore about the same proportion to the crew as the number of marines to the crew of a modern man-of-war. In the Roman navy marines were styled *classiarii milites*. In the early history of the English navy we read of men-at-arms still serving afloat, their armor and weapons differing but little from those of the ancients. The Scandinavians called them *båt-karler* or sea-soldiers—that is, carls, or sturdy fellows, who fought in boats. Later they were called *supra-salientes*, a word still preserved in the Spanish *sobresaliente*. The Genoese crossbowmen, the best marines of the period, were in the thirteenth century employed, and very highly esteemed, in the English navy. In Aug., 1387, Sir Henry Percy ("Gunpowder Percy") was appointed "captain of all the men-at-arms and archers of the fleet." He was, in fact, commandant of marines.

With the introduction and gradual increase of naval ordnance the occupation of men-at-arms afloat passed away. The earliest employment of marines under their present form was in 1653, when Admiral Blake embarked a number of soldiers to act as small-arms men (Schomberg's *Chronology*, vol. i., p. 51) in the battle with von Tromp off Portland. Subsequently, in 1664, troops from the line were detailed for service afloat, and came to be called *marine soldiers*, or *marines*. (Grose's *Military Antiquities of the English Army*.) For good conduct in battle, but more particularly for steadfast loyalty during the great mutinies in the fleet at the Nore and at Spithead, they were, in general orders dated Apr. 20, 1802, styled Royal Marines. The Royal Marine forces of Great Britain are divided into two branches: the Royal Marine Artillery and the Royal Marine Light Infantry, comprising 14,000 men. They are obliged to serve for fourteen years, and then may re-engage for seven years. At the expiration of the twenty-one years' service they are pensioned. The artillery consists of one division, quartered at Plymouth, and the infantry of three divisions, quartered at Chatham, Portsmouth, and Plymouth.

The U. S. Marine Corps was first established by the act of Congress of Nov. 10, 1775, authorizing the enlistment of two battalions, to be styled "first and second battalions of marines." After the adoption of the present Constitution and the reconstruction of the navy, the Marine Corps was again called into existence by the act of July 11, 1798, "establishing and organizing a marine corps." By this act the Marine Corps is at any time liable to do duty in the forts and garrisons of the U. S. on the seacoast or any other duty on shore, as the President may direct. The corps consists of 1 colonel commandant, 1 colonel, 2 lieutenant-colonels, 1 adjutant and inspector, 1 quartermaster, 1 paymaster, 4 majors, 2 assistant quartermasters, 20 captains, 30 first lieutenants, 12 second lieutenants; also 1 sergeant-major, 1 quartermaster-sergeant, 1 leader of band, 1 drum-major, 50 first sergeants, 140 sergeants, 180 corporals, 30 musicians, 96 drummers and fifers, 25 apprentices learning music, and 1,575 privates; total, 2,175. The Naval Appropriation Act approved Aug. 5, 1882, enacts that from the naval cadets (Naval Academy, Annapolis) who successfully complete the six years' course appointments shall be made to fill vacancies in the lower grades of the line and engineer corps of the navy, and *of the Marine Corps*, in the order of merit, as determined by the academy board of the Naval Academy, the assignment to be made by the Secretary of the Navy on the recommendation of said board. Marine officers are on the same footing as to rank, pay, and allowances as similar grades in the infantry; take precedence of like rank in the volunteers and militia; may be associated with officers of the army on courts martial, the senior to preside; are promoted up to colonel by seniority; can not exercise command over navy-yards or vessels of the U. S.; and no officer can absent himself without leave until notified of the acceptance of his resignation. The staff is separate from the line and appointed by the President by selection. The colonel commandant is also appointed by selection. Officers may be advanced thirty numbers in rank for gallant conduct in battle or extraordinary heroism, and retire at the age of sixty-four. (See *Laws United States Navy*.) The judge-advocate-general of the navy may be appointed from the officers of the Marine Corps. Privates enlist for five years. The recruit must be at least 5 ft. 5 in. high, between eighteen and thirty-five years of age, able to read and write, of steady habits, unmarried, well made, and in good health. Credit is given to both officers and men for previous service in the volunteer army or navy, and re-enlistment in either the army or the Marine Corps within thirty days after honorable discharge will count as continuous service, which brings increase of pay. Marines are exempt from arrest for debt or contract. The marine guard of the Chicago, flagship, consists of 1 captain, 1 lieutenant, 4 sergeants, 5 corporals, 2 musicians, and 45 privates; total, 58. Other vessels of similar size, like the Baltimore, Newark, San Francisco, etc., carry 1 commissioned officer, 3 sergeants, 3 corporals, 2 musicians, and 32 privates; total, 41. A fourth rate, like the Petrel, is entitled to 1 sergeant, 2 corporals, and 7 privates; total, 10. The marine guard constitutes the police force, and is an indispensable element of the organization of a ship of war. Marines may be detached for service on board the armed vessels of the U. S., and the President may detach, and appoint for service on board said vessels, such officers of said corps as he may deem necessary. (Sec. 1616, *Revised Statutes*.) The Marine Corps shall at all times be subject to the rules and regulations for the better government of the navy, except when detached for service with the army by order of the President, when they come under army regulations. The headquarters of the corps and the "school of application" for the instruction of officers and enlisted men are at the U. S. marine barracks, Washington, D. C. See *History of the United States Marine Corps*, by Capt. R. S. Collum, U. S. M. C.

S. B. Luce.

Marinette: city; capital of Marinette co., Wis. (for location of county, see map of Wisconsin, ref. 4–F); on Green Bay, at the mouth of the Menominee river, and on the Chi. and N. W. and the Chi., Mil. and St. P. railways; 49 miles N. by E. of Green Bay. It has an excellent harbor, in which the U. S. Government has expended over $275,000 for improvements, and is near large tracts of valuable hard and soft wood forests, and beds of iron ore. Two bridges, one of wood, the other of iron (cost $75,000), connect the city with Menominee, Mich., on the other side of the river. There are 14 churches, 5 public-school buildings (cost $100,000), water-works (cost $200,000), public park, driving-park with a half-mile track, 3 cemeteries, 2 national banks with combined capital of $200,000, electric lights, electric street-railway, and 2 daily and 8 weekly newspapers. The city has a large lake traffic, and is principally engaged in the lumber industry, and in pulp and paper making. Pop. (1880) 2,750; (1890) 11,523; (1900) 16,195.

Editor of "North Star."

Marini, maă-ree'neĕ, Giovanbattista: poet; b. in Naples, Italy, Oct. 18, 1569. His father, a lawyer, wished to bring him up in the same profession, but found him more inclined to poetry and dissipation than to serious studies. At length, weary of his spendthrift habits, he turned him out of his house. The youth was saved from misery for the time, however, by the Prince of Conca, grand admiral of Naples, who made him his secretary. In his family Marini made the valuable acquaintance of Torquato Tasso. In 1598 a disgraceful escapade obliged him to flee from Naples, and he went to Rome. Here he soon made friends among the great, but toward 1602 he went to Venice to see through the press a collection of his poems, *La Lira* (3 parts, 1602–14). Returning to Rome in 1603 he lived with Cardinal Aldobrandini, whom he accompanied to Ravenna a little later. In 1608 we find him living in Turin, where he found favor for a time at the ducal court. In 1615, however, he went to Paris, where he was kindly treated by Marie de' Medici and by Louis XIII. His literary fame was now very great, and he exercised a powerful influence upon the ideals, not only of Italian, but also of French writers. For a time, indeed, his style was the model to which all elegant poets strove to conform, and Marinism, like Euphuism in England and Gongorism in Spain, became a veritable disease. In 1623 he returned to Italy, and after a time in Turin he settled in Rome, where he was shown extraordinary honor, and made Prince of the Academy of the "Umoristi." Finally, he went back to Naples, where the splendor of his reception was in marked contrast to the manner of his departure years before. D. at Naples, Mar. 25, 1625. Few poets have exerted a greater influence than he upon their contemporaries, and it must be admitted that real excellences in his work in part justify this. His ideals, however, both moral and literary, were mainly vicious, and show us the decaying Renaissance at its worst. Besides the collection of poems mentioned above, Marini wrote many other works, but the most important is the long poem of 45,000 verses, entitled *Adone* (1st ed. Paris, 1623). Though purporting

to deal with the love of Venus and Adonis, the poem was used by its author as a receptacle for all kinds of matters. Much autobiographical information, for example, is to be found in it. The work is extremely licentious, and the style is often painfully mannered. See F. Mango, *Le fonti dell' Adone* (Turin, 1891). Also M. Menghini, *La vita e le opere di Giambattista Marini* (Rome, 1888).

A. R. Marsh.

Marino, maă-ree'nō: town in the province of Rome, Italy; beautifully situated on a slope of the Alban Hills; 12 miles S. E. of the city of Rome (see map of Italy, ref. 6–E). The walls and towers present a very picturesque appearance; its streets and squares are broad, and the public buildings, especially the churches, are well worthy of notice, both for their external architecture and their interior decorations. In 1347 it was the scene of a conflict between Rienzi and the great Orsini family, after which it was for a long time in the hands of the Colonna, who still have large possessions here. There is more manufacturing industry in this place than is usual in this part of Italy. Marino was the birthplace of the celebrated Victoria Colonna. Pop. 6,070.

Mario, maă-rec'ō, Giuseppe, Marquis di Candia: opera-singer; b. at Cagliari, Sardinia, Oct. 18, 1810; served for some time in the Sardinian army, from which he resigned, and, when his resignation was not accepted, succeeded in escaping to Paris. Having received a fine musical education, and possessing an admirable tenor voice, which he improved by two years' study in Paris, he accepted an engagement in opera, and made his *début*, under the assumed name of Mario, in *Robert le Diable*. He soon became the acknowledged leading tenor, and was a great favorite in England and on the Continent. He married Giulia Grisi, by whom he had several children. In 1854, in company with Grisi, he fulfilled a successful operatic engagement in the principal cities of the U. S. In 1871 he retired from the stage in London, but in 1872 appeared in concert in the U. S. with poor success, his voice having lost its beauty. D. in Rome, Dec. 11, 1883.

Mariol'atry [from Gr. Μαρία, Mary + λατρεία, priestly service, worship]: the worship of Mary, the mother of Jesus. This has no foundation whatever in the New Testament, but developed naturally as Jesus became the Church doctrine and less the Friend of man, the Elder Brother of the whole human family. The heart of the Church found in the mother of Jesus the tenderness and sympathy the intellect had deprived it of when it formulated its cold and abstract theories of the person of Jesus from the idea of Christ as the God-Man. Before the close of the fourth century there had been produced a considerable amount of apocryphal and legendary descriptions intended to supplement the meager information which the Gospels give concerning the mother of Jesus. From the Nestorian controversy this whole movement received a decided impetus. The question arose and was hotly discussed whether Mary should be styled "mother of God," or only "mother of Christ." Nestorius rejected the former title as inappropriate, but was condemned by the Synod of Ephesus (431), and the Fathers who had defended "mother of God" were accompanied with torchlights and incense-burning from the assembly-room of the synod through the illumined city to their respective stopping-places. Thus the worship of Mary was established, and it rapidly increased during the next centuries. After the iconoclastic controversies, images of her became very frequent not only in the churches and houses, but also in the streets and along the roads, and it became customary to light candles and burn incense in front of them. Numberless miracles were wrought by her relics and images, and Saturday was consecrated to her memory. The Synod of Toulouse (1229) fined people for neglecting her worship. The modern Roman Church, under the impetus of Pius IX., has declared (1854) that Mary was immaculately conceived. The Protestant position is that her worship brings to her the homage, trust, and affection which rightly belong to her Son alone. See Mary.

Revised by S. M. Jackson.

Marion: town; capital of Perry co., Ala. (for location of county, see map of Alabama, ref. 5–C); on the E. Tenn., Va. and Ga. Railway; 30 miles N. W. of Selma. It is the seat of the Marion Female Seminary (non-sectarian, chartered 1836), Judson Female Institute (Baptist, opened 1839), and Marion Military Institute (non-sectarian, opened 1887); is principally engaged in agriculture; and has weekly and quarterly periodicals. Pop. (1890) 1,982; (1900) 1,698.

Marion: city; capital of Williamson co., Ill. (for location of county, see map of Illinois, ref. 11–E); on the St. L., Alt. and Terre H. Railroad; 172 miles S. by E. of Springfield. It is in an agricultural and coal region, has woolen and cotton mills, and contains 6 churches, graded public school, county buildings, and 2 weekly newspapers. Pop. (1880) 881; (1890) 1,338; (1900) 2,510.

Editor of "Leader."

Marion: city; capital of Grant co., Ind. (for location of county, see map of Indiana, ref. 4–F); on the Mississinewa river, and the Cleve., Cin., Chi. and St. L., the Pitts., Cin., Chi. and St. L., and the Toledo, St. L. and Kan. City railways; 41 miles S. E. of Logansport, 67 miles N. E. of Indianapolis. It is an agricultural, fruit-growing, and natural-gas region; has 72 manufacturing establishments, including 10 glass-factories, malleable-iron works, and flour and rolling mills; is the seat of a national soldiers' home which cost over $1,000,000; and has a normal college, high-school building which cost $60,000, electric street-railway, and 2 daily and 5 weekly periodicals. Pop. (1880) 3,182; (1890) 8,769; (1900) 17,337. Editor of "Chronicle."

Marion: city; capital of Linn co., Ia. (for location of county, see map of Iowa, ref. 4–J); on the Chi., Mil. and St. P. Railway; 6 miles N. E. of Cedar Rapids, 70 miles S. W. of Dubuque. It has important manufactures, including foundry products, flour, carriages, furniture, and agricultural implements, and 2 public parks and 3 weekly newspapers. Pop. (1880) 1,939; (1890) 3,094; (1900) 4,102.

Marion: city; capital of Marion co., Kan. (for location of county, see map of Kansas, ref. 6–G); on the Cottonwood river, and the Chi., Rock Is. and Pac. and the Atch., Top. and S. Fé railways; 104 miles S. W. of Topeka. It is in an agricultural, fruit-growing, and stock-raising region; contains 4 churches, 2 public schools, several public parks, and valuable mineral springs; and has an iron-foundry, flour-mills, and 2 weekly newspapers. Pop. (1880) 857; (1890) 2,047; (1900) 1,824. Editor of "Record."

Marion: city: capital of Marion co., O. (for location of county, see map of Ohio, ref. 4–E); on the Cleve., Cin., Chi. and St. L., the Col., Hock. Val. and Toledo, the Col., Sandusky and Hock. Val., and the Erie railways; 40 miles N. of Columbus. It is in an agricultural region; has large steam-shovel works, malleable-iron works, thresher and engine works, track-sulky and mattress factories, and lime-kilns; and contains a normal school, business college, 2 State banks with combined capital of $425,000, a banking company with capital of $200,000, and a private bank, and 2 daily, a semi-weekly, and 3 weekly newspapers. Pop. (1880) 3,899; (1890) 8,327; (1900) 11,862. Editor of "Evening Star."

Marion: town; capital of Marion co., S. C. (for location of county, see map of South Carolina, ref. 5–G); on the Wilmington, Col. and Augusta Railroad; 85 miles W. of Wilmington, N. C., 125 miles E. by N. of Columbia. The Great Peedee river, navigable for steamboats, is 8 miles distant. The town is in a cotton-growing region, and has two weekly newspapers. Pop. (1880) 824; (1890) 1,640; (1900) 1,831.

Marion: town: capital of Smyth co., Va. (for location of county, see map of Virginia, ref. 7–C); on the Norfolk and Western Railroad; 160 miles W. of Lynchburg. It is in an agricultural, mining, and cattle-raising region; has flour-mills, iron-foundry, and agricultural-implement works; and contains Marion Female College, a high school, and two weekly newspapers. Pop. (1890) 1,651; (1900) 2,045.

Marion, Francis: soldier; b. at Winyaw, near Georgetown, S. C., in 1732, of Huguenot ancestry; received a very limited education; went to sea at the age of sixteen, and barely escaped with his life from a vessel that foundered on a voyage to the West Indies. He volunteered in the expedition of Gov. Lyttleton against the Cherokees (1759), and was a captain in Middleton's regiment in 1761. He served with honor in the Revolutionary war, taking part in the defense of Fort Moultrie, in the siege of Savannah, and in the defense of Charleston, but his most noteworthy achievements belong to the last two years of the war, during which he maintained a harassing partisan warfare against the British. He recruited a few companies from among his neighbors, who were obliged to content themselves with the rudest arms and equipments, and joined Gen. Gates in North Carolina, but this re-enforcement met only with ridicule on account of its ragged condition. Marion was returning from a bootless errand against the British boats on the neighboring rivers at the time Gates was defeated at

Camden (August), and falling suddenly upon the British guards he succeeded in rescuing the Continental prisoners. A few days later he surprised and dispersed in quick succession two bodies of Tories, baffled pursuit by Tarleton, and from that time was for more than two years engaged in a constant series of adventurous forays and manœuvers which procured him the name of the "Swamp Fox," and laid a basis for a thousand legendary tales. He occasionally undertook more formal warfare in the capture of British outposts, and took part in several battles in connection with the army of Greene. After the evacuation of Charleston (Dec., 1782) Marion disbanded his forces and resumed the life of a farmer, and married a lady of wealth. He served in the State Senate and the constitutional convention of 1790, was until 1794 a general of the State militia, and died on his plantation near Eutaw, Feb. 29, 1795. See his *Life*, by Horry and Weems, and that by W. G. Simms.

Marionettes' [plur. of *marionette* = Fr., liter., dimin. of *Marie*, Mary], or **Pup'pets** [from O. Fr. *poupette*, doll, puppet; cf. Fr. *poupée*, doll < deriv. of Lat. *puppa*, girl, doll]: small figures set in motion on a miniature stage by a concealed mechanism of springs and wires or cords, to represent the action of a pantomime. This amusement was known both to the Greeks and Romans (Gr. ἀγάλματα νευρόσπαστα; Lat. *imaguncula*), has been popular in Italy ever since the Middle Ages under the name of *fantoccini*, and was introduced into France in the time of Charles IX. In England the puppet-show was common in the time of Elizabeth, as may be gathered from allusions in *Hamlet*, *Two Gentlemen of Verona*, and Ben Jonson's *Bartholomew Fair*. Regular dramas were sometimes attempted, as in the case of Jonson's *Bartholomew Fair*, so named from the locality in London which was then the chief resort of puppet-players. Puppets were still popular in the days of Swift and *The Spectator*, but for a century and a half thereafter were rarely seen except at country fairs or as strolling "Punch-and-Judy shows," until in 1872 they reappeared in London, under the name of "marionettes," as a French novelty, and were exhibited for many months with very complete apparatus and scenery at the Egyptian Hall. Since that time the marionettes have been represented in various parts of the U. S. and in the Spanish-American republics. See PUNCH.

Mariotte's' Law: the principle, called otherwise **Boyle's Law**, that if the temperature remains the same the volume of a gas will vary inversely as the pressure. This formula was enunciated independently both by Mariotte (a French physicist, d. 1684) and BOYLE (*q. v.*), and is found very nearly true in experiment with gases not too near their point of condensation. With those which under severe pressure become liquefied, departures from the law occur, which are wider the more nearly the point of liquefaction is approached, the diminution of volume being more than proportional to the increase of pressure. See GAS and HEAT. E. L. N.

Mariotti, L.: See GALLENGA, ANTONIO CARLO NAPOLEONE.

Mariposa Lilies [*mariposa* is Span. for butterfly]: popular name for species of *Calochortus*, a genus of liliaceous plants, all natives of the Western U. S. and Mexico. They grow from corms, producing sparingly leafy, herbaceous stems, bearing large, showy, terminal flowers, consisting of three outer narrow segments, and three inner broad ones, which are mostly glandular and bearded. Thirty-two species are known, of which *C. venustus*, *C. luteus*, and *C. pulchellus* of California, and *C. nutallii* and *C. gunnisonii* of the Rocky Mountains, are best known. Many species are cultivated in gardens in the U. S. and Europe; they are sometimes called butterfly lilies.

Flower of *Calochortus venustus*.

CHARLES E. BESSEY.

Mariposan Indians, or **Yokuts Indians** [*Mariposan* is from the Spanish *mariposa*, butterfly, the name of a county of California; *yokuts* signifies Indian or Indians in the native tongue]: a linguistic stock of North American Indians comprising the Cholovone and Yokuts divisions. At the time of the American possession the latter inhabited a territory embracing that part of California bounded on the N. by Fresno river up to the point of junction with the San Joaquin, thence by a line running to the northeast corner of the Salinan territory, about Big Panoche creek, San Benito County, on the W. by a somewhat irregular line extending from San Benito to Mt. Pinos. The eastern boundary was the secondary range of the Sierra Nevada. The Cholovone division occupied the east bank of the San Joaquin, from the Stanislaus to the point where the San Joaquin turns westward to enter Suisun Bay, being thus separated from the Yokuts by Moquelumnan stock. Unlike most of the California tribes, the Mariposan, particularly the Yokuts group (which embraced some twenty-four small tribes), displayed great political solidarity, and hence were more capable of being grouped into coherent masses, before the advent of the whites. Their villages were very small. Every large natural division, such as a river-valley, constituted the domain of a tribe, which had its hereditary chief.

The food-supply of the Mariposan Indians included a number of farinaceous products, besides caterpillars, grasshoppers, a huge succulent worm resembling the tobacco-worm, dogs, and even skunks. The coyote and rattlesnake were considered sacred, the former being revered as the creator of the universe. Their medical treatment was chiefly by scarifications with flints, since it was believed that all diseases resided in the blood. Sweat-houses were in use by the Mariposan as well as, probably, by all other California tribes. Sorcery prevailed, and their wizards induced delirium by chewing jimson (*Datura*) seeds, their ravings while under its influence being regarded as divinely inspired oracles.

As a race the Mariposan tribes were considered peaceful. Although they celebrated a war-dance they took no scalps. They were devoted to gambling, the women having a separate game similar to dice-throwing. Marriage among the Yokuts was by purchase, and before the appearance of the whites all the Mariposan tribes, unlike the northern natives, were comparatively virtuous. Infanticide was practiced in case of deformity. Cremation was common to all the tribes of this stock except the Chukchansi, who were said to burn only those who died a violent death, or were snake-bitten. Among the ceremonials of the Yokuts was the weird "dance for the dead" which was continued for nearly a week.

In 1850 the population of the various Mariposan tribes was probably between 2,000 and 3,000. According to the census of 1890 but 167, classed as "desert Indians," survived. These are under the mission agency of California.

AUTHORITIES.—Powers, *Tribes of California*, *Contributions to North American Ethnology*, iii. (Washington, 1877); Bancroft, *History of California*, vols. i.–vii. (San Francisco, 1884–90). See INDIANS OF NORTH AMERICA. F. W. HODGE.

Maritime Law: See INTERNATIONAL LAW.

Maritime Province (in Russian, *Primorskaia Oblast*): the province which occupies the eastern coast of Siberia, including all the adjacent islands except Saghalin, which is an independent province. It is bounded on the N. by the Arctic Ocean, on the E. by Bering Sea, the Sea of Okhotsk, and the Sea of Japan, and on the S. by Korea. On the W. it is separated from Manchuria by the Usuri river as far as Lake Khanka, and S. of that by the coast watershed; from the Amur province and Yakutsk generally by the watershed of the eastern coast. The western boundary terminates in the Bay of Chaoun, on the Arctic Ocean, in lon. 170° E. As thus limited, the province is long and narrow, extending from 42° 19′ N. to 70° N., and having a breadth varying from only a few miles on the Sea of Okhotsk to over 400 within the Arctic circle. The total area is 715,982 sq. miles, of which 3,500 is in islands and 3,400 in lakes. Pop. (1889) 102,786. The coasts have abundant harbors, but they are all closed by freezing for a part of the year. The interior is generally mountainous, except beyond the Arctic circle, where large plains or tundras prevail. The Amur river passes through the province N. W. from the junction of the Usuri, a distance of about 700 miles. The Usuri rises in Lake Khanka, and flows N. 350 or 400 miles until it joins the Amur. The only other large river is the Anadyr, within the Arctic circle. It is a considerable stream, with a length of probably 700 miles, emptying into the Gulf of Anadyr of Bering Sea. The climate resembles that of the east coast of North America from Baffin's Land to New England. About the Amur it is like the Province of Quebec, and to the southward like New England. The soil is in

places excellent, the summers are hot, and the rainfall sufficient. It is a promising region for immigration, and efforts are being made by the Russian Government to fill it with Russians rather than with the Chinese, who are rapidly flowing in. For the Usuri region free passage was given to Russians in the following numbers for the years named: 1883, 1,596 persons; 1884, 1,879; 1885, 2,458; 1886, 2,847. The capital was at first Nikolacisk, at the mouth of the Amur, but was later moved to Kabarofka, at the junction of the Usuri. Later the southern part of the province was acquired, and the capital was moved to Vladivostok, a magnificent port near the southeast angle of the province, a place now strongly fortified. MARK W. HARRINGTON.

Maritza [anc. *Hebrus*, famous in mythology]: principal river of European Turkey. It rises in the Balkans, flows generally S. E., becomes navigable at Adrianople, and empties into the Ægean Sea at Enos.

Mar'ius, GAIUS: a Roman general; was born in 155 B. C. at Arpinum, the birthplace of Cicero. His parents were of humble station, although it has been suggested that the lowliness of his origin has been exaggerated. A career was opened to him by the fact that at the siege of Numantia (in 134) he attracted the attention of the younger Scipio Africanus, because of his valor. Fifteen years later he appears in the office of a tribune of the people, in which his opposition to the aristocracy was pronounced from the first. A little later he acquired distinction and influence by marrying Julia, a Roman lady of prominent family, the aunt of Julius Cæsar. In 109 he was legatus in the army of Quintus Metellus, who was directing the operation of the long-drawn-out war against Jugurtha in Africa. Here he speedily became known as an efficient officer, and won the sympathy of his soldiers to an unusual extent, thus paving the way to preferment in office. In the year 107 he was elected consul, and intrusted with the task of bringing the war with Jugurtha to a close. This he succeeded in doing, although much credit was due to the efficient aid of his questor Sulla, who secured possession of the person of Jugurtha. At the time of Marius's return from Africa, Italy was threatened with invasion from the north by vast hordes of Cimbri and Teutons. For years they had menaced the northern frontier, and had defeated many Roman armies that had been sent against them. In expectation of a contest with them Marius was elected consul for the third time in 103 B. C., and again in 102. In this year the barbarians returning from Spain were planning to invade Italy. One portion of them, consisting of Teutons, was met by Marius on the Rhône at Aix and totally annihilated. The Cimbri meantime had entered Northern Italy by the eastern defiles of the Alps, and in the following year they, too, were attacked and overwhelmingly defeated at Vercelli. Marius returned to Rome in triumph and was received with unprecedented marks of honor. He was elected to the consulship again in the year 100, but in peace he was unable to maintain the leading position which war had conferred upon him, and accordingly we hear nothing of him for a number of years. At the end of the social war in 88 B. C. he succeeded by violent and unconstitutional means in securing for himself the command of the war against Mithridates, which the senate had already intrusted to Sulla. The latter, however, was in possession of the army, and Marius had to flee for safety, first to Minturnæ (where a fruitless effort was made to kill him) and then to Africa. Meantime Sulla had proceeded against Mithridates, and in his absence Rome was the scene of great confusion and disorder, during which Marius returned. He allied himself with Cinna, the consul of the popular party, who had been excluded from Rome by his colleague Octavius, and together they inaugurated a reign of terror and vengeance such as Rome had never before seen. They were designated as consuls for the following year, 86 B. C., during which Marius died at the age of seventy. Marius was a soldier and nothing else; his influence on subsequent events of Roman history consisted chiefly in the establishment of an army of paid and professional soldiers in place of a citizen militia, and in the introduction of better methods of handling the legion. Many of the most characteristic features of Roman military organization and discipline date from his innovations; but the brilliancy of his victories over Jugurtha and the Cimbri and Teutons was heavily shadowed by the unscrupulousness and ferocity which he displayed in his old age. G. L. HENDRICKSON.

Marivaux, măă'rĕĕ'vō', PIERRE CARLET DE CHAMBLAIN, de: dramatist and novelist; b. in Paris, France, Feb. 4, 1688. His first literary efforts were travesties and novels: *Pharsamon, ou les Folies romanesques* (1712), a parody of *Don Quixote*; *Effets surprenants de la sympathie* (1713); *Homère travesti* (1716); *La Voiture embourbée* (1714). Losing a part of his modest means in the speculations of Law he turned to journalism, without much success, publishing in 1722–23 *Le Spectateur français* in imitation of Addison, and later two other periodicals, *L'Indigent philosophe* and *Le Cabinet du philosophe*. His chief fame is due to his comedies, which to the number of twenty-eight were given at the Théâtre Italien and the Théâtre Français between 1720 and 1756. The best of these, as the *Jeu de l'Amour et du Hasard* (1730), *Le Legs* (1736), *Les Fausses Confidences* (1737), and *L'Épreuve* (1740), have held their place upon the stage, and are among the best representatives of French comedy. His strength is in minute psychological analysis. Incidents count for little, and there are no strongly individualized characters or striking pictures of society; but a passion or sentiment is followed, in its birth, growth, or transformation, with the nicest skill through all its intricate turnings and doublings, advances, hesitations, and retreats. The delicate analysis of sentiment in nicely chosen and refined phrase is so conspicuously his mark that it has since been called *marivaudage*. The same qualities are found in his later novels, both unfinished, *La Vie de Mariane* (1731–41) and *Le Paysan parvenu* (1735–36), which have been of influence for the English novel. His *Œuvres complètes* were published in 1827–30 (10 vols.): his best comedies, as *Théâtre choisi*, are in the collections of Garnier and Didot. Cf. G. Larroumet, *Marivaux: sa vie et ses œuvres* (Paris, 1882).
A. G. CANFIELD.

Mar'joram [M. Eng. *marjoran*, from one of the Rom. langs.; cf. Span., Provenç., Ital. *majorana*, Mod. Fr. *marjolaine*; under influence of popular etymology corrupted from Lat. *ama'racus* = Gr. ἀμάρακος]: a popular name for several aromatic labiate herbs of the genus *Origanum*. The common marjoram (*O. vulgare*) has been naturalized in the U. S. from Europe. Its leaves are used in cookery, and its essential oil is employed in liniments. The sweet marjoram of the gardens, *O. majorana* of the south of Europe and the Levant, is much pleasanter in odor and taste than *O. vulgare*, and is employed in garnishing meats and seasoning soups.

Marjoribanks, maarch'bănks, EDWARD, Lord Tweedmouth: statesman; b. in London, England, July 8, 1849. He was educated at Oxford, and was called to the bar in 1874. He was Liberal member of Parliament for Berwickshire in 1880.; moved the address in answer to the speech from the throne in 1883; became second whip of the Liberal party in 1886; and patronage secretary to the treasury in Mr. Gladstone's administration in 1892. He became Lord Tweedmouth on the death of his father March 4, 1894.

Mark [= Germ. *mark* < M. H. Germ. *marc*, *marke*, half-pound of silver or gold, M. Eng. and O. Eng. *marc*, O. N. *mǫrk*. Origin obscure]: a term employed since the middle of the eleventh century, throughout the states of Germany and also in Spain and Portugal, to signify a half-pound weight of gold or silver. The same term has also been used in many of these states to designate the unit of account in their monetary systems. These monetary units were originally identical with the unit of weight, but by the continual degradation and debasement of the coinage came in the lapse of time to represent very inferior and, in different states, very unequal values. Thus the silver mark current of Hamburg became worth no more than 1*s.* 2½*d.* sterling = $0.29, the mark banco = 1*s.* 5·57*d.* = $0.35½. A mark also was used in England, equal to 13*s.* 4*d.* = $3.24⅓; and another in Scotland, equal to 13⅓*d.* = $0.27. In most of the German states it has been the usage during the past century or two to fix the standard of the silver coins in actual use by declaring what number of such coins shall be struck from one mark by weight of pure silver, the standard mark being the mark of Cologne, containing 3,608 English grains, exceeding half an avoirdupois pound by 108 grains. Thus 11⅓ thalers of Lubeck were coined from one Cologne mark of fine silver, and 14 thalers of Prussia from one such Cologne mark.

Since the formation of the German empire the term "mark" has been applied to the standard unit of the imperial monetary system, the value being fixed by the enactment that 139½ ten-mark pieces, or 69¾ twenty-mark pieces, shall be made from one German pound (500 grammes) of fine gold. A mark of the empire has therefore the value of

$0.23·8213 of the money of the U. S. As the standard of gold coinage is but nine-tenths fine, a ten-mark piece weighs 3·9825 grammes = 61·4593 grains, and a twenty-mark piece 7·965 grammes = 122·918 grains troy.

Mark, Saint [*Mark* is from Lat. *Mar'cus*, whence Gr. Μάρκος]: the author of the second book of the New Testament. I. *Life.*—There was in the primitive Church an office which occupied an intermediate position between the apostolate and the ministry—namely, that of *evangelist* or missionary of the second order, subordinate to the apostles (Eph. iv. 11). Mark belonged to this class of ecclesiastical functionaries. He is believed to have been a native of Jerusalem, where his mother, called Mary, owned a house (Acts xii. 12). His Israelitic name was John, but to this was added, according to a Jewish custom of that time, the Roman surname of Mark. A singular tradition preserved in some old documents tells that he was of priestly descent, and, having once embraced Christianity, he cut off one finger in order that the defect might make him unsuitable for the performance of any service in the temple.* The first part of this tradition is supported by the circumstance that, according to Col. iv. 10, he was a cousin of Barnabas the Levite. He was no doubt won to the faith by St. Peter, who was a friend of his family (Acts xii. 13, 14), and calls him *his son* in the same spiritual sense of the word in which Paul gives this name to Titus and Timothy (1 Pet. v. 13). The Gospel of Mark contains a short narrative, omitted in the other Gospels, of a young man who, observing what took place at Gethsemane, fled when surprised by the constables, leaving behind him the linen robe in which he was wrapped. The fact that the evangelist recorded this incident, which is of no particular interest, leads naturally to the conclusion that this young man was Mark himself, who, living in the vicinity, heard the noise and would see what was going on. Mark appears for the first time in the evangelical history in Acts xiii., when, about the year 44, Paul and Barnabas set out on their first missionary journey among the pagans to the island of Cyprus and the adjacent parts of Asia Minor. On their arrival in the wild regions of the Taurus Mountains, Mark left the two missionaries and returned to Jerusalem; and this circumstance was the reason why on his second journey St. Paul absolutely refused to have him for a companion, though Barnabas, whom their relationship no doubt made more lenient, insisted on it. The two missionaries then separated, Paul taking Silas along with him, instead of Barnabas, and Timothy instead of Mark, while Barnabas, together with Mark, went to the island of Cyprus, and thence to other countries which are not specially mentioned in the history (Acts xv. 37, *seq.*). Later on, however, Mark became reconciled to St. Paul. We find them together at Rome about the year 62, when Paul remembers him to the Colossians and Philemon (Col. iv. 10; Philem. 24), and toward the close of his life Paul called him a second time to stay with him as a coadjutor "profitable for the ministry" (2 Tim. iv. 11). Nevertheless, Mark appears to have been most closely connected with Peter. A tradition, almost unanimous, designates him as the companion of Peter, either his secretary or his interpreter. It is difficult, however, to ascertain at what time Mark thus accompanied Peter. In 62, when he was in Rome with Paul, Peter was certainly not there, since he is not mentioned in the Epistles written during the Roman captivity (Colossians, Ephesians, Philemon, and Philippians). It must have been either before or after. If *before*, it is necessary to consider the city of Babylon, whence Peter wrote his First Epistle (1 Pet. v. 13), as Babylon proper, situated on the Euphrates, and to admit that before Peter went to the Occident he had visited, together with Mark, the numerous Jewish settlements in Syria and Mesopotamia; but, then, why should Mark separate from him and go to Rome to stay with Paul? If *after*, there remains only the year 63 and the first half of 64 for the voyages of Mark with Peter, which is a very short term. In this case it must be admitted that at the time when the Epistle to the Colossians was sent off, Mark himself was going to the Orient (iv. 10); that he met Peter in Asia Minor, accompanied him, and went with him to Rome, whence Peter wrote his First Epistle to the churches of Asia. If so, Babylon is used figuratively for Rome, which, indeed, is the conception of most of the Fathers. Several ancient writers attribute to Mark the foundation of the Church of Alexandria. According to them he was the first bishop of that Church, died there, and left the episcopal see to Anianus.* At all events, it was from Alexandria that in the Middle Ages the Venetians carried his ashes, and deposited them in the cathedral to which they gave his name. It is possible that Barnabas and Mark after leaving Paul went to Alexandria, where there was a numerous and rich Jewish population wishing to have the Gospel preached to them. When St. Paul wrote the Epistle to the Romans, in the winter of 58–59, he declared that all the great centers of the Orient were evangelized, and that there was no more room for his labor in those countries (Rom. xv.). Could he have spoken thus if no missionary had as yet visited Egypt? If Mark and Barnabas are the founders of the Church of this country, it is easy to understand that it was hither Mark went when in 64 Peter died at Rome during the persecutions of Nero. Chrysostom, moreover, asserts that it was at Alexandria he composed his Gospel. Thus the career of Mark, although not so very conspicuous, is nevertheless very interesting. He forms a connecting link between the great apostles. Attached now to Barnabas. now to Paul, and now to Peter, he resembles a comet which successively traverses the orbits of the great planets, accompanying them for some moments, though always preserving its independence; and to these personal relations correspond the relations between his and the three other Gospels.

II. *Gospel.*—The testimonies of the Fathers relative to our second canonical Gospel are nearly unanimous with respect to the following three points: (1) That it was composed by the evangelist Mark; (2) that Mark wrote it from the narrations which he heard from the lips of Peter in the churches which he visited together with him; (3) that it was written at Rome, and on the demand of the Christians of that capital. With respect to the first point, it follows from the title, "according to Mark," which title the work must have received at the time when the collection of our Gospels was made; that is, at the latest, in the first half of the second century. With respect to the second point, we will only quote the tradition given by Papias, and by him received from an ancient presbyter of Palestine called John, who by some is identified with the apostle St. John: "Mark, having become the secretary of Peter, wrote down exactly all that he remembered of the words and deeds of Christ, though not in order. For he had never himself heard or accompanied the Lord, but, as above mentioned, he accompanied Peter, and Peter made his narrations according to the demands of the moment, and not for the purpose of giving a complete exposition of the discourses of the Lord. Thus Mark has made no fault in writing down the facts detached as he remembered them, simply wishing not to omit anything of what he had heard, nor to alter it." With respect to the third point, the composition of the Gospel as having taken place at Rome, we have a detailed testimony in two passages of Clement of Alexandria, of which we give this one: "As Peter preached the Gospel publicly at Rome, and stated several words of Christ in the presence of a number of prominent men, these desired to keep firmly in their memory what they had heard, and applied to Mark, the companion of the apostle, who afterward wrote those accounts, which are called the Gospel according to Mark." The contents of the Gospel itself confirm these three points. To begin with the last: (1) Is it not evident that the second Gospel was written for Christians of pagan origin, since it omits throughout the evidence of the Messiahship of Jesus drawn from the prophecies of the Old Testament, and gives explanations of Jewish customs unnecessary to Christians of Hebrew origin? The most striking example is found in Mark vii. 1–4, especially when compared with Matt. xv. 1–2, destined for converted Jews. Furthermore, is it not evident that these Christians were of Latin origin, since Mark always prefers Latin terms, Hellenized, to the Greek terms, and in the account of the poor widow even transfers the Greek money into Roman (xii. 42), which Luke does not? Does it not follow from the notice relating to Simon of Cyrene, "the father of Alexander and Rufus" (xv. 21), that these were Latin readers, since Rufus was a member of the church of Rome (Rom. xvi. 13), and this small detail could interest none who were not personally acquainted with the members of the family? (2) It is as incontestable that the statements of Peter must have served as a basis for the work. A multitude of small details betray the remembrance of an eye-witness: "And he was in the hinder part

* This is perhaps the reason why the *Philosophumena* call him the κολοβοδάκτυλος, the "stump-fingered," though it would be possible to explain this surname from the mutilated state of the last part of his Gospel.

* Eusebius, *Historia Ecclesiastica*, ii., 24.

of the ship, *asleep on a pillow*" (iv. 38); "and he, *casting away his garment*, rose, and came to Jesus" (x. 50); "*And when he had looked around about on them with anger*, being grieved for the hardness of their hearts, he saith unto the man" (iii. 5); "*And looking up to heaven, he sighed*, and saith unto him" (vii. 34); "*Then Jesus beholding him, loved him*" (x. 21). Who else but an eye-witness, quite near Jesus, and observing with deep interest his impressions, can have seized this flash of love in his eye and introduced such a feature in the narrative? The same conclusion follows from the Aramaic expressions which Mark inserts, such as *Abba*, *Talitha-cumi*, etc. The narrator reproduces the very words of the Lord, whose voice he seems to hear; but this witness so intimate can not be he who among the disciples loved Jesus most; it must be he who admired him most. Throughout the whole narrative he strives at one aim only —to impress the reader with that admiration which penetrated all who came in contact with Jesus; and all people were *amazed* and *filled with fear*, etc., are expressions common throughout the whole narrative, but such expressions make us immediately think of Peter, the passionate admirer and enthusiastic confessor of Christ. Of whom else could we think when reading the scene between Jesus and his disciples at Cæsarea Philippi (viii. 27–33)? Our evangelist here reports the crushing words of Jesus to Peter: "Get thee behind me, Satan; for thou savorest not the things that be of God, but the things that be of men"; but he omits the honoring words which preceded immediately, "And I say also unto thee, that thou art Peter, and upon this rock I will build my Church"—two traits which are closely connected in the account of Matthew (xvi. 13–23). Such a manner of narrating must either proceed from Peter himself or from a declared enemy of his; the latter supposition would be absurd. It is also in this Gospel alone that we find mentioned the crowing of the cock twice, a little trait which makes the denial of Peter still more inexcusable. In the Acts (x.) we find a specimen of Peter's manner of teaching while founding or traveling in order to build up the churches. This speech of the apostle at Cornelius is a sketch of the history of Jesus, exactly such as it is developed into details in our second Gospel; it is, indeed, as it has sometimes been called, the Gospel of Mark in a nutshell. (3) The authorship of Mark might be inferred from the two following facts, even if we had no tradition: First, the style of our Gospel is so absolutely different from that of the First Epistle generally attributed to Peter that even though the statements belong to Peter the narrative must have proceeded from another; next, in his Epistle, Peter calls Mark his son, thus designating him as his spiritual heir, with whom he had deposited his most precious treasure, his personal acquaintance with Jesus. The resemblance between this work and those of Matthew and Luke has been opposed to the explanation of the origin of Mark's Gospel which we have given, as if he had drawn his narration from them. The freshness and originality of his work forbid us to suppose that he had used those of the two others; but ought not the problem to be solved in quite a different manner? An apostolical tradition concerning the acts and discourses of Jesus was formed at Jerusalem, first in Aramaic and then in Greek, and on account of its purity and simplicity immediately received a fixed form, which was reproduced nearly identically in the reports of the apostles and evangelists. It is this narrative—so to speak, stereotyped—which constitutes the foundation of our first three Gospels, and it is from this the striking resemblance between Matthew and Mark arises. Matthew first wrote down this tradition at Jerusalem; Peter reproduced it in the churches through oral recital, introducing only such minor significant details as sprang from his personal remembrance. Thus the double fact which we have indicated may be easily explained; on the one hand, the common foundation for Mark and Matthew; on the other, the small picturesque features which characterize the narrative of the former. Klostermann supposes that Mark wrote with the work of Matthew before him, but such a supposition materializes the relation between the two evangelists in a manner open to very serious objections, from which our explanation is exempted. If Mark wrote, or began to write, his Gospel at Rome, it dates from the year 64 or 65, which date corresponds to a remark with which he interrupts the discourse of Jesus on the destruction of Jerusalem (xiii.). In the passage indicating the signs which shall show to the Christians of Judæa the moment when they must flee in order to escape from the catastrophe which threatens the country, Mark, like Matthew, interrupts the discourse of Jesus in order to fix the attention of the reader on the importance of the indication: "Let him that readeth understand" (14). This remark, which no doubt was used when the discourse was repeated in the churches of Palestine, proves that the present form of the discourse belongs to the time before the destruction of Jerusalem. At all events, the notice relating to the two sons of Simon of Cyrene shows that they were personally known to those for whom the Gospel was destined, and that the composition of the work thus belongs to the time of the apostles. The end of the second Gospel, from verse 9 of chapter xvi., is lacking in the oldest manuscripts (*C. Sinaiticus* and *C. Vaticanus*), and even the Fathers mention this gap. How is it to be explained, and whence is derived the traditional termination of the Gospel? Did Mark die before finishing the work, or has the last leaf of his manuscript been lost? Has another ecclesiastical writer finished the narrative? Surely Mark could not stop with the word γάρ, with which the eighth verse terminates. Furthermore, an angel had promised an apparition of Jesus, and the author must have had the intention of narrating it. Is it not possible that it was the persecution of Nero during the sojourn of Peter at Rome in 64 which caused the interruption of the work of Mark, and that an incomplete copy remained at Rome, whence the manuscripts having no conclusion, while the copy which Mark carried along with him was completed afterward, and hence the form which has finally prevailed in the Church? As to *the plan* of the work, which Papias found inconsistent with the historical order, it seems very natural, on the contrary, from our point of view. The author having placed Jesus in the center of his activity at Capernaum, shows us how this activity expands in every direction through excursions more and more prolonged, though at the end of each excursion the Lord always returns to Capernaum.* His final departure for Jerusalem thus appears as his last missionary voyage. The Gospel of Mark is the most picturesque delineation of the ministry of Jesus in its office of evangelization; and the first and the last words of the work confirm this view: "The beginning of the Gospel of Jesus Christ, the Son of God" (i. 1); "And they went forth, and preached everywhere, the Lord working with them, and confirming the word with signs following" (xvi. 20). Thus from heaven Jesus still continues through his apostles that office of evangelization which he filled himself so faithfully during his ministry on earth. See Godet, *The Origin of the Four Gospels*, in his *Studies on the New Testament*. FRÉDÉRIC GODET.

Marked Check: See the Appendix.

Markell, CHARLES FREDERICK: See the Appendix.

Market: the meeting together of people for the purpose of buying and selling commodities; secondarily, the place where such meeting is held, and in a more general sense the region or locality where anything is or may be bought or sold. The need of assembling in order to exchange commodities arose as soon as man emerged from the savage state—that is, as soon as the division of labor began to diversify production. During the Middle Ages the markets and FAIRS (*q. v.*) afforded the only means for the exchange of goods, the retail shop being an institution of modern growth. The market, as well as the fair, from which it is distinguished by its local and more permanent character, was subject to the complicated regulative system that characterized the economic policy of mediæval towns. The principle of *justum pretium*, or fair price—that the state should fix the price in the interest of the individual—expressed itself in numerous restrictions, such as the laws against forestalling or buying goods on their way to market with a view to enhancing their price, and against the kindred offenses of regrating and engrossing, which were nothing more than the ordinary operations of retail trade. These and other restraints on trade have been swept away with the rise of the modern commercial spirit and the doctrine of *laissez faire*. With the increase of trade, too, the market ceased to be the sole place in the town for purchase and sale, as the scattered shops of retail dealers performed many of its functions, and the markets of modern towns confine themselves as a rule to the sale of certain classes of goods. As a result, they are no longer the important source of profit to the state that they were in the Middle Ages, when the levying of market tolls was one of the most lucrative ma-

* Ch. i. 21–45; ii. 1–v. 20 (Gadara, E.); v. 21–vi. 52 (Bethsaida and Julias, N.); vi. 53–viii. 21 (Phœnicia, N.); viii. 22–ix. 50 (Cæsarea Philippi, N.); x. *seq.* (Peræa and Jerusalem).

norial rights. In the U. S. markets have not been such important features of town life as in Europe, because of the comparatively recent settlement of the country, nor can the market buildings be compared with the solid and imposing structures common in the older communities. The term is often used by political economists in a technical and restricted sense as applying to a single group of exchangers and to a particular article of uniform quality, as when it is said that there can be but one price for a given commodity at any time in the same market. The statement would be obviously untrue if the term market as here used included wholesalers, retailers, and importers, and referred to several grades of the article sold. F. M. Colby.

Market Overt [from O. Fr., liter., open market]: an open and public market, legally constituted by charter or prescription. In the country the boundaries of each market-place are defined, and the market-days are fixed. In the city of London, every day except Sunday is a market-day, and every shop in which goods are exposed publicly for sale is a market overt for such things as the owner ordinarily sells there. By English common law, the *bona-fide* purchaser of goods in market overt gets a valid title to them, although his vendor had neither title nor authority to sell. This exception to the general rule, that no one can give a better title to goods than he has, never obtained recognition in Scotland nor in the U. S. Even in England the tendency of courts and Parliament has been to limit its application. It never protected the purchaser of goods belonging to the crown, nor one acting in bad faith, nor one who began or completed the treaty of sale out of the fixed limits of market overt, nor one buying between sunset or sunrise. The courts have uniformly insisted that transactions are not to have the benefit of the market overt exception, unless they have been so conducted "as to give the fullest opportunity to the man whose goods have been taken to make pursuit of them, and prevent their being sold." Hence it has been held that a sale by sample in a market overt is not within the exception, nor a sale to a London shopkeeper of goods in which he dealt, nor a sale by him in a show-room over his shop to which customers were only admitted on special invitation. Moreover, as this exception exists for the benefit of the innocent purchaser, an innocent vendor of goods without a valid title in market overt can not take advantage of it, but is liable to the rightful owner for conversion.

As early as 1555 a statute was passed regulating the sale of horses in market overt, and providing that the property in them should not pass, as against the true owner, unless the prescribed requirements were complied with. Other statutes provide that property, though sold in market overt, shall revest in the true owner, upon the conviction for felony or misdemeanor by or on behalf of such owner of the person stealing, taking, obtaining, extorting, embezzling, converting, or disposing of the property. This legislation extends to property obtained by any criminal method, the early common-law rule that in the case of stolen goods the plaintiff in a proceeding by appeal, in which he established the theft, was entitled to their restitution, though they had been sold in market overt. It has been held that these statutes apply to chattels which have been intentionally transferred by the true owner to one obtaining the transfer, pursuant to a contract of sale, itself obtained by an indictable fraud, and sold by the latter in market overt to an innocent purchaser. (*Bentley* vs. *Vilmont*, 12 Appeal Cases 471.) Such legislation has gone far toward nullifying the peculiar rule governing sales in market overt, but has been modified to some extent by the Sale of Goods Act, 1893 (56 and 57 Vict., cap. 71). For rules laid down in modern European codes, see Possession. Francis M. Burdick.

Markham, Charles Edwin: See the Appendix.

Markham, Clements Robert: traveler, geographer, and historian; b. at Stillingfleet, Yorkshire, England, July 20, 1830. He was educated at Westminster; entered the navy as a cadet in 1844; served in the Pacific squadron, attaining the rank of lieutenant; and in 1852 accompanied an Arctic expedition in search of Sir John Franklin. Leaving the navy, he traveled in Peru 1852–54; and in 1860 visited Peru and India as commissioner to introduce cinchona-plants into the latter country. He accompanied the Abyssinian expedition as geographer 1867–68. Mr. Markham has held various positions in the Government departments, and was appointed assistant secretary of the India office in 1867, taking charge of the geographical department in 1868. Among his numerous works are *Franklin's Footsteps* (1852); *Cuzco and Lima* (1856); *Travels in Peru and India* (1862); a *Quichua Grammar and Dictionary* (1863); *History of the Abyssinian Expedition* (1869); *Peruvian Bark* (1880); *The War between Peru and Chili* (1882); *The Threshold of the Unknown Region* (relating to Arctic exploration, 1874); a *Sketch of the History of Persia* (1873); and *History of Peru* (1892). As secretary of the Hakluyt Society he has edited a number of its editions of old works, principally relating to Peru and the Amazon; he has been secretary of the Royal Geographical Society, and has contributed to its publications; edited *Ocean Highways*, a monthly publication merged in 1874 into *The Geographical Magazine*; and from 1871 wrote the valuable annual reports on the *Material Progress of India*. His studies on Peru are particularly valuable.

Herbert H. Smith.

Markland, Jeremiah: classical scholar; b. at Childwall, England, Oct. 29, 1693; studied in London and Cambridge. For many years a traveling tutor, he lived a life of scholarly leisure after 1743. D. at Milton, in Surrey, July 7, 1776. Apart from valuable text critical emendations to Lysias and Euripides, two of whose plays he edited, he is now chiefly known for his learned edition of the *Silvæ* of Statius and for his *Remarks on the Epistles of Cicero to Brutus*, whose authenticity he denied, thus starting a famous controversy, which has now been definitively settled in favor of their genuineness. Markland also condemned Cicero's orations *Post reditum in senatu*, *Ad Quirites*, *pro domo*, and the *De haruspicum responsis* as spurious, which hypercritical verdict subsequently found an ingenious but equally unsuccessful champion in F. A. Wolf. Alfred Gudeman.

Marks, Henry Stacy: genre and decorative painter; b. in London, Sept. 13, 1829. He was a pupil of the Royal Academy, London, and of Picot, Paris; was elected a Royal Academician in 1878. Among his pictures are *St. Francis Preaching to the Birds* (1870) and *Hermit and Pelicans* (1888). D. Jan. 10, 1898. W. A. C.

Marl: See Limestone.

Marlborough: city (incorporated in 1890); Middlesex co., Mass. (for location of county, see map of Massachusetts, ref. 2–H); on the Fitchburg and the N. Y., N. H. and Hart. railways; 15 miles E. of Worcester, 25 miles W. of Boston. It is in a choice fruit-growing region; contains Lake Williams, covering 73 acres, city-hall which cost $85,000, a public library with over 12,000 volumes, Unitarian parish library founded in 1847, soldiers' monument, gas and electric light plants, electric street-railway, 2 national banks with combined capital of $300,000, a savings-bank, and a daily, a monthly, and 4 weekly newspapers, and is widely noted for its extensive manufacture of boots and shoes. Pop. (1880) 10,127; (1890) 13,805; (1900) 13,609. Editor of "Times."

Marlborough, John Churchill, First Duke of: soldier and statesman; b. at Ashe, Devonshire, England, June 24, 1650, son of Sir Winston Churchill, who obtained for him shortly after the Restoration an appointment as page to the Duke of York, afterward James II. About the same time his sister Arabella was appointed maid-of-honor to Anne Hyde, Duchess of York, and soon became mistress to the prince. It was probably to this circumstance that young Churchill was indebted for rapid promotion in the army, which he entered in 1767 as ensign in the Guards. In 1672–77 he served with the rank of captain of Grenadiers in the corps sent to co-operate with France against Holland, and distinguished himself at the sieges of Nymwegen and Maestricht, attracting the attention of Turenne and of Louis XIV., by whose favor he was promoted to the rank of colonel. At the Peace of Nymwegen (1678) he returned to England, received a lucrative position in the household of the Duke of York, and increased his influence at court by marriage with Sarah Jennings, maid-of-honor to the Duchess, celebrated for her beauty and talent, who had been the most intimate friend of the Princess Anne from childhood. He now became the constant and favorite companion of the Duke of York, his confidant in his intercourse with Charles II. and with the King of France, to whom he was sent repeatedly on secret missions. He was created Baron Churchill of Aymouth in the peerage of Scotland in 1682, and in the following year was given the command of the only regiment of Dragoons then existing in England. On the death of Charles II., Churchill was sent as ambassador to Louis XIV., to announce the accession of James (Feb., 1685), as well as to sue for a continuance of the French king's friendship, alliance, and subsidies. On his return from this successful

negotiation he was created brigadier-general and Baron Churchill of Sandridge in the English peerage, rendered good service in the suppression of Monmouth's rebellion, and was advanced to major-general. He did not scruple, however, when the follies of James rendered his downfall imminent, to enter into treasonable correspondence with the Prince of Orange, nor to desert with many of his officers to the invading army (1688) at the critical moment. He received the reward of his baseness in the earldom of Marlborough (Apr. 9, 1689) and a commission as lieutenant-general; was in command of the English forces in Flanders (1689) and in Ireland (1690), where he captured Cork and Kinsale, but in 1692 was suddenly dismissed from all his official posts and thrown into the Tower in consequence of the partial discovery of treasonable intrigues with the exiled king. He was soon released from prison, but not restored to favor, and spent the ensuing years of the reign of William in false protestations of loyalty, soliciting military command while carrying on secret correspondence with James, and employing every artifice to strengthen his favor with Anne as the probable successor to the throne. In 1698 William so far restored Marlborough to favor as to appoint him governor to Anne's infant son, the Duke of Gloucester. On the accession of Anne (1702), Marlborough, who had recently been employed in military and diplomatic service in Holland, became at once the most influential subject of the new queen, since to his own favor at court was added that of Lady Marlborough, and that of his son-in-law Godolphin, who became Prime Minister. He was at once intrusted with the chief command of the armies of the formidable alliance then combined against France. His subsequent history for several years is merged in the military annals of England, and may be summarized as consisting of an extraordinary series of victories and a no less remarkable succession of rewards and honors. The capture of Liège (Oct. 29, 1702) brought him the dukedom of Marlborough and the thanks of Parliament; other successes were afterward recognized by the grant of the celebrated manor of Woodstock, on which Blenheim Palace was erected at the expense of Government. With the aid of Prince Eugene he terminated the campaign of 1704 by the important victory of Blenheim (Aug. 13). In the following years he gained the notable battles of Tirlemont (July 18, 1705), Ramillies (May 23, 1706), Oudenarde (July 11, 1708), Tournay (July 28, 1709), Malplaquet (Sept. 11, 1709), and Bouchain (Sept., 1711); was made a prince of the German empire; was rewarded by a magnificent pension (£5,000) by act of Parliament of 1706. Marlborough returned to England in Oct., 1711, but was charged with peculation shortly after, and the duchess having fallen from Anne's favor in the same year, the Tory ministry of Harley succeeded to power. Marlborough was dismissed from all his offices Jan. 1, 1712, and retired to Germany, where he became an energetic partisan of the Hanoverian succession; returned to England at the accession of George I. (1714), by whom he was restored to his offices and honors. He rendered prompt service in the direction of the campaign of 1715 against the Pretender, passed the remainder of his life in quiet enjoyment of his immense wealth, died at Windsor Lodge, June 16, 1722, and was buried in Westminster Abbey. He left no son, but the title has been perpetuated through the descendants of his second daughter. Through the brilliancy of his military genius Marlborough long found apologists as well as admirers among the historians of England, but the bare recital of unquestioned facts convicts him of numerous treasons under aggravated circumstances of ingratitude. Due justice was first meted out to him from this point of view in Lord Macaulay's celebrated *History of England*. His great military and political talents were intuitive, as his education was extremely limited. The Duchess of Marlborough survived until Oct. 18, 1744, having lived long enough to discern the rising greatness of the elder Pitt, to whom she bequeathed £10,000. See Murray's *Letters and Despatches of Marlborough* (5 vols., 1845–46); Coxe's *Memoirs* (3 vols., 1817–19); Alison's *Life* (2 vols., 1847); and Saintsbury's *Marlborough*, in the series English Worthies (1885).

Revised by C. K. Adams.

Marlborough Dog: See Blenheim Dog.

Marlin: town; capital of Falls co., Tex. (for location of county, see map of Texas, ref. 3–I); near the Brazos river; on the Hous. and Tex. Cent. Railroad; 97 miles N. E. of Austin. It is in an agricultural and stock-raising region, and has two weekly newspapers. Pop. (1880) not in census; (1890) 2,058; (1900) 3,092.

Marlitt, E. (pseudonym for Eugenie John): novelist; b. at Arnstadt, Germany, Dec. 25, 1825; went in 1842 to Vienna in order to study singing. She met with much success as a singer, but soon lost her voice, and became companion to the Princess of Schwarzburg-Sondershausen, who had assisted her in obtaining her education. She remained with the princess until 1863, and then began to publish novels in *Die Gartenlaube*, an illustrated journal. Her novels, *Goldelse* (1867), *Das Geheimniss der alten Mamsell* (1868), *Reichsgräfin Gisela* (1869), *Das Heideprinzesschen* (1872), *Die zweite Frau* (1874), *Im Hause des Commerzienraths* (1877), *Im Schillingshof* (1879), *Amtmanns Magd* (1880), *Die Frau mit den Karfunkelsteinen* (1885), reached a number of editions. She gained her popularity both by her clever narrative style and by cautiously appealing not only to the sentimentality but also to the lower instincts of a class of readers who cared little for the higher demands of art. D. June 22, 1887.

Julius Goebel.

Marlowe, Christopher: dramatist; b. at Canterbury, England, about 1564; studied at King's School, Canterbury, and at Corpus Christi College, Cambridge, and graduated 1583; produced upon the stage in 1586 the first part of his tragedy of *Tamburlaine*, which, though filled with extravagant flights, exhibited more poetic genius and better dramatic combination than any previous English play. In 1588 he brought out his *Tragical History of the Life and Death of Dr. Faustus*. A second part of *Tamburlaine* was added in 1590, and he wrote two other plays, *The Jew of Malta* and *Edward II.* Several anonymous dramas are generally attributed to Marlowe, and by many critics he is believed to be the author of the second and third parts of *Henry VI.*, included in Shakspeare's works. He also made translations from Ovid, and wrote the first portion of a narrative poem, *Hero and Leander*, which was completed by George Chapman. He died from a wound received in a quarrel at Deptford, June 16, 1593. The best edition of his works is that of Dyce (3 vols., 1850). See English Literature.

Revised by H. A. Beers.

Marmier, măr'mi-ā', Xavier: writer; b. at Pontarlier, Doubs, France, June 24, 1809; engaged in journalism and various literary enterprises, and spent a large portion of his time in traveling. He visited Switzerland and Holland in 1830, Germany 1832, the Scandinavian countries 1836–38, Russia 1842, the East 1845, Algeria 1846, and America 1849. In 1846 he was appointed librarian at the library of St. Geneviève, in Paris, and in 1870 he was elected a member of the Academy. Besides translations of dramas by Goethe and Schiller, novels by Hoffmann, Scandinavian folk-lore, etc., he published *Histoire de l'Islande* (1838); *Langue et littérature islandaises* (1838); *Histoire de la littérature en Danemark et en Suède* (1839); *Lettres sur la Russie, la Finlande et la Pologne* (2 vols., 1843); *Du Rhin au Nil* (1846); *Lettres sur l'Amérique* (1852, 2 vols.); *Lettres sur l'Adriatique et Monténégro* (1854); *Voyage en Suisse* (1861); *Les voyages de Nils à la recherche de l'idéal* (1869); *Les États-Unis et le Canada* (1874); *Nouveaux récits de voyages* (1879); *Voyages et littérature* (1888); and some novels: *Les fiancés du Spitzberg* (1858); *Gazida* (1860); *Les Hasards de la Vie* (1869); *Cimarosa* (1867); *Les drames du cœur* (1868); *Une grande dame russe* (1876). He has also published some volumes of verse: *Esquisses poétiques* (1830); *Poésies d'un voyageur* (1841). D. in Paris, Oct. 11, 1892.

A. R. Marsh.

Mar'mol, José: author; b. in Buenos Ayres, Argentine Republic, about 1818. He was proscribed during the dictatorship of Rosas, and spent many years in exile, traveling extensively in South America; in the civil wars which led to the expulsion of Rosas he took an active part; subsequently was senator and deputy to congress from Buenos Ayres, and was director of the national library. His works include many poems, several dramas, and *La Amalia*, a romance of the time of Rosas; this has been translated into French and German. D. in Buenos Ayres, Aug. 12, 1871. A volume of his poetical and dramatic works was published in Paris in 1875.

Herbert H. Smith.

Marmont, măr'mōṅ', Auguste Frédéric Louis Viesse, de, Duke of Ragusa: marshal of France; b. at Chatillon-sur-Seine, department of Côte-d'Or, France, July 20, 1774, received a military education; was aide-de-camp to Napoleon in 1796; accompanied him to Egypt; was made general of division after the battle of Marengo, commanded the forces in Dalmatia, 1806 to 1809; joined the great army the day before the battle of Wagram, and was made a marshal on the battle-field of Znaym; served in Portugal and Spain

in 1811–12, where he lost the battle of Salamanca (July 22, 1812) and was severely wounded. In 1814 he commanded the troops in and around Paris, and compelled Napoleon to abdicate by evacuating the capital and entering into negotiations with the allied powers. For this reason Napoleon excluded him, on his return from Elba, from the general amnesty, and he was compelled to flee, while afterward Louis XVIII. made him a peer of France and loaded him with honors. He lived mostly in retirement, until in 1830 Charles X. called him to Paris to quell the revolution of July. In this he failed, and so great was the indignation he excited that his name was struck from the lists of the French army. Afterward he resided mostly in Vienna. D. at Venice, Mar. 2, 1852. His *Mémoires* (9 vols., Paris, 1856–57) are important for the history of his time.

Marmontel, măr'mōñ-tel', Jean François: author; b. at Bort, in Limousin, France, July 11, 1723. He studied to enter the Church, but his taste for letters drew him away, and under the patronage of Voltaire he went to Paris (1745) to live by his pen. He began with journalism and the drama, winning success with the tragedies *Denys le Tyran* (1748) and *Aristomène* (1749). In 1753 he became *secrétaire des bâtiments* at Versailles; in 1758 and 1759 edited the *Mercure*; passed eleven days in the Bastile for a political satire in 1760; was in 1763 chosen to the Academy, of which he became in 1783 permanent secretary. D. Dec. 31, 1799. He wrote much, and some of his tragedies, his *Contes moraux* (1761), the novels *Bélisaire* (1767), one chapter of which was condemned as heretical by the Sorbonne for its plea for religious toleration, and *Les Incas* (1778), had an immense popularity. Of more permanent value are his *Poétique française* (1763), his contributions to the *Encyclopédie*, collected as *Éléments de Littérature* (1787), and his *Mémoires*. His *Œuvres* were collected in 1786–87 in 17 vols. Tourneux has given a good edition of his *Mémoires* (3 vols., Paris, 1891).

A. G. Canfield.

Mar'mora, or Marma'ra, Sea of (anc. *Propontis*): a body of water which separates European from Asiatic Turkey, and communicates with the Black Sea by the Strait of Constantinople, or Bosphorus, and with the Ægean Sea by the Strait of the Dardanelles (anc. *Heltespont*). It is 135 miles long and 45 miles broad. The island of Marmora, in this sea, is famous for its fine marble and alabaster.

Mar'moset [from Fr. *marmouset*, queer little figure, ugly little boy < Low Lat. *marmore'tum*, marble figure, deriv. of Lat. *mar'mor*, marble. See Marble]: a name applied to various small South American monkeys of the family *Mididæ* and genera *Hapale*, *Midas*, etc. They are the nearest of all the true monkeys to the Prosimiæ or lemurine Quadrumana. The thumbs are not opposable, nor is the tail prehensile. Their nails are long and sharp. These creatures are harmless, affectionate, and often very beautiful. They are, however, very delicate, and in cool climates soon die if exposed. The *Hapale jacchus* is one of the best-known species.

The marmoset.

Mar'mot [= Fr., ape, grotesque little figure, child (as term of endearment), marmot; cf. O. Fr. *merme*, little, and Fr. *marmaille*, troop of children; all < derivs. of Lat. *minimus*, least]: a name given to the larger rodent mammals belonging to the squirrel family. The typical species of marmot is *Arctomys marmotta*, the European marmot, which is abundant in the Alps. The Old World has several other species. The best-known American species is *Arctomys monax*, the woodchuck or ground-hog, which is very abundant E. of the Mississippi. Its flesh is sometimes eaten, but is not good. Its fur is not of much value. The Pacific coast region has several species. (See Sciuridæ.) Closely akin to the marmots are the prairie-dogs (*Cynomys*), which some, indeed, include in the genus *Arctomys*, to which the marmots belong. See Prairie-dog.

Marne: department of France, along the Seine and the Marne. Area, 3,159 sq. miles. In the southern part the soil is very fertile and much grain is raised; the northern part is chalky and sandy, but produces excellent wine, among which are several varieties of the famous champagne wine. Sheep of a good breed are reared here, and a great number of millstones are quarried. More than three-fourths of the total area is arable land. The principal manufactures are of woolens produced in the vicinity of Reims, and consist of flannels, merinoes, tartans, shawls, etc. Pop. (1896) 439,577. Capital, Châlons-sur-Marne.

Marnix, Philipp, van: theologian, diplomatist, and author; baron of Sainte-Aldegonde; b. in Brussels, 1538; was educated in Geneva under Calvin and Beza; in the Netherlands from 1560 to 1568 worked against Spanish political and religious tyranny; was exiled with William of Orange, whose praises he sang in his *Wittiam's Lay*. In 1573 he was a prisoner of the Spaniards. He played a prominent part in politics, but for a time was under suspicion for his dealings with the French. In 1583–85 he was burgomaster of Antwerp, and it was laid to his charge that the city surrendered to the Spaniards in the latter year without stipulating for religious liberty. During the rest of his life he lived quietly upon his estates. He died in Leyden, Dec. 15, 1598, whither he had gone to superintend a translation of the Bible into Dutch. His complete works appeared Brussels 1857–59, 7 vols., and his theological writings at The Hague 1871–78, 2 parts. Among his works may be mentioned his rhymed version in Dutch of the Psalms (1591); his *Traicté du Sacrement de ta Saincte Cene du Seigneur* (Leyden, 1599), and his satire on the Roman Church, *De Biencorfs der hetige roomeche keerke* (1569; n. e. under name of T. Fischarts, by J. Eiselein, St. Gallen, 1847). See his *Life*, by E. Quinet (Brussels, 1854); and by the Roman Catholic Alberdink-Thijm (Haarlem, 1878).

Samuel Macauley Jackson.

Maroa: city; Macon co., Ill. (for location of county, see map of Illinois, ref. 6–E); on the Ill. Cent. and the Vandalia line railways; 13 miles N. of Decatur, the county-seat. It is in an agricultural region, and has several large grain warehouses, grain elevator, flour-mills, library association (founded in 1870), and two weekly newspapers. Pop. (1880) 870; (1890) 1,164; (1900) 1,213.

Marocco: state of Northwest Africa. See Morocco.

Marochetti, măă-rō-ket'tĕĕ, Carlo, Baron: sculptor; b. at Turin, Italy, in 1805, naturalized and educated in France; began his studies under Bosio; visited Italy, and exhibited in 1829 in Paris a group, *A Girl Playing with a Dog*, which attracted much attention. He resided in Paris and produced many works, and after 1848 removed to London, where he died in 1867. His principal works are an equestrian statue of Emmanuel Philibert at Turin and a colossal statue of Richard Cœur-de-Lion in London, besides busts and statues of Prince Albert, the Queen, etc. His sculpture was popular, striking, full of lively interest and vigor of treatment, but it was extremely defective in technical and sculpturesque qualities.

Maroní, măă-rō-nee', called Marowijne by the Dutch: a river of Guiana, separating the Dutch from the French colony. It rises in the highlands near the frontiers of Brazil, takes a general northerly course and empties into the Atlantic after a course of about 425 miles. Seagoing vessels can ascend to the Armina fall, 50 miles from the mouth, and above that there are considerable stretches of navigable water. The lower portion is in parts nearly a mile wide, and the banks are covered with heavy forest. The region about the upper river is inhabited only by Indians and maroon Negroes. Gold is obtained in considerable quantities about the lower

falls. The Cottica channel forms a navigable waterway between the lower Maroní and the Surinam, parallel to the coast. HERBERT H. SMITH.

Mar'onites: a Christian people of Syria who take their name from their first monothelitic bishop, John Maron or Maro, who died 701 A. D. Their number is estimated at from 200,000 to 250,000. They live chiefly in the north part of the Lebanon, but are found also all over the Lebanon and the Anti-Lebanon, with a few in the larger cities of Syria. They are Roman Catholics of the SYRIAN RITE (*q. v.*). They have a patriarch who lives at Canubin, a monastery near the foot of Lebanon, but who bears, in common with five other dignitaries, the title of Patriarch of Antioch. They have also metropolitans of Tyre, Damascus, Aleppo, Tripoli, and Cyprus, besides seven bishops. They were anciently monothelites, but having joined in the second crusade against the Saracens, in 1182 renounced their heresy before the Latin Patriarch of Antioch, Aimeric III. In 1445 they were more formally united to the Roman Catholic Church. They are hospitable toward all Christians; have since 1840 been deadly enemies of their neighbors, the Druses; speak Arabic or Greek; consider the Syriac their sacred language, and make use of Syro-Chaldæan books, which they do not understand. Their secular clergy may marry before ordination, and the Eucharist is administered under both kinds. They have a great number of celibate monks and nuns, who follow the rule of St. Anthony, take no vows, but fast often, and never eat meat. The Maronites suffered much from the Druses, who are far inferior to them in numbers, and who were, it appears, the injured party at the origin of the bloody war of 1860.

Maroons' [from Fr. *marron* (in *nègre marron*, with clipping of *ci-*), from Span. *negro cimarron* (from *cimarron*, wild, fugitive), lit., fugitive Negro]: a name formerly used in Jamaica for runaway slaves and their descendants. It has been applied to a similar class in Guiana, where, however, they are generally known as bush Negroes. See GUIANA and JAMAICA. H. H. S.

Maros': a river of Europe which rises in Transylvania, near the frontier of Moldavia, flows in a western direction into Hungary, and joins the Theiss opposite to Szegedin, after a course of about 400 miles, for the greater part of which it is navigable.

Marot, mȧȧ'rō', CLÉMENT: poet; b. at Cahors, France, in 1495 (1497?). His father, Jean Marot, was a poet and *valet de chambre* of Francis I. At the age of ten he was taken to Paris, and later entered the *basoche* to study law, but left it soon to become page in the service of Nicolas de Neuville, Seigneur de Villeroy. His poetical talent was already declaring itself in translations and imitations from Latin poets and in light verses. In 1515 he dedicated an allegorical poem, the *Temple de Cupidon*, to Francis I., at whose recommendation he was attached to the suite of his sister, Marguerite d'Angoulême (1519). He accompanied the king in the field in 1520 and took part in the Italian campaign ending in the batte of Pavia (1525), in which he was wounded and taken prisoner. Soon released, he returned to France, fell under the suspicion of holding Protestant opinions, and, though he vigorously denied them, was thrown into the Châtelet. By the friendly intervention of the Bishop of Chartres he was transferred to Chartres, where his confinement was freed of all hardship. During it he composed *L'Enfer*, a satire on his imprisonment in the Châtelet. He was set at liberty by Francis I. (1527), but was soon in prison again for aiding the escape of a prisoner; an epistle in verse to the king again freed him. Meanwhile his father died, and he succeeded to his place as *valet de chambre* of the king. In 1532 a selection of his epistles, elegies, and other verses was published with the title *Adolescence Clémentine*, and was followed the next year by a second. His relations with Protestants, and probably his own unguarded speech, subjected him again to the suspicion of heresy, and he fled to the court of his patroness, Marguerite, now Queen of Navarre (1534), and, insecure even there, crossed into Italy and took refuge first at Ferrara and then at Venice. He returned to Lyons in 1536, where new difficulties awaited him in the quarrel which an inferior rival, Sagon, brought upon him. This ended to his advantage, and he again enjoyed court favor till 1543, when his translation of the first fifty Psalms, at first encouraged by Francis I., was condemned by the Sorbonne; but his translation was completed by Beza, and is used in the French Protestant churches. He fled to Geneva, but gave offense to the austere society there, and went to Turin, where he died in 1544. Besides writing original verse, he edited the *Roman de la Rose* and the poems of Villon. He is easily the foremost poet of his time, but it is not depth and seriousness that recommend him, but vivacity, sprightly wit, agile grace, and *esprit gaulois*. At first following in the steps of the rhetorical school, he later freed himself from its pedantic Latinizing tendency, felt the influence of Villon, and achieved a simple, easy, and fluent style that was like the familiar vernacular. He used the old forms of the ballade and the rondeau with effect, but excelled in his elegies, eclogues, and epistles, the last of which, especially by their qualities of grace, lightness, and badinage, have fixed upon this manner the name *style marotique*. His works were collected in 1538 (4 vols.), and more completely in 1544 (4 vols.). Recent editions are by Jannet (4 vols., Paris, 1868–72), and B. Pifteau (4 vols., Paris, 1884). A very thorough edition in six volumes was begun by G. Guiffrey (vol. ii., 1876; vol. iii., 1881). A very valuable edition of Marot's *Œuvres choisies* has been published by E. Voizard (Paris, 1890). See the *Life* of Marot, by Douen (2 vols., Paris, 1878–79). A. G. CANFIELD.

Mar'quardt, JOACHIM: classical scholar; b. in Dantzic, Germany, Apr. 19, 1812; studied from 1830–34 in Berlin and Leipzig; was director of a gymnasium in Gotha, where he died Nov. 30, 1882. He was widely known as the author of the *Römische Staatsverwaltung* (2d ed. 1881) and *Privatleben der Römer* (2d. ed. 1886, by Mau), forming vols. iv. and vii. of Mommsen-Marquardt's *Handbuch der römischen Alterthümer*. A. G.

Marque, Letters of [from Fr. *lettres de marque*; cf. Germ. *mark*, sign, symbol, seal]: in international law, the consent of a government, expressed in a formal permission, that a certain vessel may act as a privateer when the requisite bonds and formalities have been given or complied with. The words are explained best by the French *lettres de marque*—i. e. of stamp, or stamped letters, like *lettres de cachet*, letters of seal, or sealed with the king's signet, but specially giving authority to arrest. They are, then, stamped letters allowing reprisals or private warfare. See PRIVATEERING. T. D. WOOLSEY.

Marquesas (mȧȧr-kā'sȧȧs) **Islands** (French, *Les Marquises*; named by the discoverer, Mendana, *las Marquesas de Mendoza*, after the wife of the Viceroy of Peru): archipelago in Eastern Oceania, belonging to France since 1842; in lats. 7° 55′ to 10° 30′ S., and lons. 138° 40′ to 140° 46′ W., consisting of twelve islands; total area, 492 sq. miles; pop. (1889) 5,054. The largest island is Nukahiva; area, 186 sq. miles; pop. 988; greatest elevation (and highest in the group), 3,840 feet. The second in size is Hivaoa; area, 155 sq. miles; pop. 2,636. It is the most densely populated. Only six of the islands are inhabited. They are all mountainous, with great depths of water close to them, and poor harbors. The climate is warm and humid, but not unhealthful. The rainy season is from May to September, with a short rainy season in January. The winds are from the N. E. and S. E., and storms are rare. The surface of the islands is furrowed with deep valleys, and it is to these valleys that life is, for the most part, confined. Vegetation is here profuse and luxuriant. The commonest tree is that of the breadfruit, which furnishes a large share of the food of the natives. The land and air fauna are poor, but the marine fauna is very rich. The inhabitants are closely allied to the Tahitians, and have the reputation of having the finest physical forms known. Tattooing is universally practiced. Cannibalism was practiced as late as 1867. They profess Roman Catholicism almost universally. They were early visited by Protestant missionaries, who yielded to the Roman Catholics in 1858. The natives are warlike and skillful, yet hospitable, affectionate, and indolent. There are few foreigners on the islands, mostly deserters from vessels or Chinese. The political administration is under the Tahiti Government through a naval lieutenant, resident on Nukahiva, and the native chiefs. The southeastern islands were discovered by Mendana in 1595, and Capt. Cook touched there on his second voyage in 1772. The northwestern islands, which are somewhat separated and are sometimes called Washington islands, were discovered in 1791 by a captain named Ingraham from the U. S. See Clavel, *Les Marquisiens, études physiologiques, anthropologiques, et ethnographiques* (1885). MARK W. HARRINGTON.

Marquetry, or **Marqueterie** [from Fr. *marqueterie*, deriv. of *marqueter*, checker, inlay, deriv. of *marque*, mark,

sign]: the decoration of a surface by thin sheets of wood, ivory, metal, tortoise-shell, or the like, arranged in patterns for ornament. The thin sheets of wood are like those used in VENEERING (*q. v.*), but marquetry consists in making a pattern of different veneers, laid edge to edge, with or without other materials than wood. Marquetry differs from common inlaying, because there is no cutting of grooves or sunken patterns in a solid surface, but all is done by a kind of mosaic of thin pieces put upon the solid backing. Boule-work (called often in English BUHL-WORK, *q. v.*) is a variety of marquetry. RUSSELL STURGIS.

Marquette: city; capital of Marquette co., Mich. (for location of county, see map of Michigan, ref. 2–F); on Lake Superior, and the Duluth, S. Shore and Atlantic Railway; 425 miles N. of Chicago. It is an important shipping-point, having regular steamboat communication with all the principal cities on the Great Lakes. It contains a Roman Catholic cathedral and convent, 2 libraries (the State, founded in 1872, and the Peter White Public, founded in 1891), a public natural park, a national bank with capital of $150,000, a State bank with capital of $100,000, and a private bank, and a monthly, 2 daily, and 3 weekly periodicals. The city has iron mines, brownstone quarries, blast furnaces, rolling and powder mills, foundries and machine-shops, and large lumber interests. Pop. (1880) 4,690; (1890) 9,093; (1900) 10,058. EDITOR OF "MINING JOURNAL."

Marquette, JACQUES: missionary; b. at Laon, France, in 1637; sailed in 1666 as a Jesuit missionary to Canada; founded the mission of Sault Ste. Marie in 1668; went in 1669 from La Pointe du Saint Esprit (now in Michigan) to Mackinaw, where in 1671 he built a chapel; accompanied Joliet in his expedition of 1673 down the Wisconsin and Mississippi, and returned viâ the Illinois river and Green Bay, Wis.; opened in 1675 the mission at Kaskaskia, but, finding his strength failing, set out to return to Mackinaw. D. on the journey, May 18, 1675, near the mouth of Marquette river, in what is now Michigan. In Shea's *Discovery and Exploration of the Mississippi Valley* (New York, 1852) there are translations of his narrative and journal.

Marquez, măr'kāth, JOSÉ ARNALDO: poet; b. in Peru about 1825. In early life he took part in the civil wars; was several times banished, and resided in Chili, Cuba, and the U. S. He was private secretary of President Echenique in 1851, and subsequently held consular and diplomatic positions. Marquez is regarded as the best of the modern Peruvian poets, both for purity of diction and richness of poetic sentiment. His first verses date from 1848, and appeared in various journals. In 1862 he published the collection *Notas perdidas*, which was followed by various others, mainly in the lyric style; his *Flor de Abel* is particularly admired. Marquez edited, at different times, several journals. Among his prose works are *El Peru y la España moderna* and *Recuerdos de un viage á los Estados Unidos de América*. He was killed in the defense of Lima against the Chilians, Jan. 15, 1881. HERBERT H. SMITH.

Marquez, LEONARDO: soldier; b. in Mexico about 1820. He was an adherent of Santa Anna, headed a movement in his favor in 1849, and during his last presidency (1853–55) had important military commands. In the "Reform war" (1858–60) he was one of the most trusted generals of Zuloaga and Miramon, and after their defeat by Juarez he continued to wage an irregular warfare on that president, finally supporting the French intervention 1862–64. Maximilian made him minister to Constantinople, but the dangers threatening the empire brought him back in Oct., 1866, and he took command of a division. He was sent to Mexico in Mar., 1867, with directions to take charge of the defense of that city, form a new cabinet, and organize re-enforcements for the relief of Querétaro; but Diaz, having reduced Puebla, brought all his forces against Marquez, who, after various reverses, was driven into the city; finding resistance hopeless, and having heard of the death of Maximilian, he resigned his command on June 19, and escaped to Havana, where he took up his residence. He was expressly excluded from the amnesty of 1870. Marquez has been accused of great cruelty, and was nicknamed the "tiger of Tacubaya," in allusion to his massacre of prisoners at that place in Apr., 1859; in this, however, he acted under the orders of Miramon. HERBERT H. SMITH.

Marquis, or **Marquess** [readapted to Fr. from M. Eng. *markis*, from O. Fr. *markis*, *marquis* > Fr. *marquis*; cf. Germ. *mark*, boundary, and the title *markgraf*, nearly equivalent to marquis]: a British title of nobility, next in rank below that of duke, and next above that of earl. Like the ancient English title of *lord-marcher* and the German one of *Markgraf*, it originally signified an officer who governed a mark or frontier district. As an honorary title it was first bestowed in England in 1386. A marquis is addressed as "the most honorable." The title of his wife is "marchioness," and she is also addressed as "most honorable," or as "your ladyship."

Marquis, DAVID CALHOUN, D. D., LL. D.: minister and professor; b. in Lawrence co., Pa., Nov. 15, 1834; was educated at Jefferson College and Western and McCormick Theological Seminaries; was a teacher 1857–60; pastor of a Presbyterian church at Decatur, Ill., 1863–66; of the North Presbyterian church, Chicago, 1866–70; of Westminster church, Baltimore, 1870–78; of Lafayette Park church, St. Louis, 1878–83; moderator of the General Assembly at Minneapolis 1886; since 1883 has been Professor of New Testament Literature and Exegesis in McCormick Theological Seminary. He has published occasional articles, and has written a *Life of Christ*, for use as a text-book in schools. C. K. HOYT.

Marradi, măăr-raa'dĕĕ, GIOVANNI: poet; b. in 1852 at Leghorn, Italy. He studied at Pisa and Florence, and in the latter place, in 1877, joined Guido Biagi and Severino Ferrari in founding the literary periodical *I nuovi Goliardi*. By the name Goliardi he and his associates were for a time known. After the failure of the periodical, he published, under the pseudonym *G. M. Labronio*, a volume entitled *Canzoni moderne* (1878). He has since produced *Epicedio: poesie* (1880); *Fantasie marine* (1881); *Ricordi lirici* (Rome, 1884); *Poesie* (Turin, 1887); *Nuovi Canti* (Milan, 1891). Marradi has felt strongly the influence of Carducci, and echoes the note of paganism and naturalism that is characteristic of his master. His style has often a rare and personal perfection of its own. A. R. MARSH.

Marri: a sanitarium in Northern India. See MURREE.

Marriage [M. Eng. *mariage*, from O. Fr., deriv. of *marier*, marry < Lat. *marita're*, wed, marry, deriv. of *mari'tus*, husband, deriv. of *mas*, *ma'ris*, man, male, husband]: the contract by which a man and a woman assume the status or relation of husband and wife, or the status itself.

HISTORICAL OUTLINE OF THE CUSTOMS AND LAWS OF MARRIAGE.

I. EARLY CUSTOM AND LAW.—*The evolution of marriage* begins with the appropriation of one or more women by one man. The earliest form of complete appropriation seems to be *wife-capture* from a hostile horde. The right established by such a capture is ownership; the woman is the man's property, his slave. The second form of marriage, which develops insensibly out of the first, is *wife-purchase*. As the older and smaller hordes are united into tribes, by conquest or defensive federation, and as the tribes, under the operation of the same causes, grow larger and are welded into something like states, wife-capture becomes more and more difficult. Such capture is legally permissible only out of the limit of the tribe or state; within these limits it is a breach of the peace, and a wrong to the woman's kinsman; it has become theft. If, therefore, a wife is sought within the tribe, she must be bought; at first from her clan; at a later period, when the clan is in process of dissolution, from her father or guardian. Like the captured wife, the purchased wife is still, in legal theory, the husband's property, but her actual position rapidly improves. Her kinsmen are members of the same community; they claim the right to protect her against cruel treatment and to exact vengeance or penalty if her husband puts her to death or puts her away without good cause. This protection extends to her children also. Rights begin to be attributed to the wife and mother, and these rights, however slight and faintly marked, differentiate her from the slave. This evolution is often hastened by religious influences. Among many peoples a *religious marriage* supplements the sale or is substituted for it; the relation thus initiated is a religious relation, and the wife is protected by the priests. Even where no such religious marriage is developed, the sale of the wife tends to become fictitious. A symbolic consideration, a ring or a coin, is substituted for the purchase-money, and marriage, though technically a sale, is really a distinct contract. It is still, of course, in every early system of law a contract between the man and the woman's father or guardian; the latter "gives her to be married,"

and her consent is not necessary. When the woman's consent begins to be regarded as essential, marriage has practically reached its modern form.

Polygamy.—In the normal evolution of marriage polygamy (or rather polygyny, a plurality of wives) and monogamy may exist side by side; but for obvious reasons polygamy can never be a general system. Only the most powerful or most wealthy members of a community can capture or purchase a plurality of wives.

Manus-marriage and the Patriarchal Theory.—The form of marriage above described, which rests upon the appropriation of the woman by the man, is called by Semitic scholars the *ba'al* or ownership marriage; by students of Indo-Germanic custom the *manus*-marriage. In early Roman and in early Teutonic law marriage brings the woman into the "hand" (*manus, munt*) of her husband; and it seems certain that these words originally designated possession or proprietorship. The theory that *manus*-marriage is the primitive form of marriage is in accord with the so-called patriarchal theory, but does not involve the acceptance of the latter theory in its broadest form, as set forth by Maine, according to whom all early social organization is based on the patriarchal family.

Promiscuity, Group-marriages, Polyandry, and Marriage without Marital Power.—There are several other theories regarding the earliest form of the family. Some modern writers hold that the primitive horde was itself a single undifferentiated family, with complete promiscuity or hetairism. Others assert that the earliest marriages were group-marriages in a narrower sense; a number of husbands in every case holding a number of wives in common, and a number of such matrimonial groups being included within the horde. Others again (notably McLennan) declare that polyandry, a system under which one woman maintains more or less permanent relations with a number of husbands, is a primitive (if not the primitive) form of the family. Still others maintain that a frequent (if not universal) form of early marriage is that in which the wife remains in her own horde and the husband is adopted into it. In none of these forms of association is there any marital proprietorship or any considerable degree of marital authority. Paternal authority does not exist over the children; the woman is the head of the family (*matriarchate*).

These theories rest partly on customs actually prevailing in modern times, or said to have prevailed in the past among many savage or barbarous peoples, and partly upon early methods of tracing kinship. The evidence furnished by actual custom is, however, by no means conclusive. Promiscuity, polyandry, etc., are sporadic, not general, phenomena; and in many cases it is probable that they represent comparatively late conditions, due not to normal evolution but to social degeneration. It should also be observed that general license outside of the marriage relation proves nothing as to the nature of marriage itself; and that the selling or lending of wives, so frequently noticed among barbarous peoples, is rather an assertion than a negation of marital ownership. More important is the evidence furnished by early systems of kinship. It is coming to be generally conceded that in the earliest stages of social evolution relationship is not traced through the male line at all, but exclusively through the female (*Mutterrecht, uterine* or *cognatic relationship*). It also seems clear that kinship between father and child, when it comes to be recognized, is generally based on the power of the husband over the mother, her child being regarded as his child because she is his property. These facts are explained by the opponents of the patriarchal theory by asserting that in primitive society there is either no marriage at all, or no marriage to a single husband, or that in primitive monandrous marriage the husband does not own his wife. The latest and most careful investigations, however, seem to show that there is no necessary connection between the earliest theories of kinship and the earliest organization of the family. Relationship to the mother and through the mother is first recognized because it is the most obvious and most certain form of relationship. We find that relationship to the father and through the father is ignored by many of the lowest savages, in spite of the fact that their marriages are uniformly monandrous, and that the husband has the fullest power over the wife. In a much higher stage of social development, moreover, at the period of fully developed clan organization, the method of tracing relationship seems to depend primarily not upon the form of the family, but upon the custom of the clan. According to its own theory, the clan is always based on kinship; the tie which holds it together is always a tie of blood. If, now, the clan were regularly perpetuated by *endogamy*, i. e. by intermarriages between its members, it would not be forced to choose between "mother-right" and "father-right"; but this is not the case; *exogamy*, or a system of cross-marriages between clans, is the rule; and in order that each clan may establish and preserve a distinct and separate existence, the children of such cross-marriages must be assigned either to the mother's clan or to the father's. With the acceptance of a uniform rule of assignment, each clan perpetuates itself through one exclusive line of descent, either through the female line or through the male line; and the line which is excluded by clan custom is practically ignored by the entire community. It is perfectly conceivable that the female line may be chosen; and in this case "mother-right" will maintain itself long after paternity has become certain; but this solution of the question seems to be exceptional, or at least transitional. As a rule, the woman is taken into the man's clan, capture and purchase alike bring her there, and her children are accounted members of his clan. This certainly was the system which prevailed among the Aryan or Indo-Germanic races. Among them the clan name descended in the right male line, as our modern family names still descend. Among them, as long as the gentile or clan organization was still strong, kinship through the male line (*agnatic relationship*) was either the only legal kinship, as was the case for centuries at Rome, or it was at least the more important form of kinship. Cf. the position assigned in early German law to the "sword-kin" (*Schwertmagen*).

Conclusions.—In view of the above facts, it appears very doubtful whether promiscuity or group-marriage or polyandry can be regarded as a really primitive type of social organization; and it seems certain that none of them is a general type. It may be added that none of these forms of sexual association is really entitled to be called marriage; and it is not easy to see how any one of them can have furnished even a starting-point in the evolution of monandrous marriage. It is equally doubtful whether the form of marriage in which the husband enters the wife's family is a really primitive form; and it is certain that it is not the starting-point from which Indo-Germanic marriage has been derived.

LITERATURE.—Maine, *Ancient Law* (London, 1st ed. 1861; 7th ed. 1878); *Early History of Institutions* (4th ed. 1885); *Early Law and Custom* (1883); Bachofen, *Das Mutterrecht* (Stuttgart, 1861); *Antiquarische Briefe* (Strassburg, 1880–86); Morgan, *Systems of Consanguinity* (Smithsonian contributions, vol. xvii.); *Ancient Society* (London, 1877); McLennan, *Studies in Ancient History* (London, 1876); *The Patriarchal Theory* (1885); Hearn, *The Aryan Household* (London, 1879); von Dargun, *Mutterrecht und Raubehe* (Breslau, 1883); *Mutterrecht und Vaterrecht* (Leipzig, 1892); Lippert, *Geschichte der Familie* (Stuttgart, 1884); Giraud-Teulon, *Les Origines du Mariage* (Geneva, 1884); Robertson Smith, *Kinship and Marriage in Early Arabia* (Cambridge, 1885); Starcke, *The Primitive Family* (transl. New York, 1889); Post, *Entwickelungsgeschichte des Familienrechts* (Leipzig, 1889); Westermarck, *History of Human Marriage* (London, 1891).

II. ROMAN LAW.—Early Roman marriage was based on the acquisition, by the husband, of *manus*. In early Roman legends there are traces of wife-capture; but this form of marriage is not recognized in the sacral law (*leges regiæ*) nor in the Twelve Tables. Manus (and therefore marriage) was established among the patricians by a religious ceremony (*confarreatio*); among the plebeians by purchase (*co-emptio*). We find also in early Roman law that if a man exercises marital authority over a woman for a year, he acquires manus as he would acquire any other property right, viz., by prescription (*usus*). From the marriage by prescription there was ultimately developed a *free, consensual marriage*, without *manus*. The acquisition of *manus* could be defeated by a brief annual absence of the wife from her husband's home; and it came to be recognized that, even without *manus*, the voluntary union was legally a marriage. In the late Roman law this free union was the general form of marriage. It was based upon the agreement of the man and the woman (*consensus, non concubitus, facit nuptias*), although, if either of the parties was under paternal authority the consent of the father also was necessary to the validity of the contract.

Marriage was regularly preceded by betrothal (*sponsalia*); but the engagement to marry was not capable of specific en-

forcement, nor, in the later development of the law, could any penalty be recovered for breach of the promise.

Marriage was dissoluble at pleasure by either party. The Roman jurists described marriage as the sharing of fortune, good or ill, for life (*consortium omnis vitæ*); but they meant a voluntary sharing, and held that a promise not to exercise the right of divorce was invalid *because immoral*. The Christian emperors endeavored to check unreasonable divorce by penalty, and Justinian forbade divorce by mutual consent—a prohibition which his successor repealed.

Literature.—Rossbach, *Römische Ehe* (Stuttgart, 1853); Karlowa, *Römische Ehe und Manus* (Bonn, 1868).

III. Early Teutonic Law.—In the earliest written laws of the Scandinavians, Germans, Anglo-Saxons, etc., wife-purchase (*Brautkauf*) is the normal form of marriage; but wife-stealing (*Frauenraub*) is still recognized as establishing the relation of husband and wife (*Raubehe*), at least when the customary penalty (a certain number of cows or horses) has been paid. Among many German tribes the penalty paid for abduction and the price paid in buying a wife are identical in amount. Wife-purchase, like other contracts of sale, falls into the two stages of sale and delivery. Sale consists in the agreement to deliver, accompanied by the payment of a part of the price (*arrha*), or the giving of a pledge (*Wette*, *wadium*) to bind the bargain. Delivery of the bride was frequently clothed in the form of abduction, followed by the payment of the full price by the bridegroom and his kinsmen to the bride's kinsmen. "Bride-purchase," says Heusler, "is essentially nothing but an abduction previously agreed upon." At a later period both the pledge and the price are paid to the woman's father or guardian, and at a still later period to the woman herself. The modern betrothal ring represents the *wadium* of the primitive sale. The marriage settlement made by the husband represents the full payment of what was once penalty and afterward price. Whether, in Teutonic law, the relation of husband and wife was established by the sale or by the delivery, by the betrothal (*Verlobung*) or by the marriage ceremony (*Trauung*) is disputed. Sohm asserts that the betrothal, according to Teutonic ideas, was not an agreement to marry but a contract of marriage, and that the ceremonies of delivery represented simply the execution of the contract. (Cf. the etymological connection between *Wette* and the English "wedding," and the introduction of the troth-plighting into modern marriage services). Others—and this is the general opinion—hold that the matrimonial relation was established by the giving of the bride to her husband. Heusler asserts that the relation was fully established or "consummated" only by *concubitus* (*copula carnalis*). As a matter of fact, Teutonic custom seems to have attached some results of marriage to the betrothal, others to the ceremony of marriage, and yet others to its consummation. All these ideas had an influence upon the development of the canon law.

Early Teutonic custom allowed the husband to put the wife away for cause (e. g. adultery, barrenness), and it probably recognized divorce by mutual consent.

Literature.—See especially the controversial literature of Sohm and Friedberg: Sohm, *Eheschliessung* (Weimar, 1875); Friedberg, *Verlobung und Trauung* (Leipzig, 1876); Sohm, *Trauung und Verlobung* (Weimar, 1876); and *Zur Trauungsfrage* (Heilbronn, 1879). Cf. also Heusler, *Institutionen des Deutschen Privatrechts* (Leipzig, 1886), ii., 277–292; Brunner, *Deutsche Rechtsgeschichte* (Leipzig, 1887), i., 70–81.

IV. Roman Ecclesiastical Law.—The mediæval Church declared marriage a sacrament. It therefore claimed, and obtained, an exclusive jurisdiction over matrimonial cases; and in the exercise of this jurisdiction it developed a uniform law of marriage for the entire Christian world.

The Church accepted the doctrine of the Roman civil law, that marriage is established by the consent or agreement of the parties. It accepted the Roman age of consent, viz., fourteen for males, twelve for females. It rejected the Roman requirement of parental consent. It was customary, throughout the Middle Ages, to celebrate the troth-plighting at the church door (*ad ostium ecclesiæ*, *in facie ecclesiæ*) and then to consecrate the marriage within the church; it was also customary to require the previous publication of banns; but until the Council of Trent, in the sixteenth century, the clandestine, unconsecrated marriage was completely valid.

Betrothal (*sponsalia*).—Starting with the Roman idea of betrothal as a mere contract to marry at some future time, the Church was nevertheless strongly influenced in the early Middle Ages by Teutonic usages, and declared that betrothal established at least an inchoate marriage (*matrimonium initiatum*). In the Gallican Church, however, the Roman theory was retained, and a distinction drawn between *sponsalia de futuro* and *de præsenti*. This distinction was accepted by the Church as a whole in the twelfth century (Alexander III.), but some concessions were made to Teutonic ideas. An agreement *in præsenti* (e. g. *accipio*, I take) constituted a valid canonical marriage; but such a marriage, if not consummated, could be dissolved by a vow of celibacy on either side, and also by papal dispensation. An agreement *de futuro* (e. g. *accipiam*, I will take) was not marriage, but if followed by *concubitus* it became marriage. The *concubitus* was said to create a presumption of consent *in præsenti*, and this presumption was an absolute one, i. e. proof of the contrary was excluded.

Hindrances (*impedimenta*).—The Church established a formidable list of impediments to marriage, some of which made the marriage voidable (*impedimenta dirimentia*), while others did not have this effect, but simply subjected the parties to ecclesiastical censure (*impedimenta impedientia* or *prohibitiva*). To the latter class belonged, for example, the disregard of ecclesiastical rules concerning banns, and precontract (*de futuro*) between either of the parties and a third person. To the former class (*impedimenta dirimentia*) belonged, for example, lack of consent, whether due to insanity or essential error; lack of free consent, as in the case of intimidation; legal incapacity to give a binding consent because of non-age; and lack of physical fitness (*impotentia*). Precontract *de præsenti*, i. e. the existence of a previous marriage, a previous solemn vow of celibacy, and difference of religion also excluded marriage. The greatest innovation introduced by the Church consisted in its list of impediments based on relationship (*cognatio*). The Roman and the Teutonic law excluded marriage in only a few cases of very near relationship. The canon law forbade marriage between blood-relatives (*consanguinei*); between each party to a previous marriage (or to an unlawful *copula*) and the relatives of the other party (*affines*); and it added to these impediments the so-called "spiritual relationship," established by participation in the sacraments of baptism and confirmation. Before 1215 the impediments of consanguinity and affinity extended to the seventh degree (e. g. to sixth cousins), and marriage was forbidden not only with *affines* but with *affines* of *affines*; but Innocent III. abolished the latter rule, and limited the prohibitions based on consanguinity and affinity to the fourth degree (e. g. third cousins). All impediments of kinship, except between ascendants and descendants and brother and sister, may be removed by dispensation.

Separation.—The most important inference which the Church drew from the sacramental character of marriage was the indissolubility of the union, save by death. It refused to permit any separation *a vinculo* (divorce), and permitted only separation from bed and board.

The most peculiar feature of the canon law, viz., its extended list of impediments based on actual, legal, and spiritual kinship, has been variously explained. Some of the early Protestant Reformers insisted that the Church meant to supply a substitute for divorce by permitting frequent annulment of marriages. Others declared that its motive was fiscal; that many prohibitions were created in order that many dispensations might be sold. Modern historical investigation has discovered better and more probable reasons for the policy of the Church. After the disappearance of the marriage by capture, a strong tendency appeared, at least among the Germans, toward marriage within the *Sippe*, or body of relations, the motive being to keep property in the *Sippe*; and throughout the Middle Ages—indeed, until the nineteenth century—the tendency of European village life has been toward marriage within the village. In those parts of the Continent that have been least affected by modern migratory tendencies, villages may still be found where all the inhabitants are more or less nearly connected by blood or marriage. The prohibitions of the Church, in forcing men to seek wives outside of the narrow circle of their kinsfolk, exercised a beneficent influence in checking these tendencies to inbreeding.

Council of Trent.—The validity of clandestine marriages between minors was recognized as one of the most objectionable features of the mediæval law of marriage. The Council of Trent declared that marriage must take place in

the presence of the parish priest and two witnesses, and that no clandestine marriage should be held binding.

Literature.—Works on canon law (*jus canonicum*, *droit canonique*, *Kirchenrecht*), public and private, contain the canon law of marriage; works on the public law alone do not. Two of the most recent treatises on the Catholic law of marriage are Esmein, *Le Mariage en Droit Canonique* (Paris, 1891), and Bender, *Handbuch des Katholischen Ehcrechts* (4th ed. Freiburg i. Br., 1891). For the history, see Freisen, *Geschichte des Canonischen Eherechts* (Tübingen, 1888). For the doctrine of *sponsalia*, see Sohm and Friedberg, cited above, and Sehling, *Die Verlöbnisse im Kanonischen Rechte* (Leipzig, 1887).

V. Protestant Ecclesiastical Law.—The Protestant Reformation brought with it numerous changes in the law of marriage, the most important of which resulted from the rejection of the sacramental theory. In some territories these changes were made by ecclesiastical authority, in others by secular legislation; but until the nineteenth century legislation was generally guided by the opinions of the Church authorities. In Germany the territorial princes were thought to deal with marriage rather in their capacity of supreme bishops than in that of secular rulers.

Betrothal and Marriage.—Luther protested against the Catholic distinction between *sponsalia de futuro* and *de præsenti*, on the ground that it was foreign to the instincts and language of his countrymen. "Wilt thou" and "I will," he declared, were not, in German, *verba de futuro*; they expressed simply volition, consent. He therefore insisted that all betrothals, unless expressly made subject to condition precedent (e. g. "if my parents consent"), or term precedent (e. g. "if you will wait a year for me"), expressed a present matrimonial consent, and constituted at least an inchoate marriage. This view was dominant in Germany until the eighteenth century.

The evil of clandestine marriages, which was rather exaggerated than lessened by Luther's theory of betrothal, was met in different ways in different German territories. Consent of parents was demanded, or the presence of witnesses, or an ecclesiastical ceremony. Church marriage was regarded as the usual and regular consummation of the inchoate marriage established by troth-plighting; but it was still held that any sort of betrothal followed by *concubitus* established a marriage, a rule which made the requirement of publicity illusory.

Böhmer (*Jus Ecclesiasticum Protestantium*, Halle, 1714) reintroduced the Roman distinctions. He held that *sponsalia* are always, in principle, *de futuro*; that the consent given in betrothal is not a consent to marriage, but to betrothal. Betrothal followed by *concubitus* constitutes indeed a "natural" marriage, but by positive law the benediction of the Church is necessary to its legal recognition. The ecclesiastical marriage is therefore the only perfect marriage. The views of Böhmer were generally incorporated in German legislation during the latter part of the eighteenth and the early part of the nineteenth century.

The Church of England adhered, as far as these questions were concerned, to the older ecclesiastical law. Whether this was precisely the same as the ecclesiastical law of the Continent—whether the latter had not been supplemented and modified by English legislation, ecclesiastical and secular—is a matter of dispute. Many authorities hold that neither *sponsalia de præsenti* nor *sponsalia de futuro* with subsequent *copula* constituted a perfect marriage at English ecclesiastical law without a priestly benediction. (See *Queen* vs. *Millis*, 10 Clark and Finelly, where the judges were equally divided.) It is also maintained that the presumption of present consent derived from the *copula* was not absolute; that proof to the contrary was admissible. All uncertainty was removed by statutes passed in the reigns of George II. and George IV., requiring a church marriage preceded by publication of banns, except in the case of marriage by special license, and making any other sort of marriage invalid. The first of these statutes (Lord Hardwicke's Act, 26 Geo. II., c. 33) made even such a marriage void in the case of minors, unless the consent of the parents or guardians had been obtained; but this provision was afterward repealed.

None of these statutes applied to Scotland, and their passage gave rise to a great number of elopements to that country. See Gretna Green.

Hindrances.—Protestant ecclesiastical law rejected the theory of spiritual kinship, and narrowed the impediments resulting from consanguinity or affinity. In Germany the new rules were based in some territories upon the Roman civil law, in others upon the Mosaic law (Leviticus xviii.). In England the Levitical degrees were adopted by acts passed in the reign of Henry VIII. This system limited the impediments of consanguinity and affinity to the second degree, and permitted certain marriages within that degree, e. g. between first cousins.

Divorce.—The Protestant churches of the Continent regarded divorce *a vinculo* as permissible: in some cases for adultery only, in others for malicious desertion and cruelty, and by reason of the condemnation of either party to imprisonment at hard labor—particularly in those cases where a more humane tendency in legislation had substituted the penalty of imprisonment for an earlier penalty of death. The Church of England, on the contrary, opposed the granting of divorce for any cause, and where divorces were granted by special act of Parliament the ecclesiastical authorities were unwilling to sanction a second marriage.

Literature.—For Germany, works on Church law, Catholic and Protestant, e. g. Hinschius, *Kirchenrecht* (Berlin, 1869–88); Friedberg, *Kirchenrecht* (Leipzig, 1889). For England: Burn, *Ecclesiastical Law* (9th ed. London, 1842); Phillimore, *Ecclesiastical Law* (London, 1873).

VI. Modern Legislation.—*Europe.*—The modern state regards marriage as (primarily, at least) a civil relation, and even in Catholic states marriage and divorce are governed to-day by civil legislation. The most important changes introduced by modern legislation are as follows: (1) The *age of consent* is generally raised. (2) The *consent of parents* or guardians is generally made a condition of validity during minority, and in some states for several years after majority (so, e. g., in France, Italy, and Germany). (3) Marriage must be publicly contracted. The earliest form of *compulsory public marriage* was, as we have seen, the church marriage. In this form the principle of publicity was introduced into the Catholic states of Europe by the Council of Trent; into Protestant Germany and England by civil legislation. The church marriage meant, at first, marriage according to the rites of the established Church of each country; but the irritation excited by subjecting the adherents of other confessions, or of no confession, to such a form of marriage has led in some states to the recognition of marriages celebrated according to the rites of any recognized confession, and ultimately to the general establishment of *civil marriage*, i. e. marriage before a secular official. In England marriages before justices of the peace were authorized under the Commonwealth, but disappeared with the Restoration. In the nineteenth century the act of 6 and 7 Wm. IV., c. 85 (supplemented by acts of 1 Vict., c. 22, and 19 and 20 Vict., c. 119) furnishes an option between marriage according to the forms of the established Church, marriage according to the forms of other confessions, and marriage before a "registrar." An optional or "facultative" civil marriage exists also in Austria, Spain, and Portugal. In a larger number of continental states, however, conflicts with the Catholic Church—arising, in general, from the refusal of that Church to recognize the rules established by the state; in particular from its opposition to marriages between Catholics and non-Catholics, or its attempt to make the celebration of such "mixed marriages" conditional on a pledge that the children shall be brought up in the Catholic faith—have resulted in the establishment of the *obligatory civil marriage*, e. g. in France, Italy, Germany, Holland, and Switzerland. The civil marriage is regularly preceded by notices modeled on the banns of the Catholic Church, and subserving the same purpose of publicity.

The requirement of public marriage has swept away all doubt as to the nature of *betrothal*. It is merely an agreement to marry at some future time. It gives no claim for specific performance. That breach of promise of marriage creates a claim for damages is denied or disputed in many states, but affirmed in Germany.

Hindrances.—According to the law of most Protestant and some Catholic states, consanguinity is a bar to marriage only between ascendants and descendants (*linea recta*), brothers and sisters, uncle and niece, and nephew and aunt. Some states (e. g. Prussia) limit the collateral impediment to brothers and sisters. Affinity in some Protestant states (e. g. Prussia) is a bar only in the right line, and not between collaterals. England still adheres to the prohibition of marriage with the deceased wife's sister. Even in those Catholic states which cling most closely to the Roman ecclesiastical law there is a tendency to limit the impediments of consanguinity and affinity to the third degree.

Divorce a vinculo is generally permitted, but for causes which vary greatly. Italy, Spain, and Portugal grant no absolute divorce. Austria grants it only to non-Catholics.

LITERATURE.—For comparison of the laws of the principal countries, see Glasson, *Mariage Civil* (2d. ed. Paris, 1880); Grünwald, *Die Eheschliessung* (Vienna, 1881); Wright, *Report on Marriage and Divorce* (Washington, 1889).

United States.—The so-called "common-law marriage" recognized in the U. S. is simply the canonical marriage by agreement *de præsenti*. An agreement *de futuro*, though followed by cohabitation, does not establish marriage. Cohabitation is merely evidence of an agreement *de præsenti*, and is by no means conclusive evidence. In a few of the States consent is not sufficient to constitute marriage without a public ceremony or actual consummation. The law of Louisiana requires the observance of certain forms and solemnities. In Nevada marriages between minors require parental consent, and failing such consent, the marriage appears to be invalid. In the other commonwealths all rules regarding parental consent, solemnization of marriage by clergymen or secular magistrates, notices of intention, issue of licenses, etc., are merely directory, or entail no further result than the punishment (usually by fine) of the parties, or clergymen, or magistrates, who disregard them. The system which prevails in the U. S. accordingly offers an election between religious marriage, civil marriage, and completely formless marriage. It may be added that it would be practically impossible for any single commonwealth to suppress clandestine marriages, as its rules would not affect marriages contracted by its citizens beyond its borders.

In the absence of statutory provision to the contrary, the *age of consent* is the canonical age, viz., fourteen for males, and twelve for females. In many of the States the age has been raised, and varies from sixteen to twenty-one in the case of males, and from fourteen to eighteen for females.

All of the States prohibit marriage between ascendants and descendants (*linea recta*), and between brothers and sisters of the full or half blood. Nearly all prohibit marriage between uncle and nicce, or aunt and nephew. Ten States forbid marriage between first cousins. Affinity is usually a bar only in the right line, i. e. between step-parents and step-children, and between father-in-law and daughter-in-law, etc.; but in a few States close collateral affinity is made a bar. Marriages within the prohibited degrees are generally declared to be void. In many States marriage is unlawful between whites and persons of African descent, and in a few between whites and Indians or Mongolians.

Divorce is granted in all the States and Territories except South Carolina and New Mexico. The causes vary greatly in different States, some granting divorces only for adultery, some even for incompatibility of temper.

LITERATURE.—Bishop, *Marriage and Divorce* (6th ed. Boston, 1881); Noble, *Complete View of the State Laws of Marriage and Divorce* (New York, 1882); Robinson, *Marriage and Divorce* (Chicago, 1884); Stewart, *Marriage and Divorce* (San Francisco, 1884); Snyder, *Geography of Marriage, or Legal Perplexities of Wedlock in the United States* (New York, 1889); Wright, *Report on Marriage and Divorce* (Washington, 1889). MUNROE SMITH.

GENERAL LAWS GOVERNING MARRIAGE IN GREAT BRITAIN AND THE UNITED STATES.

The word marriage in law, as well as in popular usage, is commonly used of two things which are in their nature widely different—namely, a contract, that is, the act, the series of acts, or the ceremony by which a man and a woman agree to live together as husband and wife; and a "status," that is, the condition or relationship toward one another and toward the community which is contemplated in and arises out of the contract. Technically, this status is the condition or relationship in which a man and a woman may lawfully cohabit as husband and wife.

The marriage status is distinguished from a contract by the facts that when once created by the marriage contract it can not be dissolved or abrogated by the act of the parties; that incapacity of one of the parties to perform its duties does not affect its continued existence; that it ends only with death or dissolution by legal process; that a minor can not avoid its continuance if he entered into it when of the age of consent; that no suit for damages will lie for nonperformance of its duties; and that the causes for which it can be dissolved by legal process can be validly changed by legislation without violating the obligation of a contract, and also change with the domicile of the persons married.

Agreement or Promise to Marry and its Breach.—In the nature of the case there is customarily, and practically always, an agreement or promise to marry between the parties preliminary to the act of marrying, which constitutes a contract governed by the same legal principles as to capacity of parties, consideration, etc., as other contracts.

This contract may be proven, like any other contract, by any words or acts sufficient to show that the parties mutually expected and assented to the future entry into the state of matrimony by intermarrying. Both parties to the contract must be of marriageable age, or otherwise it will be void, and if one be a minor, the contract, like other contracts, is voidable at his option, but binding on the adult. The mutual promises or assents may be the only considerations; the time of performance, like that of any other contract is, when not expressly fixed, such a time as is reasonable under the circumstances of the case. The contract can not be specifically enforced under any circumstances, but the defaulting party is liable in a suit for damages, in awarding which the jury may, besides actual pecuniary damages, take into consideration the loss of worldly advantage reasonably expected from the marriage by the plaintiff, wounded feelings, the mortification arising from the breach, and the positive injury to the plaintiff's prospects in life. In Great Britain, and generally in the U. S., seduction under promise of marriage may legally be shown in an aggravation of damages, and in any case it is practically impossible to keep the knowledge of the fact from the jury. A breach of the contract which will be a sufficient basis for an action in damages may arise from the fact of a person promising to marry when he knows that he is legally disqualified, or is incapable of performing the duties of the marriage relation (as one already married or one impotent), from his rendering it impossible for him to fulfill the contract (as by marrying another), or from words or acts showing his intent not to do so, or from his failure to fulfill it at the proper time, or on such request as the law requires. It is generally held in the case of a woman that she need only prove that she held herself in readiness and willingness to be married. The contract may be rescinded by one party by reason of its becoming unsafe or improper for him to celebrate the marriage by reason of bad health; for the fraud or deception of the other party, such as the concealment of previous unchastity or the disposal of property in a manner injurious to his interests, without his consent; for the occurrence of such physical infirmity (as total blindness or deafness) as incapacitates the other party from properly fulfilling the marital duties; for duress, and for mistake of fact which goes to the essence of the contract. Either party may also rescind it for ill-conduct of the other party occurring subsequently to the promise, what constitutes such ill-conduct as to justify rescission being necessarily left without exact definition, but in any case being less than would be necessary to constitute a ground for divorce; thus subsequent lascivious conduct not amounting to fornication might be a sufficient ground for rescinding the contract, though not for obtaining a divorce.

Of the Marriage Contract itself, Valid, Invalid, or Void, and Voidable.—Any marriage contract by which the parties completely assume the legal relation of husband and wife is valid. To this end it is necessary to follow only those formalities required by the unwritten law and those statutory ones without the observance of which the statutes expressly provide that no valid marriage can take place, all other statutory formalities being by the policy of the law held to be directory merely, the failure to observe them not affecting the validity of the marriage, but subjecting the negligent parties to a penalty, usually a fine of small amount. In the U. S. at the unwritten (or common) law and in Scotland any agreement by which the parties intend to assume the legal relationship of husband and wife is a valid marriage; whether more is required in England (and Ireland) is a matter of dispute. See above under the subdivision of *Protestant Ecclesiastical Law.*

An invalid or void marriage contract is one which does not alter the status of the parties, and which without any legal proceeding may be treated as of no effect by all persons under all circumstances. Such marriage contracts in general are those between persons under some civil disability, as prior marriage or idiocy, etc.—that is, those disabilities which the policy of the law will not allow the parties to waive. A voidable marriage is one which by reason of some hindrance may be set aside in a legal proceeding instituted for that purpose, but until then is valid, and the validity of which can not be attacked after the death of

either of the parties, nor collaterally at any time. When set aside it generally becomes void from the beginning. The hindrances which make a marriage voidable are such as were originally canonical disabilities, as consanguinity, affinity, impotence, etc., or those which the policy of the law now allows the parties to waive, although these facts are not infrequently made absolute disabilities by statute. See above (under the subdivisions *Roman Ecclesiastical Law*, *Protestant Ecclesiastical Law*, and *Modern Legislation*) for mention of the disabilities imposed by the ecclesiastical law and by statutes.

Capacity, or Competency, of the Parties.—The disabilities which are now recognized as making a marriage contract void or voidable are want of age of consent; mental incapacity to enter into the contract; physical incapacity to perform the marriage functions; consanguinity (or blood-relationship) and affinity (or relationship by marriage); the condition of being a slave; racial difference; and a previous marriage still continuing.

At the common law the *age of consent* at which a boy or a girl becomes capable of entering into a valid marriage contract without the consent of the parents is fixed at fourteen and twelve years respectively, the age for this purpose being different from that of majority, and fixed with reference to the probable age of attaining puberty, the years being derived from the Roman law. A marriage by a child under the age of consent and over seven years of age is voidable by the child upon reaching the age of consent, and a marriage by parties under seven years of age is void, and a mere nullity. The age of consent has now been very generally changed by statute. See under the sub-heading *Modern Legislation*, above.

The law with regard to *mental capacity* of the parties to a marriage to enter into the contract is an application of the general rule governing the formation of contracts—namely, that the parties must be capable of understanding the nature and consequences of the contract entered into. No exact definition can be given of what constitutes such mental capacity, but it is sufficient to say that the question will be decided by considering the simple nature of the contract entered into, and that it is only the immediate consequences that must be understood by the parties, and not those remote and secondary ones, such as property rights, etc. This mental incapacity may arise from mental unsoundness, or from intoxication, or any other cause. (See Insanity and Intoxication.) So a marriage entered into by a person during a lucid interval is good at the common law, and subsequent insanity would not invalidate the marriage or be a ground for divorce except under statutory provisions.

Physical incapacity, or impotence, is the irremediable incapacity of a party to a marriage to have any reasonable sexual intercourse with the other party, and in order to render the marriage voidable (see above) or to be a ground for divorce must have existed at the time of the marriage and have continued unchanged. Mere barrenness or sterility does not render the marriage voidable, nor is it a ground for divorce. A marriage declared void for impotence is void from the beginning, and a statute making impotence a ground of divorce is construed as providing that the marriage is a nullity if the divorce be granted.

A marriage by *a person already married* to another at the time of the second marriage is of course void absolutely; and no decree of court or legal process is necessary to make it so, but it is void *ab initio*, the capacity of the parties to contract a future marriage being unaffected by a bigamous marriage. The celebration of such a second marriage constitutes bigamy or polygamy, which was not punishable as a crime, except in the ecclesiastical courts, in England until the time of James I. The act is now, however, a statutory offense both in Great Britain and in the U. S. At the common law the children of a bigamous marriage are illegitimate, but by statute in some States they are made legitimate. If, however, a husband or wife has been absent and unheard from for seven years, the other does not commit a crime in contracting a second marriage, although if the absent party afterward returns or be proved to be living, the second marriage is void except as otherwise provided by statute. See Bigamy.

Of the *other incapacities* or hindrances: (*a*) Relationship within the prohibited degrees renders the marriage voidable. (See *Roman Ecclesiastical Law*, *Protestant Ecclesiastical Law*, and *Modern Legislation*, above; and see also Incest.) In England the prohibited degrees were established by 32 Henry VIII., ch. 38, which, in the absence of statutes, is the law in the U. S. (*b*) The laws governing the marriage of slaves are now of historical importance only. The cases are not all in harmony, but in general it is settled that slaves were capable of entering into a certain inchoate or imperfect marriage relationship, which on emancipation and continued cohabitation became a complete marriage with no further acts of the parties. (*c*) Difference of race is an impediment only when so provided by statute, and in many of the States marriage between persons belonging to different races (miscegenation) is forbidden, and the celebration of such a marriage is made a crime.

Marriage Accomplished by Fraud, Error, or Duress.—Although the form or ceremony of a legal marriage may have been gone through with, if either by reason of fraud, error (or mistake), or duress there is no such meeting of the minds of the parties as is essential in the case of an ordinary contract the status of marriage does not arise. The party who acted under fraud, duress, or error may have the marriage declared null and void, or may ratify it, on discovery of the fraud or error. The ratification may be by words or by acts alone, as by continued cohabitation. The fraud or error for which a marriage may be declared void must be such as affects the capacity of the parties to properly fulfill the relations to one another of husband and wife, or the consent of the parties to the entering into or assuming the duties of this relation. Thus pregnancy at the time of the marriage by a party other than the husband is a sufficient ground for avoiding the marriage, but not deception as to the health, previous chastity, or wealth of the other party.

Foreign Marriages.—The institution of marriage is of such a nature and so universal that public policy demands that the validity of marriages wherever celebrated, whether by persons in the land of their domicile, or by persons not in the country of their domicile, but while abroad in a foreign land, shall be recognized as valid everywhere if valid under the laws of the country where celebrated, unless such marriage be of such a nature as to be inconsistent with the general rules of propriety or morality according to the standards of civilized nations. With some exceptions, which can not be particularly noted here, this is the almost universal rule; and the practice in this matter may be contrasted with that followed as to recognizing foreign divorces, where domicile of one party at least is necessary to the validity of a divorce.

Marriage Brocage Contracts and Contracts in Restraint of Marriage.—A contract by which one person undertakes to bring about or negotiate a marriage (technically called a *marriage brocage contract*) is void as against public policy, without regard to whom the consideration is to be paid, since such contracts tend to bring about marriages through fraud and collusion, or marriages for unworthy purposes. Contracts in restraint of marriage are also wholly void, for the policy of the law is to favor and uphold marriage contracts. So a gift or bequest made to a donee upon the condition that the donee never marry, or do not marry for a considerable length of time during which a marriage might lawfully be celebrated, is void, except under certain peculiar circumstances where the dictates of common morality would suggest the refraining from marriage although lawful.

The foregoing brief sketch, based upon the common law of England (and Ireland) and the U. S., will serve as an outline of the laws of Scotland upon this subject, since (with the above-noted exception of the recognition of irregular marriages; see Gretna Green) they differ from those of England chiefly in matters too unimportant or too technical to be noted here. For a bibliography and further information as to the effect of marriage on the rights and duties of the parties, see Married Women. F. Sturges Allen.

Medical Aspects of Marriage.

Marriage may improve or may injure the health of the contracting parties, and the probabilities of healthy offspring from any given marriage depend to a certain extent upon the physical characteristics of each of the parents. At all ages over twenty years the death-rates of married males are less than those of the unmarried, and at all ages over twenty-five the death-rates of married females are less than those of the unmarried. At all ages the death-rates of widowers are greater than those of men who are either married or have never been married, while at ages between twenty and forty the death-rate of widows is greater than that of other women, and over forty it is greater than that of married women, but less than that of single women. This will be seen by the following table, compiled by Bertillon, show-

ing the average annual death-rates per 1,000 of each class in France during the ten years 1856–65:

AGES.	MALES.			FEMALES.		
	Single.	Married.	Widowers.	Single.	Married.	Widows.
15–20	6·89	51·32	774·0	7·53	11·86	12·31
20–25	12·88	8·92	49·6	8·32	9·92	23·62
25–30	10·17	6·24	21·84	9·02	8·98	16·9
30–35	11·51	6·82	19·17	9·87	9·36	15·03
35–40	13·15	7·52	17·50	10·87	9·29	12·73
40–45	16·62	9·55	18·89	13·28	10·14	13·30
45–50	19·60	11·47	22·2	15·71	10·69	15·20
50–55	25·8	15·61	26·8	20·97	14·11	18·71
55–60	32·1	21·5	34·17	26·90	19·29	24·47
60–65	45·92	32·6	47·5	40·52	30·75	37·07
65–70	58·5	44·8	62·97	58·3	45·3	53·5
70–75	85·1	71·5	95·4	85·5	72·69	86·1
75–80	123·0	114·5	143·9	140·5	109·4	126·7
80–85	202·7	182·8	221·8	222·5	172·5	198·0
85–90	268·4	228·6	263·05	305·0	205·1	264·0
90–95	282·0	279·0	319·0	314·1	256·3	308·0
95–	480·0	357·0	385·0	387·7	416·0	324·0

It can also be shown by statistics that insanity, intemperance, suicide, crime, and deaths from certain forms of disease, as for instance, cholera, are less frequent among the married than among the unmarried. It does not, however, follow that these differences in death-rates, and the correspondingly greater longevity of married persons, are due wholly, or even partially, to marriage, or that marriage is a means of preventing disease and prolonging life to the extent which figures might seem to indicate. Normal, healthy, energetic men and women are more likely to marry than those who are deformed, feeble, or affected with chronic disease, and therefore their death-rates should be lower. This will probably not account for all the difference, the married state being somewhat healthier than the unmarried, especially for males. The excess of mortality is greater in monks than it is in nuns. The death-rate of both youths and girls who marry before twenty years of age is very high; and such marriages are, in almost all cases, unadvisable on hygienic grounds, especially for girls, who are liable to become chronic invalids as the result.

So far as health only is concerned, the best age for marriage in the U. S. is for males from 23 to 26 years, and for females from 21 to 25 years. The probabilities of offspring are decidedly affected by the age at which marriage takes place; thus of males under 30 years of age marrying, about 84 per cent. have children, while of males marrying between 40 and 50 years of age, 67 per cent. have children; and of females marrying at the age of from 20 to 25 years, 85 per cent. produce offspring, while of those marrying between 33 and 37 years, 50 per cent. have one or more children. The special dangers to health connected with married life affect the woman, as a rule, more than the man; they are due chiefly to the transmission of disease from the husband, and to the perils connected with pregnancy and childbearing.

The health of the children depends to a considerable extent upon the health of each parent, and to some extent upon their relationship and relative race, but the popular belief that the marriage of near blood relations tends to produce certain degenerations and deformities in the children is, in the main, erroneous.

The results upon the offspring of consanguineous marriages depend, not on the consanguinity, but on the health of each parent. If in each parent—no matter whether they are blood relations or not—there is a tendency, small or great, to abnormity of structure or function of some organ or system of organs, that tendency will be, as a rule, increased in the children, and thus such affections as gout, insanity, deaf-mutism, tubercular disease, or deformities of various kinds may be directly or indirectly produced or aggravated; but in a consanguineous marriage the risk of transmitting and increasing a family tendency or taint is evidently somewhat greater than in a marriage between persons not related. It may be said that the possibility of transmitting good conditions of certain organs is also greater; and this is true, as has been shown by Francis Galton in his studies on natural inheritance, but it must be remembered that the strength of a chain is measured by that of its weakest link, and that the fact that certain links or parts of links have been thickened or strengthened avails nothing to prevent the catastrophe resulting from the thinning or weakening of other links or parts of links. The marriage of people of different races sometimes produces a healthier and at other times a more sickly offspring. The general rule appears to be that the first results of the cross are often strong and healthy, but that these must marry among the purer blood to secure a perpetuation of healthy offspring. The children of mulattoes of the second or third generation do not seem to be so healthy as those of the original races, but definite statistics on this point, covering numbers sufficiently large to make the results reliable, have not as yet been obtained.

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Marriage Settlement: See the Appendix.

Married Women: By the celebration of the marriage contract, the parties, as already stated (see Marriage), place themselves in a new status or condition both as regards each other and as regards the public in general; and the capacities, rights, and relations of the parties arising out of that status are regulated by the general rules of law relating to marriage, and, with the exception of their mutual property rights, can not be varied by any act or agreement of the parties made either before or after the marriage contract. (See *Property Rights*, below.) That is, they can not give to the one or the other the right to do or refrain from doing any act or duty denied or enjoined by the general laws regulating the personal rights and duties of the parties standing in the marriage relation. Thus the husband can not by any agreement between himself and his wife, either before or after marriage, waive his right to change his and her domicile, or avoid such liability for her debts as the law imposes.

These capacities, rights, and relations are so many and so varied in their nature, and the laws relating to them are so manifold and complex, that the most that can be attempted in the space here available is to give a summary statement of the general rights and duties of the husband and wife with respect to each other and to third persons, omitting whatever is technical, exceptional, or obsolete in character. The confusion due to the wide reach and complexity of these laws is increased by the important changes which they are now undergoing by reason of the influence of changing public opinion, the numerous and uncertain changes made by statute, and in some of the U. S. by reason of the presence of conflicting systems of law relating to the same subject-matter. The laws which still form the basis of the jurisprudence of England (and Ireland) and the U. S. on this subject are those of the common law of England, and, except where it is otherwise stated, these alone are referred to in this article. The laws of Scotland do not differ from those of England sufficiently to make necessary a separate statement of them. The community system (which is an outgrowth of the Roman law) will be only briefly referred to under *Property Rights* (below); and statutory changes will be mentioned only so far as it is possible to state their general tendency. They are so varied, contradictory, and often uncertain, that more is impossible here. The general results of marriage upon the rights and capacities of the parties may be considered with respect to—

The Names of the Parties.—The husband retains his name unchanged, but the legal surname of the woman is immediately changed to that of her husband, and this continues to be her name until she is lawfully married again, or until she acquires or lawfully assumes a new one. See Names, Law of.

The Personal Rights.—These have been but little changed by statute, but such changes in law as have taken place have mostly arisen from the growing disposition of the courts to look upon the parties as standing upon an equality, following the change of public opinion as to the proper degree of independence to be asserted by and accorded to the wife. The entrance upon the marriage status necessarily imposes certain restraints upon the personal liberty of both of the parties. They are mutually bound to live in the society and companionship of one another as husband and wife, and a refusal so to do is a breach of the marital duties and may amount to what will be construed to be legal desertion, or to be such cruelty as will justify a divorce, where cruelty is a ground for divorce. What degree of default or misconduct by either party shall constitute a refusal of such society or companionship is necessarily incapable of any exact definition, mutual love and affection, solicitude for the welfare of offspring, and self-respect being, in the nature of the case, much more efficient than any interference of the law in regulating the conduct of the parties.

The old common law in England recognized the right of the husband to correct his wife by corporal punishment, and to restrain and regulate her in her actions in many ways which would now be considered brutal, and be held unlawful. He can not to-day lawfully inflict actual vio-

lence upon her nor forcibly keep her a prisoner against her will. He may, however, if possible, in any reasonable manner not amounting to force, as by moral coereion, regulate the going or coming of his wife, and under certain circumstances the application of gentle force or passive restraint might be justifiable, sinee the law is loath to interfere between husband and wife except upon clear neecssity. Guardianship over the persons (and in some plaees the property) of minors ceases upon marriage. See GUARDIAN.

The Home or Domicile, and its Government.—The husband has the legal right to fix the place of domicile, and any refusal of the wife to live in the place chosen by the husband is a desertion by her. His domicile is hers, and it is her legal duty to reside with him wherever he sees fit to live, and so long as they remain married she can not by living in a jurisdiction other than that of his domicile aequire there a legal domieile, except for the purposes of obtaining a divorce or some other redress for a breach of marital duties by him. In the application of this rule, however, the courts at present would be less harsh than formerly in England, and would not force upon the wife a change of domicile not made by the husband in good faith. Since many of the rights and capaeities of the wife depend upon her domicile, this is often a question of importance. See DOMICILE.

The citizenship, like the domicile, of the wife is the same as that of the husband, so that if an alien woman marry a citizen of the U. S. she becomes thereby a citizen of the U. S., and when both are aliens the wife becomes a citizen at the same time her husband does by his naturalization.

In the regulation of the household the voice of the husband is supreme, the extent to which he may go in asserting his right being limited only by the endurance of the wife, providing that he keep within the bounds of what the law construes to be such cruelty as will enable the wife to demand and receive a support separate from him or to obtain a divorce. This varies greatly, and what would be considered his legal right in the matter in England, where the law is still strict in the recognition of this right of the husband, might suffice in some of the U. S. to enable the wife to obtain one or the other of the above-mentioned remedies.

Support by the Husband and Services by the Wife.—The husband is bound to provide a home and support for the wife and their offspring whieh shall be in keeping with his circumstanees and means in life; and the wife on her part is bound to render sueh domestic services as these circumstances and means render reasonable, and to accommodate herself to whatever unfortunate vieissitudes may attend him. She can not in any case claim compensation out of his estate for serviees rendered to him.

Whenever the husband refuses to support his wife in a manner suitable to his circumstanees and condition in life, she by operation of law becomes his agent with power to pledge his credit and make him liable for obligations incurred by her in purchasing such things as may be neeessary for such support, even to one who supplies them against his express orders. If he offers her a home and support such as he deems consistent with and suitable to his means and station, in order to make him liable there must be very strong evidence to prove that his judgment was perverted or merely one simulated for sinister motives, since it is the policy of the law to allow him great discretion in deciding what expenditures are and what are not warranted. If he offer her a suitable home and support, but by his conduct make it impossible or intolerable for her to accept it, she is not bound to accept of it, but may leave the home and pledge his credit as fully as if he had refused to support her. In any case, however, those who furnish her necessaries do so at their own peril of being able to prove that the facts were such as to justify them, and what are necessaries must be determined by the exigencies of each case, depending upon the means and position of the husband.

Property Rights.—At the common law the celebration of the marriage vests in the husband (1) absolutely, all of her personal property in her possession, and the right during the marriage or as administrator after her death to appropriate or reduce to his possession all of her choses in action (bills, debts due her, etc.), her leasehold estates, and her personal estates in expectancy. What constitutes a reduction to possession varies with the circumstances, but the general statement is that the husband must acquire the title to the property by the exercise of acts of ownership intended to produce that result, and that mere actual possession by him is not sufficient unless accompanied with the intent to become the owner of the property. The chattels real (leases, estates for years, etc.) of the wife are exceptional, in that upon her death his title to them is absolute without any act of ownership on his part, and upon his death they vest absolutely in her unless he has during coverture made an absolute alienation or disposition of the whole term. (2) The right to manage and receive as absolutely his own the profits of her real estate during their joint lives, and after her death the right to the life estate of curtesy therein, he surviving and having had issue by her during her life. (See ESTATES.) Of this property the wife upon the death of her husband receives back absolutely as her own her real estate, such personal property as he has not by some act appropriated as his own, and her personal ornaments and clothing suitable to her condition, known as her *paraphernalia*.

Property acquired by the wife subsequent to marriage is governed by the same rules as that held by her when married, and so at the common law (which has generally been abrogated in this respect) the earnings of the wife in whatever capaeity belong absolutely to the husband, and he (or his agent) alone can receipt for them. These rights of the husband do not, however, extend to the property placed in trust for her sole and separate use; and equity abridges them with respect to her other property by protecting and enforcing any marriage settlements made between them, her equity to a settlement, and her right to a similar settlement of a proportion (usually a half) of property coming to him in her right during marriage.

While at the common law, as just stated, all of the wife's property held by her absolutely goes to her husband, at equity she may have a separate estate (i. e. an estate limited to her sole and separate use; see USES and TRUST) whieh she may manage, and with reference to which she may contraet, and sue and be sued, in her own name, in a manner mueh the same as if unmarried. The doctrine of the separate estate of the wife is a eomparatively late development of the equity courts of England; and in the U. S., owing to the lack of courts with equitable jurisdiction, the subject has generally been regulated by statutes, which have in general gone further than the equity doctrine in recognizing the wife's separate estate, and have in many States provided that the property of a woman married thereafter, or thereafter acquired by a married woman, should remain her separate property, giving her all or practically all of the powers of an unmarried woman with respect to it. The separate property of a married woman may be given to her by third parties, or it may be settled upon her by her husband by a contract (*post-nuptial settlement*) which is binding upon him exeept it be in fraud of third parties, the consideration of love and affection being sufficient to make him a trustee of the property for her.

The parties to a marriage may, however, by a contract (*marriage settlement*) in the nature of a conveyance or trust deed, entered into or agreed to be entered into (by promises and agreements called *marriage articles*) before marriage, vary their mutual property rights from those which they would otherwise have by operation of law. The eonsideration of such a contract may be either the promise of marriage itself (as is more often the case) or any other valuable consideration. The marriage settlement by its terms secures land or trust property as a provision for the widow (usually as a jointure in lieu of dower; see JOINTURE) and for the children, and (sometimes) for the husband. Such a settlement may be made or promised by third parties upon the consideration of the promise of marriage, and is then enforceable against them. The object of making a marriage settlement is frequently to preserve intact family estates.

The wife, on her part, obtains by the marriage no interest in or right of control over the property of the husband, except a certain right of inheritance to a share in his personal property (which he may generally defeat by will, except as to the paraphernalia), and the right to DOWER (*q. v.*).

These property rights of the husband and wife have, however, been very generally changed both in Great Britain and in the U. S. by statutes which more or less completely take away the rights of the husband to the property of the wife (enabling her to restrain and manage as her own with some or all the powers of an unmarried woman the property, real or personal, which belongs to her at the time of marriage, leaving untouched the common-law rights of dower and curtesy, or substituting for them some statutory equivalent), and which give a corresponding exemption to the husband from liability for the ante-nuptial debts of the wife.

Ante-nuptial Debts of the Wife.—The husband, whether infant or adult, immediately upon the marriage becomes jointly

liable with the wife for all her outstanding debts and obligations (whether arising from contract or tort), whatever be their amount and however little property she brings to him, even notwithstanding that he may have been purposely kept by her in ignorance of her debts. This liability continues, however, only so long as coverture lasts, neither he nor his estate being liable unless the debt or obligation is brought to judgment before the termination of the marriage by the death of either party or by divorce. Her liability revives immediately upon such termination to the same extent that it existed previous to the marriage; and upon her death, leaving him surviving, any choses in action not reduced to possession by him during her lifetime become liable for the payment of the debts, even though they be in his hands as her administrator.

Torts and Crimes of the Wife.—For the frauds and torts of the wife committed during coverture the husband is jointly responsible (in damages only) in an action which must be brought against them both as codefendants, and to charge him must be brought to judgment during coverture. If she commit a tort or crime in his presence (actual or constructive), it is *prima facie* presumed that she does it under coercion by him, and he alone is liable; but this presumption may be rebutted by evidence showing that she was under no coercion. In the case of crimes of the most heinous character, such as treason, murder, and robbery, the presumption of coercion does not exist, and in any case the general tendency is to hold the wife alone responsible, unless the husband is near enough to exert such influence as amounts to coercion.

Torts against the Wife.—As a natural result of the wife's incapacity to acquire personal property of her own during coverture, she can not during coverture recover damages for torts against her person or character committed during that time. Her husband, however, may bring suit in his own name for injury done him by reason of his being deprived thereby of her services or her society and companionship; and with her as coplaintiff he may sue for and recover damages for such injury as she herself has sustained. If the marriage be terminated, she surviving, before judgment is taken, the right survives to her, and she may recover the damages for herself.

Agency of the Wife.—The wife may be the agent of third parties in the same way that any other person may be, so long as such agency charges her with no obligations. She may be also the agent of her husband in the same way, and she practically always is his agent for the purpose of purchasing articles for use in the family. If the articles so purchased are not such as the law holds to be necessities for her support (see above), the question as to whether the husband is bound by the acts of the wife in making such purchases is governed by the same rule which governs in the case of any other agency—namely, whether as a matter of fact he had made her his agent for the purpose, or so acted as to estop himself from denying that she was his agent. The simple fact that the two live together as husband and wife is ordinarily held to raise a presumption that she is actually invested by him with the authority ordinarily bestowed upon the wife, and is rightfully making such purchase as she deems necessary. As a rule, a husband who supplies his wife with reasonable necessaries may prohibit third persons from selling to her on his credit, but actual notice is necessary to be effectual, and a newspaper advertisement of warning (in the absence of statutory provision to the contrary) will not be sufficient, except to those who have had actual notice thereby.

Wife's Capacity to Make a Will.—At the common law a married woman can not by will dispose of her fee to real property held by her husband by virtue of their marriage, she being denied this right by the Statute of Wills (32 Henry VIII., c. 1) and a subsequent statute (34 Henry VIII., c. 5). Neither can she by will abridge the rights of her husband to her personal property; but a will of hers disposing of her choses in action is valid upon her death, unless her husband asserts his right to them by reducing them to his possession. Her separate estate, however (see *Property Rights.* above), she is free to devise in any way she sees fit, and statutes have now very generally been passed removing her incapacity with respect to her other property.

Capacity of the Parties to Contract.—The capacity of the husband to make contracts with third parties is as full after marriage as before. The wife, on the other hand, at the common law is totally incapable of contracting either alone or in conjunction with her husband (except in certain special cases, as in case of the CIVIL DEATH (*q. v.*) of the husband, or of some special custom (as that of sole traders in London), and any contract entered into by her during coverture is absolutely void, binding neither her nor her husband, and not being made enforceable against her by her subsequent promise made after the termination of coverture, if this promise be without consideration. In equity, however, she may make contracts which are binding upon her separate estate, and which will be enforced against it in an action IN REM (*q. v.*). Her common-law capacity, however, has now been very much enlarged, both in Great Britain and in the U. S., by statutes expressly enabling her to contract, and by separate-property acts enlarging her capacities by implication. In England, as a consequence of her general disability to make a contract, the wife could not convey her dower interest in the estate of her husband, even by joining with him in a deed of conveyance, but only by the methods of a fine and common recovery, in which the husband must be a joint party. (See FINE and RECOVERY, COMMON.) In the U. S. fine and recovery have never been recognized, but either by legislation or by early colonial usage the wife may bar her dower by joining with the husband in due form in conveying the land, but she thereby merely releases her dower right therein, and is not bound by any covenants made in the deed of conveyance.

At the common law neither husband nor wife can contract directly with the other, but through the intervention of third parties the husband can validly contract with his wife, while her general disability to contract prevents her from contracting with him to the same extent as with any other person. Wherever, therefore, a third party can be interposed she may bind her separate estate in transactions with him as with any other person, although such transactions would be readily set aside by a court of equity upon any suspicion of fraud or undue influence on his part. Equity courts, however, will give effect, as against the husband, to many transactions made directly between them, such as the conveyance of lands to her for a money consideration or as a reasonable provision for her, by making him her trustee.

Incapacity to Testify.—Neither a husband nor a wife is competent to testify in any action or cause, civil or criminal, in which the other is a party, or in which the result of the decision will be to fix the interests or liability of the other, though not a party. An exception is made to this rule in certain cases where public policy requires it, as in those cases where the testimony of one party is necessary to afford protection from personal injury by the other, or is necessary to make it possible to obtain such redress as the law affords for wrongs at the hands of the other. Either party, however, may testify in collateral proceedings, that is in proceedings not immediately affecting the interests of either of them, even though such testimony may tend to incriminate the other. This rule rests partly upon the common-law rule, which precludes a party from being a witness in his own behalf (the legal interests of husband and wife being identical), and partly upon public policy, which forbids any violation of the confidence and fidelity to one another which the interests of society demands should exist between them. For this latter reason neither party is allowed to testify to any matters communicated to the other during the continuance of the marriage, even though neither of them be a party to or interested in the action. Neither this or the preceding disability can be waived by the parties, nor is either removed by the termination of the marriage. In Great Britain and in many of the U. S. statutes have been passed removing to a greater or less degree the disability to testify based upon the interest of the parties (especially in civil cases), but generally confirming the rule of the inviolability of communications made during marriage.

Legal Remedies against each other.—Formerly in England, by a resort to a suit for the "restitution of conjugal rights," an order could be obtained commanding a married person unreasonably refusing cohabitation to return thereto, for disobedience to which order such party was liable to be imprisoned for contempt of court. This action no longer exists as such there, nor has it ever been recognized as in force in the U. S., so that there is no way of enforcing the specific performance of the duties of marriage except by compelling a defaulting husband to support the wife separate from himself, and by refusing to a defaulting wife the right to support by her husband, and by standing ready to grant to either party a divorce from the other for such default or misconduct as the law of the domicile makes a ground for

divorce. At the common law neither party can sue the other, for they both constitute but one person at law, so that for injuries by one to the person or property of the other no suit in damages can be maintained; but resort for protection must be had to the criminal law, where for this purpose either is a competent witness against the other. Equity, however, and modern statutory law have worked a change in this matter (thus a wife may bring an equitable action against her husband for the enforcement of her equity to a settlement and to enforce other equitable rights); and by some statutes she is permitted to bring an action at law against her husband for damages to her separate estate.

For fuller treatment, see Stephen's *History of the Criminal Law of England*; Stephen's *Digest of the Law of Evidence*; Bishop *On Marriage, Divorce, and Separation*; Bishop *On the Law of Married Women*; Bishop's *Criminal Law*; Schouler's *Domestic Relations*; Parsons *On Contracts*; Greenleaf *On Evidence*; Lush's *Law of Husband and Wife*; Lush's *Married Women's Rights and Liabilities*; Wharton's *Law Lexicon*; Kent's *Commentaries*.

F. Sturges Allen.

Roman and European Law.

In the *Roman law* the wife *in manu* was as completely subjected to her husband's authority as were his children. Her legal position was that of a daughter. Whatever property she possessed before marriage or acquired after marriage was his. On the other hand, if the wife survived the husband she had an equal share with their children in his estate. With the disappearance of the *manus*-marriage, the position of the wife was radically changed. The husband acquired no rights over her property. It was usual, however, since the husband was still reponsible for his wife's maintenance, for the bride's father or the bride herself to place in the bridegroom's hands a dowry (*dos*), the yield or income from which was to be used for "defraying the expenses of matrimony." On the dissolution of the marriage by the death of either party, or by divorce, the husband or his heir was regularly bound to restore the dowry or its equivalent to the wife or to her heirs.

It was also customary for the bridegroom to settle property upon the bride (*donatio ante nuptias*). This settlement was usually equal in amount to the *dos*, and as in the case of the *dos*, the income was intended to be used in meeting the expenses of the marriage. The principal, however, was intended as a provision for the wife in case of the husband's prior decease, for with the disappearance of the *manus*-marriage the widow had lost her right to a daughter's share of her husband's estate. This settlement, until the time of Justinian, had to be made before marriage, because gifts from wife to husband or from husband to wife were invalid.

The later form of Roman marriage imposed no restraints upon the personal liberty or capacity of the married woman. The husband had a summary remedy against any third person who deprived him of his wife's society (*interdictum de uxore exhibenda*), and this ran even against her father; but he had no power to force his wife to live with him against her will. Certain limitations were imposed upon the capacity of women to bind themselves by contract, but those affected all women, married or unmarried, and were mainly intended for their protection.

Mediæval Law of Europe.—In early Teutonic law, at the period when wife-purchase had become a mere ceremony, the portion (*Ausrade, Aussteuer*) which the wife brings with her from her father's house and the property settled upon her by the husband (*dos* or dower in the English sense, German, *Witthum*) constituted a sort of common *family estate*. It was all in the seizin (*saisina, Gewere*) of the husband, but the realty at least was tied up (*verfangen*) so that the husband could not destroy the eventual rights of his widow and children. On this basis there grew up, in Germany, the Netherlands, and Northern France, a great variety of local customs. German writers divide these customs into two or three principal groups, according to the greater or less stress laid upon the union of the husband's and the wife's property, the greater or less power of disposal attributed to the husband, and the extent to which the rules governing the joint property survive the dissolution of the marriage and modify the law of inheritance. These groups are (1) community of goods (*Gütergemeinschaft*), a sort of joint-ownership, and (2) common administration (*Verwaltungsgemeinschaft*, or *Gütervereinigung*), under which the wife's portion remains, in theory at least, her property. Under both systems the husband's power to dispose of movable property is practically unlimited, but his power to alienate realty is restricted. Under both systems the wife has no power to dispose of property, or to contract debts except in ordinary household affairs (*Schlüsselgewalt*). Under the system of full community the joint property is liable for the debts of each party; under the other system the wife's realty is not liable for the husband's debts. In many localities the second system is applied to the property which the wife has brought into the marriage, and the first system to later acquests (*partikuläre Gütergemeinschaft*). In the later Middle Ages, under the influence of Roman ideas, the second system was sometimes modified by declaring that the husband's powers are simply those of a usufructuary (*ususfructus maritalis*). After the marriage is dissolved by the death of either party, the complete or limited community often continues between the surviving spouse and the children. If there are no children, and if complete community existed, the surviving spouse sometimes takes half and sometimes all of the joint property. In the case of *Verwaltungsgemeinschaft*, the childless widow usually takes out of the estate what she brought into it and whatever was specially settled upon her.

With the reception of the Roman civil law at the close of the Middle Ages the system of separate property (*séparation de biens, Gütertrennung*) and the Roman *dotal system* obtained sporadic recognition in Northern and Northwestern Europe. In Southern Europe the Roman ideas, though modified by local usage, had remained dominant through the Middle Ages.

The provincial customs of the Middle Ages and the legislation of modern European states have developed endless variations and combinations of the systems above described. In the German empire at the present time (1894) there are said to be about 100 distinct systems.

Modern Legislation.—In all modern legislations the law of matrimonial property is merely subsidiary law, i. e. it takes effect only in the absence of ante-nuptial contract. In the codes of Austria and Italy the law is substantially Roman. The provisions of the French law represent a compromise between the Roman and the Teutonic systems. In the absence of any contract the *Code Napoléon* subjects the wife's property to a system of partial community (community of movables and acquests), but it lays down special rules for a community limited to acquests, for complete or "universal community," for complete separation of property, and for the dotal system; and it provides that the parties may elect any one of these systems by ante-nuptial contract—unless they prefer to make other arrangements. The German draft code proposes a similar compromise; but in the absence of special contract it proposes to place the wife's property in the administration and usufruct of the husband.

Under any system of community the power of the married woman to dispose of property and to contract debts is of course, restricted. Even under the system of separate property, the older codes imposed restrictions upon the wife, but the tendency of modern legislation is to remove them. The German draft code requires the consent of the husband only when the wife contracts to render personal service.

As regards the personal relations of husband and wife, European law generally recognizes a superior authority of the husband in matters of common concern. He determines the place of residence, and except in case of separation, or of desertion of the wife by the husband, her domicile is necessarily his. He has usually an action, not merely against third persons, but against the wife for "restitution of conjugal rights": but the tendency of modern legislation is to exclude the forcible execution of a judgment in his favor.

Literature.—Czylarz, *Römisches Dotalrecht* (Giessen, 1870); Gide, *La Dot en Droit Romain* (Paris, 1872); Folleville, *Contrat du Mariage* (Paris, 1882); Heusler, *Institutionen des deutschen Privatrechts* (Leipzig, 1886), ii., 292–430; Neubauer, *Eheliches Güterrecht* (2d ed. Berlin, 1889); *Motive zum Deutschen Gesetzbuch* (Berlin, 1888), iv. 104–552.

Munroe Smith.

Marrow [Lat. *medulla*; M. Eng. *marou, mary* < O. Eng. *mearg*: O. H. Germ. *marg* > Mod. Germ. *mark*, marrow; cognate with O. Sloven. *mozgŭ*, Avest. *mazga*, Sanskr. *majjan*, pith, marrow]: the substance which fills the central canal of the long bones of the adult, the largest of the Haversian canals, and the hollows in cancellous bone. In the cavities of long bones of the adult it is of the yellow or fatty variety, of which 96 per cent. is fat: in the young subject and in some of the bones of the adult, it is of the

red and watery variety, which is almost without fat. The latter form is active in the production of the red corpuscles of the blood, and therefore is most abundant in that time of life—viz., embryonal life—when blood formation is most active. In cases of severe anæmia, after hæmorrhages, etc., the same necessity for rapid production of blood exists, and the marrow returns from its fatty character to the red or fœtal condition. The red character of the marrow is therefore a feature in pernicious anæmia, in leukæmia, in the cachexia of cancer, and in other conditions.

Revised by WILLIAM PEPPER.

Marrow Men: certain Scotch Presbyterians who defended the book *The Marrow of Modern Divinity*. See PRESBYTERIAN CHURCH.

Mar'ryat, Capt. FREDERICK: novelist; b. in London, England, July 10, 1792; entered the British navy in 1812 as a midshipman; took part in many naval engagements with the French, gaining great credit by rescuing drowning shipmates on more than one occasion; served on the American squadron 1812–15; was engaged in the action on Lake Pontchartrain in 1814. Having attained the rank of captain and the command of a vessel in the Channel squadron, he began in 1829 the publication of a series of nautical romances which proved a brilliant success. The first was *Frank Mildmay; or, The Naval Officer*, followed in the next year by *The King's Own*. He wrote in all twenty-four novels; *Snarley-yow* (1837) is generally considered the best. He was also the author of a *Code of Signals for Vessels employed in the Merchant Service* (1837); of a record of travel in the U. S., *A Diary in America, with Remarks on its Institutions* (1839); and of numerous miscellaneous works. D. at Langham, Norfolk, Aug. 2, 1848. See his *Life and Correspondence* (2 vols., 1872), by his daughter Florence, later Mrs. Francis Lean, who also wrote several successful novels. D. Oct. 27, 1899.

Revised by H. A. BEERS.

Mars [Lat., derivation disputed, cf. form *Mavors* perhaps > **Mac-vors* (Gr. *μάχ-η*), the fighter]: next to Jupiter the principal national god of the Italic peoples, and, under the name of QUIRINUS (*q. v.*), worshiped as the father of Romulus and ancestor of the Roman people. He seems to have been conceived of not only as a god of war and strife, but also as a god of nature, especially of the awakening year, bestowing fertility upon fields and flocks. This is indicated by the fact that March (*Martius*), the first month of spring and the beginning of the old Roman year, was sacred to him, as well as by other evidence, especially certain rites connecting his worship with Juno as goddess of marriage and birth. At a later time familiarity with Greek mythological ideas caused him to become identified with ARES (*q. v.*), and henceforth his character as a war-god became more sharply defined. In this capacity he was characterized especially by the epithet *gradivus* (i. e. who strides to the fray), which seems to have been used in the worship of Mars by the college of the SALII (*q. v.*). The most important and most sacred celebrations in his honor took place in the month of March, and were performed especially in the sacred field of Mars (*Campus Martius*) between the city and the Tiber on the north. From the time of Augustus, who founded the magnificent temple of Mars in the Forum Augusti, he was worshiped as the avenger of the murder of Cæsar (*Mars Ultor*). The symbols or characteristic attributes of Mars were the wolf, the woodpecker, and the spear.

G. L. HENDRICKSON.

Mars [named from the god MARS (*q. v.*)]: the nearest of the superior planets; his orbit being next outside that of the earth, and the fourth in order of distance from the sun. There is no planet which can be studied under such favorable circumstances as Mars; for, though Venus in inferior conjunction is nearer to us than Mars in opposition, yet Venus then turns her darkened hemisphere toward the earth. Accordingly, ever since the invention of the telescope, Mars has been a favorite object of observation. So far back as 1643 Fontana, of Naples, detected spots on the surface of Mars, and suspected the planet's rotation. Cassini's more trustworthy observations were commenced in 1666 in Bologna. In about a month he had satisfied himself that the planet rotates on its axis once in 24h. 40m. Astronomers at Rome, however, assigned a rotation-period of only 13h., which Cassini explained by showing that they had mistaken two opposite faces of the planet (not greatly unlike) for one and the same aspect. The period of rotation of Mars on his axis is now fixed at 24h. 37m. 23s.

In 1877 Schiaparelli, at Milan, thought that he detected a network of fine lines, which he called canals, passing over the equatorial regions of the planet. Their nature is still an open question. As they must be at least 60 miles wide, the term "canals" seems a misnomer.

Among the markings of Mars, a whiteness around the south pole of the planet had been already noticed for sixty years when Maraldi first paid special attention to the peculiarity. He found that the outskirts of this white region were subject to notable variations, and even while his observations were in progress the fainter portion of the spot disappeared. At this time the northern polar regions had not been carefully examined, being, in fact, only brought favorably into view, as regards the position of the polar axis, when Mars is near his aphelion, but Sir W. Herschel, whose powerful telescope enabled him to disregard the planet's changes of opposition-distance, detected a similar whiteness around the northern pole of the planet. He was soon led to ascribe the peculiarity to the probable existence of ice and snow around the polar regions of Mars. "The analogy between Mars and the earth," he wrote, "is perhaps by far the greatest in the whole solar system. Their diurnal motion is nearly the same, the obliquity of their respective ecliptics not very different; of all the superior planets, the distance of Mars from the sun is by far the nearest alike to that of the earth; nor will the length of the Martial year appear very different from what we enjoy when compared to the surprising duration of the years of Jupiter, Saturn, and the Georgium Sidus. If we then find that the globe we inhabit has its polar region frozen and covered with mountains of ice and snow, that only partially melt when alternately exposed to the sun, I may well be permitted to surmise that the same causes may probably have the same effect on the globe of Mars; that the bright polar spots are owing to the vivid reflection of light from frozen regions; and that the reduction of these spots is to be ascribed to their being exposed to the sun."

Satellites of Mars.—In Aug., 1877, Prof. Hall, of the U. S. Naval Observatory, discovered two satellites of Mars. They are so minute as to be visible only with very powerful telescopes. Their most remarkable feature is the rapid revolution of the inner one, which takes place in less than eight hours, so that to an inhabitant of Mars it rises in the west and sets in the east.

Revised by S. NEWCOMB.

Mars, ANNE FRANÇOISE HIPPOLYTE BOUTET-MONVEL: actress; b. in Paris, Feb. 5, 1779; a daughter of Jacques Monvel, acting at the Théâtre Français, and Mars-Boutet, acting at the theater of Versailles; entered very early on the stage; made in 1800 a great impression by her presentation of the deaf and dumb girl in *l'Abbé de l'Épée*; was soon acknowledged as the greatest actress ever seen in certain *rôles*, the so-called *grandes coquettes*, Agnès, Célimène, Elmire, etc.: achieved a triumph by her impersonation of Gabrielle de Belle-Isle, a girl of twenty, herself being sixty; retired from the stage in 1841, honored, admired, and rich. D. Mar. 20, 1847.

Marsa'la [from Arab. *Mersa 'Ali*, liter., port of 'Ali]: a maritime town of Sicily; in the province of Trapani; about 19 miles S. S. W. of the port of Trapani; in lat. 27° 47′ N., lon. 30° 05′ E. (see map of Italy, ref. 9–D). The back country is fertile, the town itself well built and well fortified, and the public edifices contain many objects of historic and artistic interest. The splendid harbor was destroyed in 1567 in order to prevent it from being occupied by Turkish pirates. The port has been reconstructed, and the city is now flourishing. Its trade consists chiefly in marsala wine, which much resembles sherry, and is a favorite in Great Britain. Marsala occupies nearly the site of the old Carthaginian *Lilybæum*, and here are curiously painted sepulchers cut in the solid rock, the ancient Grotto of the Sibyl with its prophetic well, rare old mosaics, etc., which may be seen outside the western gate. May 11, 1860, Garibaldi landed here with his heroic thousand, and began the romantic campaign which so ignominiously terminated the kingdom of the Two Sicilies. Pop. 19,732.

Marsch'ner, HEINRICH: composer; b. at Zittau, in Saxony, Aug. 16, 1796; studied law for some time at the University of Leipzig, but devoted himself exclusively to music after 1817, when he composed his first opera; became in 1823 musical director of the opera at Dresden; went in 1831 to Hanover as chapel-master to the king. D. there Dec. 14, 1861. Of his numerous compositions, the two operas *The Vampyre* (1828) and *Hans Heiling* (1833) were well received, and are still often performed in Germany.

Mars'den, Samuel: missionary; b. at Horsforth, near Leeds, England, July 28, 1764, of humble parentage; was at first a tradesman at Leeds and a member of the Wesleyan Methodist Church, but after some years joined the Church of England, prepared for the ministry at St. John's College, Cambridge, and in 1794 went as chaplain to the recently established penal colony at Parramatta, near Sydney, Australia. After a visit to England he purchased a small vessel, the Active, at his own expense, and went to New Zealand, where he was well received by the natives. Marsden continued to reside in Australia, but visited New Zealand at intervals; in time persuaded the natives to adopt a fixed form of government, provided for the preparation of a grammar and dictionary of the Maori language, and lived to see the islanders generally Christianized, and himself to be regarded as the "apostle of New Zealand." D. at Windsor, near Sydney, Australia, May 12, 1838. See his *Life* by J. B. Marsden (London, 1859).

Marsden, William, D. C. L.: Orientalist; b. in Dublin, Ireland, Nov. 16, 1754; entered in 1771 the civil service of the East India Company at Benecolen, Sumatra; became principal secretary to the colonial government; studied the Malay language and literature; returned to England in 1779; published a *History of Sumatra* (1782); a *Grammar and Dictionary of the Malay Language* (1812); a translation of *Travels of Marco Polo* (1817); and *Numismata Orientalia* (1823–25). In 1795 he was appointed chief secretary to the admiralty; in 1834 presented his fine collection of coins and medals to the British Museum, and his Oriental library to King's College, London. D. near London, Oct. 6, 1836. Revised by Benj. Ide Wheeler.

Marseillaise, măär'sā'yāz': the grand anthem of the French Revolution, composed, both words and music, in 1792 by Rouget de Lisle, an officer of artillery at Strassburg. It was called the war-song of the army of the Rhine. The name *Marseillaise* was given it in Paris from the incorrect report that it had originated at Marseilles.

Marseilles, măär-sālz' (anc. *Massilia*): principal seaport of France and capital of the department of Bouches-du-Rhône; on the northeastern shore of the Gulf of Lyons; in lat. 43° 18′ N., lon. 5° 22′ E. (see map of France, ref. 9–H). The old part of the city consists mostly of narrow, crooked, and even dirty streets, with a few spacious squares, and is separated from the new part, with its broad, straight streets and magnificent quays along the harbors, by an elegant avenue running from the Porte d'Aix, a fine triumphal arch at the northern entrance of the city, to the Porte de Rome, which to the S. leads into the Prado, the principal promenade. The most elegant part of the new city is the Cannebière, a street running from the above-mentioned avenue to the old harbor, and containing, besides several public buildings, the most prominent hotels and the most brilliant shops. The liveliest and most characteristic part of Marseilles is the quays, thronged with people from Algeria, Egypt, Syria, and all parts of Europe. Of the public buildings, none has any great architectural merit; the most remarkable are the cathedral, situated in the old town, on the site of an ancient temple of Diana, and the town-house, the Bourse, and the mint in the new town, but the whole city presents a picturesque aspect, rising amphitheatrically around the bay, and surrounded with hills covered with olive-groves, vineyards, and elegant villas. The educational and benevolent institutions are numerous. There are a library of 80,000 volumes, several active scientific societies, a hydrographic institution, a botanical garden, an observatory, a lyceum, an excellent medical school, several free industrial and commercial schools, an academy of Oriental languages, etc. The manufacturing industry is very flourishing, especially of soap, leather, glass, porcelain, liqueurs, etc. Its principal importance the city derives from its commerce, extending to all ports of the Mediterranean Sea. The old harbor comprises a basin 1,000 yards long, 330 yards broad, from 18 to 24 feet deep, covering an area of 70 acres, and capable of accommodating about 1,200 merchant vessels; it is defended by Fort St. Nicolas and Fort. St. Jean. The new harbor, La Jolliette, formed by a breakwater 1,300 yards long, was opened in 1855. Still more recently the basin called Dieu-Donné, admitting the largest men-of-war, was formed between the islands of Ratonneau and Pomègue, both fortified. Four lighthouses show the way into the harbors. In 1891 9,014 vessels, of 5,307,619 tons burden, entered the port, and 9,065 vessels, of 5,303,201 tons burden, cleared.

Marseilles was founded in the sixth century B. C. by Phocæans from Asia Minor. In the fourth century B. C. it sent its traders into the Baltic (see Pytheas), and had founded a number of ports in the Mediterranean Sea. In 49 B. C. it was conquered by Cæsar and united to the Roman republic; Cicero calls it at this time the Athens of Gaul. In the ninth century of our era it belonged to Burgundy, in the thirteenth to Provence; in 1481 it was united to France. During the Revolution it suffered severely from Fréron's atrocities, but it rose rapidly after the Restoration, and the conquest by the French of Algeria gave its commerce a powerful impulse. Pop. (1896) 442,239.

Marseilles: city; La Salle co., Ill. (for location of county, see map of Illinois, ref. 3–E); on the Illinois river, and the Chi., Rock Is. and Pacific Railway; 8 miles E. of Ottawa, the county-seat, 77 miles S. W. of Chicago. A dam nearly 1,000 feet long at the rapids of the river here affords the city excellent water-power, which is utilized in the manufacture of flour, paper, agricultural implements, and other articles. The city has several grain elevators, a large trade in grain, and three weekly newspapers. Pop. (1890) 2,210; (1900) 2,559.

Marsh, Alfred Henry: See the Appendix.

Marsh, Arthur Richmond: scholar; b. at Newport, R. I., Oct. 3, 1861; A. B., Harvard, 1883; Professor of English, University of Kansas, 1886–89; traveled in Europe 1889–91; Assistant Professor of Comparative Literature, Harvard, since 1891; author of articles and reviews in *American Journal of Archæology*, *Nation*, *Andover Review*, *Harvard Studies and Notes*, etc., and associate editor in charge of the department of foreign literature in the *Universal Cyclopædia*.

Marsh, George Perkins, LL. D: philologist and diplomatist; b. at Woodstock, Vt., Mar, 15, 1801; graduated at Dartmouth College in 1820; studied law at Burlington, Vt., and practiced at the bar; was elected in 1835 a member of the supreme executive council of the State; studied comparative philology, and printed privately a translation of Rask's *Icelandic Grammar* (1838); was a member of Congress from 1842 to 1849, when he was appointed minister resident at Constantinople; went on a special mission to Greece in 1852; traveled extensively in Europe; returned to the U. S. in 1854; published in 1856 *The Camel, his Organization, Habits, and Uses, considered with Reference to his Introduction into the United States*: served as railroad commissioner in Vermont 1857–59; delivered in 1859 a course of thirty *Lectures on the English Language* (published 1861) at Columbia College, New York, and in the winter of 1860–61 a second course on the same subject before the Lowell Institute at Boston, *The Origin and History of the English Language* (published in 1862); published in 1861 a largely annotated edition of the first volume of Wedgwood's *Etymology*. He also wrote *Man and Nature* (1864), which was reissued with important additions in 1874, with the title *The Earth as Modified by Human Action*. Mr. Marsh was appointed in 1861 U. S. minister to Italy, a post he retained till his death July 24, 1882. A revised edition of his complete works was published in 1885. His *Life and Letters*, compiled by his widow, were published in 1888. He had an extensive library of Scandinavian literature, part of which became the property of the University of Vermont.—His second wife, Caroline Crane, b. at Berkeley, Mass., Dec. 1, 1816, published in 1857 *The Hallig, or the Sheepfold in the Waters*, translated from the German of Biernatski, with a biographical sketch of the author, and in 1860 a volume entitled *Wolfe of the Knoll, and Other Poems*.

Marsh, Herbert, D. D.: bishop and biblical critic; b. at Faversham, Kent, England, Dec. 10, 1757; educated at St. John's College, Cambridge; studied theology at the Universities of Göttingen and Leipzig; published a number of pamphlets in German in defense of the war policy of England, which obtained him a pension from Pitt; returned to Cambridge in 1792, and published a translation of Michaelis's *Introduction to the New Testament* (4 vols., 1793–1801), accompanied by an extended commentary—a work which first made known in England the results of the biblical researches of the founders of the modern school of German criticism, and which accordingly excited discussion and provoked opposition from conservative English theologians. In 1807 Marsh became Lady Margaret Professor of Divinity at Cambridge, and published an extended *Course of Lectures on the Criticism and Interpretation of the Bible* (7 parts, 1809–23), consisting chiefly of a popularization of the views of German scholars. In 1812 he published a *History of the Transla-*

tions of the Scriptures; in 1813 *Horæ Pelasgicæ*; became Bishop of Llandaff 1816, of Peterborough 1819; wrote numerous minor treatises on theology, politics, and classical topics. D. at Peterborough, May 1, 1839. Bishop Marsh was the most learned and acute English theologian of his time, and excelled in polemics, biblical criticism, and linguistics. Revised by W. S. Perry.

Marsh, Othniel Charles, Ph. D., LL. D.: paleontologist; b. at Lockport, N. Y., Oct. 29, 1831. He graduated at Yale College in 1860 and at the Yale Scientific School in 1862, and from 1862 to 1865 studied in the Universities of Berlin, Heidelberg, and Breslau. Returning to the U. S., he was appointed Professor of Paleontology in Yale College in 1866, and retained that position until his death, in New Haven, Mar. 18, 1899. He devoted himself especially to the investigation of the extinct vertebrate animals of the Rocky Mountain districts, and nearly every year since 1868 organized scientific expeditions to those regions. In these explorations more than 1,000 new species of vertebrates have been discovered, many of which represent new orders and others not before discovered in America. Of these, more than 400 were described by Prof. Marsh in papers, most of which appeared in *The American Journal of Science*. These papers are more than 300 in number, the last of them, on *The Dinosaurs of North America*, appearing in 1896. Since 1876 he had been engaged in preparing a series of reports, to be published by the Government, giving full illustrated descriptions of his Western discoveries. The first of these, on the *Odontornithes*, or birds with teeth (34 plates), was issued in 1880, and a second memoir, on the *Dinocerata* (56 plates), appeared in 1884. In 1878 Prof. Marsh was president of the American Association for the Advancement of Science. Since 1882 he had been vertebrate paleontologist of the U. S. Geological Survey. In 1883 he was elected president of the National Academy of Sciences, and held that office until 1895. He was a fellow of the Geological Society of London, and received from it in 1877 the first Bigsby medal. He was also a member of many other scientific bodies. In 1866 he received the degree of Ph. D. from Heidelberg University, and that of LL. D. from Harvard.

Marshal [from O. Fr. *mareschal* > Fr. *maréchal*, together with Ital. *mariscalco*, Span. *mariscal*, etc., from the Teutonic; cf. O. H. Germ. *marahscalc*, M. H. Germ. *marschalc*, stable-keeper; *marah*, horse (cf. Eng. *mare*) + *scalc*, servant > Mod. Germ. *schalk*. A Low Latin translation, *comes stabuli*, has yielded also Eng. *constable*, Fr. *connétable*]: originally the person who had charge of the king's horses. When chivalry became the only important secular pursuit, and nearly all offices about the royal courts were filled by noblemen, the marshal's position became one of great importance, and finally in England there was appointed an earl-marshal, who at present has only a ceremonial dignity except as the head of the College of Heralds. The office is hereditary with the Dukes of Norfolk. In Scotland there was an hereditary earl-marischal of the Keith family, but the office is now in abeyance. There are also knight-marshals. The highest military title in most European armies is marshal (field-marshal, *maréchal de camp*, *Feld-marschall*, *Feldzeugmeister*). This title is of direct descent from feudal times, when the marshal was the king's esquire and commanded the advance-guard. The gradual increase of his authority in the army after a time led to the creation of a distinct military office of this name. In the U. S. a marshal is an officer of the U. S. courts, whose duties correspond to those of the sheriff of the State governments. There is one U. S. marshal in each judicial district. The title is also applied to the chief police officer of small municipalities.

Marshall: city; capital of Clark co., Ill. (for location of county, see map of Illinois, ref. 7–G); on the Cleve., Cin., Chi. and St. L. and the Vandalia railways; 16½ miles S. W. of Terre Haute, Ind. It is in a farming and stock-raising region; has flour and woolen mills and considerable mercantile trade; and contains 7 churches, high school, 2 grammar schools, and 4 weekly newspapers. Pop. (1880) 1,885; (1890) 1,900; (1900) 2,077. Editor of "Herald."

Marshall: city; capital of Calhoun co., Mich. (for location of county, see map of Michigan, ref. 8–I); on the Kalamazoo river, and the Cin., Jack. and Mack. and the Mich. Cent. railways; 108 miles W. of Detroit. It is in an agricultural region; contains 9 churches, 5 public schools, Roman Catholic school, and a daily and 2 weekly newspapers; and manufactures caskets, bicycles, school-seats, carriages, stoves, furnaces, and windmills. Pop. (1880) 3,795; (1890) 3,968; (1900) 4,370. Editor of "Chronicle."

Marshall: village; capital of Lyon co., Minn. (for location of county, see map of Minnesota, ref. 10–B); on the Redwood river, and the Chi. and N. W. and the Great N. railways; 150 miles S. W. of St. Paul. It is in an agricultural and stock-raising region; ships much wheat, flax, beef, and pork, and has a county court-house which cost $30,000, public high school, 2 grammar schools, 6 churches, steam-roller flour-mill, and 2 weekly newspapers. Pop. (1880) 961; (1890) 1,203; (1900) 2,088. Editor of "Reporter."

Marshall: city (founded in 1839); capital of Saline co., Mo. (for location of county, see map of Missouri, ref. 3–F); on the Chi. and Alton and the Mo. Pac. railways; 84 miles E. of Kansas City, 85 miles N. W. of Jefferson City. It is in an agricultural region; is the seat of Missouri Valley College (Cumberland Presbyterian); and contains 7 churches for white people and 4 for colored, 3 large public-school buildings, St. Xavier's Academy (Roman Catholic), a Roman Catholic convent, and 2 daily and 3 weekly newspapers. Pop. (1880) 2,701; (1890) 4,297; (1900) 5,086.
Editor of "Democrat-News."

Marshall: city; capital of Harrison co., Tex. (for location of county, see map of Texas, ref. 2–K); on the Tex. and Pac. and the Paris, Marshall and Sabine Pass railways; 40 miles W. of Shreveport, 250 miles N. E. of Galveston. It is in an agricultural and lumbering region, has numerous mineral springs and valuable deposits of iron in its vicinity, and is becoming an important manufacturing place. It contains the machine-shops of the Tex. and Pac. Railway, a car-wheel foundry, ice-factory, gin-factory, several saw, planing, and wood-working mills, furniture-factory, and cotton-compress. Marshall is the seat of Wiley University (Methodist Episcopal, opened 1873), of Bishop College (Baptist, opened 1881), and of a non-sectarian female institute. It has water-works supplied by artesian wells, 2 national banks, with combined capital of $175,000, and 2 daily and 2 weekly newspapers. Pop. (1880) 5,624; (1890) 7,207; (1900) 7,855. Editor of "Star."

Marshall, Alfred, M. A.: political economist; b. in England in 1842; was educated at Cambridge; was lecturer on Moral Science at St. John's College in that university 1866–67; was appointed principal of University College, Bristol, 1877; lecturer on Political Economy at Baliol College, Oxford, 1883; Professor of Political Economy, Cambridge, 1884. He is the author of *Economics of Industry* (1879) and *The Principles of Economics* (1890–91).

Marshall, A. Milnes, M. D., D. Sc., F. R. S.: naturalist; b. in England in 1852; entered London University, where he received the degree of B. A. in 1870; then entered St. John's College, Cambridge, in 1871, graduating as senior in the natural science tripos in 1874; studied at Dr. Dohrn's zoölogical station at Naples for a few months, when he returned to Cambridge to assist Prof. Balfour in organizing the classes of comparative morphology; was appointed Professor of Zoölogy at Owens College, Manchester, in 1879; was elected F. R. S. in 1885; entered St. Bartholomew's Hospital in 1887; and in the same year was elected a fellow of St. John's College, and in due time took the degree of M. D. at Cambridge. He received the degree of D. Sc. from London University. He took an active part in organizing the courses of study for the Victoria University. His most important publication is *The Frog: an Introduction to Anatomy and Histology* (London, 1883). D. Dec. 31, 1893.
S. T. Armstrong.

Marshall, Humphrey: soldier, lawyer, and legislator; b. in Frankfort co., Ky., Jan. 13, 1812; graduated from the U. S. Military Academy in 1832, but resigned from the army Apr. 30, 1833; was admitted to the bar, and practiced his profession first at Frankfort till 1834, then at Louisville till the outbreak of the war with Mexico, when he led the First Kentucky Cavalry to the seat of war as its colonel, and was engaged at the battle of Buena Vista. On the disbandment of his regiment he returned to his native State, and settled on a farm in Henry County. In 1849 he was chosen representative to Congress, and re-elected in 1851; in 1852 President Fillmore appointed him commissioner of the U. S. to the empire of China, which was at once raised to a first-class mission; recalled in 1853, and practiced law in Washington; elected to Congress from Kentucky in 1855, and re-elected in 1857. Although opposed to secession, he espoused the Confederate cause in Sept., 1861, and was appointed briga-

dier-general; resigned his commission shortly after, and was elected to the Confederate Congress; practiced law in Richmond, Va., for a time, subsequently returning to Louisville, Ky., where he died Mar. 28, 1872.

Marshall, John, LL. D.: jurist; b. at Germantown, Fauquier co., Va., Sept. 24, 1755, the eldest of the fifteen children of Col. Thomas Marshall, a small planter, who served with great honor as an officer of the Revolution. The son never attended a college, but in his general education, which he received almost entirely at home, he was made familiar with the best of English literature. At the age of eighteen he began the study of law, but gave this up to join the colonial army in 1775, from which time till 1779 he was an officer in active service, distinguishing himself alike in the field and in courts martial, where he often acted as judge-advocate. In 1779, while on detached service in Virginia, he attended George Wythe's law lectures at William and Mary College, and in 1780 was licensed to practice. In 1781 he resigned his commission and entered upon the practice of law, and in 1783 married and selected Richmond as his permanent residence; he was elected a member of the Legislature of Virginia, and in 1788 of the Virginia convention for ratifying the U. S. Constitution, in which latter he distinguished himself as an advocate of the Constitution, the adoption of which by Virginia was due to the arguments of James Madison and himself. His marked discretion and fairness, and his great powers as a reasoner had quickly been recognized, and he was frequently called upon to exert his influence in the support of the measures of Washington's administration. He declined the U. S. attorney-generalship, a seat on the bench of the Supreme Court, and other important positions; went in 1798 with Pinckney and Gerry as envoy to France, which he and Pinckney were ordered to leave on account of their federalistic views; entered Congress in 1799, where he was one of the ablest Federalists in the House; was appointed in 1800 Secretary of War, and soon after Secretary of State; and in 1801, having been nominated Chief Justice of the U. S. by President Adams, was confirmed by the Senate without a dissenting vote. His work in this office, which he held until 1835, has made him the greatest of American jurists, and one of the greatest jurists of any age or country. His decisions, which are very numerous, are marked by sturdy justice, breadth of view, and a simple, convincing logic, and by his decisions on constitutional questions he did more than any other one man to establish such an interpretation of the Constitution as would support the dignity and power of the Federal Government and the power of the Supreme Court of the U. S. to deny the constitutionality of acts of Congress or of State Legislatures. Among his decisions upon constitutional questions which are of especial importance may be mentioned those in the cases of *Marbury* vs. *Madison* (1 Cranch 158), *Dartmouth College* vs. *Woodward* (4 Wheaton 518), *McCulloch* vs. *State of Maryland* (4 Wheaton 316), and *Sturges* vs. *Crowninshield* (4 Wheaton 122). His *Life of Washington* (5 vols., 1805; abridged and improved, 1 vol., 1832) and his *History of the Colonies* are more valuable to the historian than to the general reader. Chief Justice Marshall was a man greater in wisdom than in learning, a sincere Christian, and a true philanthropist. He was tall, ungraceful, and somewhat awkward in manner, but most genial and kindly in private life, and was loved and venerated by his family and his associates. D. in Philadelphia, July 6, 1835.

Revised by F. Sturges Allen.

Marshall, William Calder, R. A.: sculptor; b. in Edinburgh, Scotland, in 1813; studied sculpture in London under Chantrey and Bailey; visited Rome in 1836; took up his permanent residence in London in 1839. Marshall was one of the three sculptors employed for the decoration of the new houses of Parliament, for which he executed statues of Lord Clarendon and Lord Somers. He designed the statue of Sir Robert Peel at Manchester, that of Jenner (in Kensington Gardens), that of Campbell in Westminster Abbey, and other public statues and groups, but he is best known by a number of popular works of sentiment, such as the well-known *Sabrina*, which has been copied in many forms. D. in London, June 16, 1894.

Marshall Archipelago: a large group of coral islands in Micronesia, between the parallels 5° and 12° N. and the meridians 160° and 175° E.; consisting of innumerable islets in two principal ranges running S. E. and N. W. The eastern is called the Ratak group, and the western the Ralik group. They have belonged to Germany since 1885. The Ratak islands have an area of 51 sq. miles, the Ralik of 107 sq. miles, making a total of 158. The population (1891) was about 15,000, of whom 118 were strangers. The majority of the latter were settled on the lagoon of Yaluit on the island of Yabvor, formerly Borham island, near the southern end of the Ralik islands. Pandanus, breadfruit, arrowroot, and cocoanut-palms are the only forms of vegetation supported by the thin layer of soil. Copra is the only article of export. Cattle can not support themselves on these islands.

Mark W. Harrington.

Marshalling: See Heraldry.

Marshalltown: city; capital of Marshall co., Ia. (for location of county, see map of Iowa, ref. 4–H); on the Ia. Cent., the Chi. and N. W., and the Chi. and Gt. West. railways; 70 miles W. of Cedar Rapids. It is in an agricultural region, and has a high school, 5 ward schools, public library, State Soldiers' Home, 2 national banks with capital of $200,000, a State bank with capital of $100,000, and an incorporated bank with capital of $50,000, and a daily and 7 weekly newspapers. There are furniture, pickle, vinegar, and soap factories, foundries and machine-shops, flour and oil mills, grain elevators, pork and beef packing houses, and glucose, starch, and canning and bottling works. Pop. (1880) 6,240; (1890) 8,914; (1900) 11,544.

Editor of "Times-Republican."

Mar'shalsea Prison: a prison in Southwark, London; built in the twelfth century, and placed under the control of the king's marshal of the household. It was opened by the Gordon rioters in 1780. It was long a king's bench prison, but, like the Fleet, became a poor debtor's prison. It was abolished, with the ancient Marshalsea, in 1849.

Marshfield: town; Coos co., Ore. (for location of county, see map of Oregon, ref. 5–A); on Coos Bay, and the Coos Bay, Rose and East. Railroad; 110 miles S. by W. of Salem, 380 miles N. of San Francisco. It is in an agricultural region, ships large quantities of coal and lumber, and has considerable ship-building interests and three weekly newspapers. Pop. (1880) 642; (1890) 1,461; (1900) 1,391.

Marshfield: city; Wood co., Wis. (for location of county, see map of Wisconsin, ref. 5–D); on the Chi., St. P., Minn. and Om., the Mil., Lake Sh. and W., the Port Edw., Cent. and N., and the Wis. Cent. railways; 160 miles E. by S. of St. Paul, Minn., 180 miles N. W. of Milwaukee. It contains 6 churches, high school, 3 ward schools, Roman Catholic and Lutheran schools, St. Joseph's Hospital, a water-cure sanitarium, a national bank with capital of $50,000, a State bank with capital of $25,700, and 3 weekly newspapers. The principal industries are the manufacture of pine and hardwood lumber, furniture, beer barrels and kegs, staves, headings, veneers, and machinery. Marshfield was totally destroyed by fire in 1887. The great hardwood timberlands of Wisconsin form the chief source of the city's prosperity. Pop. (1880) 669; (1890) 3,450; (1900) 5,240.

Editor of "News."

Marsh-gas (Germ. *sumpfgas, grubengas*; Fr. *gaz de marais*): light carbureted hydrogen, methane, fire-damp; a gas of the composition CH_4 which is formed in nature under a variety of conditions. The name marsh-gas is given to it because it is formed in marshes. Wherever vegetable matter undergoes decomposition without free access of air, as under water, the carbon and hydrogen combine to some extent in the form of marsh-gas. The gas seen arising in bubbles from a pool of stagnant water always contains the gas, mixed generally with other gases. It is found in the gases of the alimentary canal of human beings, and in enormous quantities in some coal mines, where it issues from crevices in the earth. Further, it is a constituent of Natural Gas (*q. v.*). It is formed when organic matter is heated without access of air, as in the destructive distillation of coal in the manufacture of illuminating gas. (See Gas-lighting.) Mixed with air it is highly explosive, and is the cause of many of the explosions in coal mines. The explosion is caused by contact with a flame or spark, which starts chemical action between the gas and the oxygen. This proceeds with great rapidity throughout the mass, and the heat evolved causes great expansion. The products of the action of oxygen on marsh-gas are carbon dioxide (Carbonic Acid, *q. v.*) and water:

$$CH_4 + 4O = CO_2 + 2H_2O.$$

Miners are well acquainted with the fact that after an explosion the air left in the mine causes suffocation. They call it *choke-damp*, a name which is applied frequently to

the compound carbon dioxide, CO_2. The use of the safety-lamp has to some extent protected the miners from the explosions to which they are subject. The entire structure of organic chemistry is based on the conception that the molecule or smallest particle of marsh-gas consists of an atom of carbon holding in combination four atoms of hydrogen, each in the same way. Each of these atoms of hydrogen can be replaced by other atoms or groups, and thus all compounds of carbon can be formed. All the facts of organic chemistry find a simple and satisfactory explanation on this assumption. See HYDROCARBONS. IRA REMSEN.

Marsh-hawk, or **Harrier**: common name in the U. S. for the *Circus hudsonius*, a large and rapacious bird found in all parts of North America. The marsh-hawk of Europe and Africa is *Circus cyaneus*.

Marsh-hen: a name applied to the clapper rail, called also salt-water marsh-hen (*Rallus crepitans*), and to the *Rallus elegans* (fresh-water marsh-hen, king-rail), game-birds of the U. S., rarely seen except by sportsmen and naturalists. See RAIL.

Mars Hill: See AREOPAGUS.

Marshmallow: an herb of the mallow family, the *Althæa officinalis*, a native of the Old World, but naturalized in the U. S., principally in salt-marshes. The plant is remarkably mucilaginous, and is used chiefly in domestic practice as a demulcent in coughs and diseases of the bowels and kidneys. It appears to have mild diuretic virtues.

Marshman, JOSHUA, D. D.: b. at Westbury-Leigh, Wiltshire, England, Apr. 20, 1768; went to India in 1799 as a Baptist missionary; resided chiefly at Serampore; gained a competent knowledge of Bengalee, Sanskrit, and Chinese; prepared Chinese translations of Genesis, the four Gospels, and the Epistles to the Romans and the Corinthians; published a *Dissertation on the Characters and Sounds of the Chinese Language* (1809); *The Works of Confucius, containing the Original Text, with a Translation* (1811); *Clavis Sinica, Elements of Chinese Grammar* (1814); and a *Defense of the Deity and Atonement of Jesus Christ* (1822), in reply to Rammohun Roy. He aided Dr. Carey in the preparation of his *Sanskrit Grammar* and *Bengalee and English Dictionary*. D. at Serampore, Dec. 5, 1837.

Marsh-marigold: See CALTHA.

Marsh-rosemary, or **Sea-lavender**: a salt-marsh plant, the *Statice limonium*, common along the Atlantic shores of the U. S., Canada, and Europe. There are many varieties, by some botanists regarded as one species. Its root abounds in tannic acid, of which it contains nearly 12·5 per cent. It is used in medicine, especially as a remedy for sore mouth and sore throat, and is best prepared by infusion.

Marsh's Test: See ARSENIOUS OXIDE.

Marsh Trefoil: See BUCK BEAN.

Marsilia: See FERNWORTS.

Marsipobran'chia [Mod. Lat.; Gr. *μάρσιπος*, pouch + *βράγχιον*, gill]: a class of vertebrates generally confounded with the fishes, but distinguished by many remarkable peculiarities. The skeleton is of an inferior type, the notochord or embryonal vertebral column being persistent. The skull is in a most rudimentary condition, and represented by a small brain-case and capsules for the organs of sense (auditory and olfactory), as well as by an ethmo-vomerine plate; the inferior appendages are developed as elements designated as (1) the subocular arch, with a meta-pterygoid or "superior quadrate," and an "inferior quadrate" portion; (2) a "palato-pterygoid" element; and (3) a "stylohyal process"; labial cartilages form also a prominent feature of the skull; bones or cartilages representing the upper as well as lower jaws are entirely wanting; the branchial apparatus is sustained by a basket-like skeleton; no limbs are developed, and consequently no scapular arch or pelvic girdle. The brain, though small, is distinctly developed, and differentiated into the brain proper and medulla oblongata; the former is composed, as in the higher forms, of the "mesencephalon," "thalamencephalon," "prosencephalon," and "rhinencephalon"; the latter is small, with a fourth ventricle conspicuous from above; and the "cerebellum" very rudimentary. The auditory apparatus is very simple, being represented by a single membranous tube without any differentiation into canals and vestibules, as in the *Hyperotreti*, or, at most, as in the *Hyperoartii*, with two semicircular canals and a sacculated vestibule. The olfactory apparatus consists of a median sac, which is provided with but a single external aperture. The heart is distinctly developed, and is divided into an auricle and ventricle, the former having in front a venous sinus; and the whole is inclosed in a "pericardium," which connects with the peritoneal cavity. The intestinal canal is simple, the liver specialized as such, and the kidneys well developed, and with ureters opening behind into the rectum. The organs of generation have no ducts, but discharge into the abdomen, from which they depart by an abdominal pore.

The class thus distinguished is represented by very few species, but these exhibit two radically distinct types of structure, and have been differentiated into two orders—(1) *Hyperoartii*, in which the tube terminates in a blind sac and its posterior end; and (2) *Hyperotreti*, in which the narial canal perforates the pharyngeal roof and connects with the pharynx. These two orders differ very decidedly from each other in the skeleton, armature of the mouth, ovulation, etc. For details see under the respective titles.

A remarkable metamorphosis is undergone by the representatives of the order *Hyperoartii* (i. e. the Petromyzontids or lampreys), but the transformations of the *Hyperotreti* (i. e. Myxine or hags) are unknown; and this is a gap most desirable to be filled, as no general characters can be specified respecting the embryology of the class until these are made known. The species of the class are found both in fresh and salt waters, the Petromyzontids having members in all temperate and sub-temperate countries; while the Myxinoids are represented in the cold waters of the northern hemisphere by Myxinæ, as well as along the shores of a considerable portion of the Pacific—e. g. in the Japanese and Chinese seas, California, Chili, and Australia. Although no representatives of the class have been found in a fossil condition, their absence in the older strata is undoubtedly due rather to the difficulty connected with the preservation of the readily destructible cartilaginous skeleton than to their actual absence. It is, indeed, probable that the order was extensively represented in past times, and that it was more abundantly developed than any other type. THEODORE GILL.

Mars la Tour, maär'laä'toor': a village on the road from Metz to Verdun; 10 miles to the W. of Metz (see map of German Empire, ref. 6–C); noted for the battle which took place here Aug. 16, 1870, and which is often called after this place, though generally after Vionville, a village situated farther to the E., and nearer the center of the battle.

Marston, JOHN: dramatist; b. in England about 1575; was educated at Corpus Christi College, Oxford; became lecturer at the Middle Temple, London, in 1593, and was author of eight dramas and two volumes of poems which were edited by J. O. Halliwell (1856, 3 vols.), and the dramas again by Bullen (3 vols., 1885). He aided Ben Jonson and George Chapman in writing the comedy of *Eastward Ho!* (1605), which caused the imprisonment of the three writers on account of its satires upon the Scotch. The best of his dramas is *The Malcontent* (1604), a tragi-comedy, originally written by John Webster, but recast by Marston and dedicated to Ben Jonson. D. about 1634.
Revised by H. A. BEERS.

Marston, PHILIP BOURKE: poet; b. in London, 1850; d. Feb. 14, 1887. He was the son of John Westland Marston, a playwright and novelist, and was blind from early childhood. He was the subject of Hake's poem *The Blind Boy* and of Mrs. Craik's *Philip, my King*. His publications are *Song Tide* (1871); *All in All* (1874); *Wind Voices* (1884); *For a Song's Sake* (1887); *Garden Secrets*, with a biographical sketch by Louise C. Moulton (1887). See also *Song Tide*, with introductory memoir by William Sharp (1888).
H. A. BEERS.

Marston Moor: an open plain, 8 miles from York, England, memorable as the scene of the victory gained (July 2, 1644) by the allied Parliamentary and Scotch armies, commanded respectively by Lord Fairfax and the Earl of Leven, over the royal forces under Prince Rupert. York was then held by the royalists, and had been besieged by Fairfax. When Prince Rupert advanced to its relief, Fairfax drew off to Marston Moor. Each army consisted of about 25,000 men. The battle began with a cannonade on both sides, but with little effect. Rupert charged with his cavalry toward evening, and dispersed the left wing of the Parliamentary forces, the commanders of which fled, but the fortunes of the day were retrieved by Leslie's Scotch regiments and Cromwell's brigade of "Ironsides," who captured the enemy's artillery, taking 1,500 prisoners and 100 colors.

Four thousand royalists were killed. The result was the surrender of York to Lord Fairfax a few days later, which made the Parliamentary cause triumphant throughout the north of England.

Marstrand, Vilhelm Nicolai: painter; b. in Copenhagen, Dec. 24, 1810; studied at the academy at Copenhagen, in Munich, and Rome; d. Mar. 25, 1873. His works are exceedingly numerous and all excellent. He had a most fertile genius, and all that he touched turned into art. With the exception of Thorwaldsen he is the greatest artist that Denmark has produced. R. B. A.

Marsupia'lia [Mod. Lat., from Lat. *marsu'pium*, pouch, bag, from Gr. *μαρσύπιον*, dimin. of *μάρσυπος*, *μάρσιπος*, pouch, purse]: the only generally recognized order of the mammalian sub-class Didelphia, comprising the opossums, kangaroos, wombats, and related types. The characters which differentiate the group as a sub-class will be found under Mammals, and the common ordinal characters will alone be given here. The brain is small in comparison with the size of the body, the cerebrum but little convoluted and only partially covering the olfactory lobes and cerebellum. The anterior commissure is large, and the hippocampal fissure continued forward over the small corpus callosum. The bones of the skull remain separate for a long time, or throughout life. There are usually two or more vacuities—sometimes confluent—in the bony palate, and, except in *Tarsipedidæ*, the posterior angle of the lower jaw is bent inward. The number of thoracico-lumbar vertebræ is always nineteen; the number of pairs of ribs usually thirteen. The radius and ulna are present, and the forearm is capable of rotation. The pelvis, in all marsupials save *Thylacinus*, has moderately long bones articulating with the pubis, arising from ossification in the inner tendons of the external oblique muscles.

The muscles of the hind limbs in most (the saltatorial types being excepted) present a peculiar modification in that the *flexor longus digitorum pedis* "is inserted fleshy into the fibula, and the knee and ankle joints are so modified as, through the action of the muscle so inserted, to admit of rotary movements of the hind foot."

The teeth are peculiar in that there is only one perfect set, none having deciduous predecessors except one on each side of each jaw, the hindmost (and indicated as such by its development) of the premolars; in other respects the teeth vary greatly; they frequently, however, are peculiar in the great number (5×2) of upper incisors, and in the number of true molars (4×2) in each jaw.

The heart is peculiar in the absence of a *fossa ovalis* and *annulus ovalis* in the right auricle; and in all it receives the two *venæ cavæ superiores* by two separate inlets.

The living marsupials represent two distinct types of foot structure—the *chorisodactylous*, in which the toes are all free, and the *syndactylous*, in which the second and third toes are much reduced in size, and closely connected together in a common integument, which leaves only the claws visible, and gives the impression of a single toe with two claws.

The chorisodactylous marsupials are represented by three very distinct families, two of which (*Dasyuridæ* and *Myrmecobiidæ*) are confined to Australia, and one (*Didelphididæ*) to America, one species advancing far up into the U. S.

The syndactylous marsupials exhibit in their dentition two very decided types. In one the incisors are permanently rooted, and in the lower jaw are either two large incisor teeth opposed to six in the upper, or six in the lower opposed to eight or ten in the upper. All these are inserted by roots. To this group belong the *Phascolarctidæ*, *Phalangistidæ*, *Tarsipedidæ*, and *Macropidæ*. In the other in both jaws the incisor teeth are like those of rodents, there being two in each jaw, continually reproduced, and growing in a subcircular direction. To this group belongs the single family *Phascolomyidæ*.

The marsupial pouch is developed in all the living representatives of the order except *Thilomys dorsigera* (the opossum of South America), which derives its name from carrying its young upon its back, with their tails swung around their mothers. This pouch is formed, according to William S. Barnard, "by the infolding of the skin. Its concavity opens on the median line of the abdomen, and extends backward and laterally, forming a kind of double bag, in the bottom of which the milk-glands open through long papillæ."

The genital organs, as to their superior modifications, have been noticed under Mammals. The young are not connected with their mothers by a placenta, by means of which they are nourished for some time before birth, but are born in a very helpless condition, and, even in the largest species, do not exceed half an inch in length nor more than a few grains in weight; the organs are in a very undeveloped condition, and the animal is naked, blind, and perfectly helpless; its fore limbs are more developed than the hind ones. The newly born animal is taken by the mother with her lips and transferred to the pouch, where it instinctively grasps and clings to the teat to which it is presented, and the corners of the mouth growing around it, the animal remains clinging to the teat for several weeks, and until it has attained a considerable size and the adult characters have been in a large degree assumed. Although it is thus capable of grasping and clinging to the nipple, it is, however, at first incapable of directly sucking, and the milk is furnished by the mother through the compression of the gland by a muscle analogous to the cremaster. To guard against suffocation of the young a peculiar modification of the laryngeal apparatus is provided, by which the air-passage is completely separated from the fauces, and the injected milk passes in a divided stream on either side of the larynx to the œsophagus. After having assumed the characters of approximate maturity, it leaves the teat and the pouch itself, but for some time after resorts to the latter in case of danger, to be conveyed by the mother.

Although the marsupials are now confined to Australasia and South America (exclusive of a few stragglers beyond those borders), they formerly inhabited every part of the globe palæontologically known, and remains of representatives of the class recovered from the Trias have been referred to this order. By some authorities it is believed that these forms belong to distinct orders of mammals of primitive structure, and that marsupials did not make their appearance until the early Eocene. In the Eocene they are developed in several types, both in North America and in Europe, and among these were representatives of genera closely related to the opossums of the present age. Although none of the marsupials of the present epoch can vie with the largest placental mammals, in former times and as recently, perhaps, as the advent of man, species of gigantic size existed, the Diprotodontids of Australasia having been nearly as large as our rhinoceroses. Revised by F. A. Lucas.

Mar'supites [from Lat. *marsu'pium*, pouch, bag], or **Tor'toise Encrinite**: a genus of the Crinoidea peculiar to the Cretaceous rocks, remarkable for having no stem or attachment; its pelvis thus resembles a plated pouch surrounded by a circle of firearms.

Mar'sus, Domitius: a Roman poet, contemporary with Horace, although not mentioned by him. He composed a collection of epigrams under the title *Cicuta*, an epic *Amazonis*, a treatise on wit (*De urbanitate*) quoted by Quintilian, and nine books of *Fabellæ* (anecdotes) in verse. Only fragments are extant. See Baehrens's *Frag. Poet. Rom.*, pp. 346–348 (Leipzig, 1886). M. W.

Mar'syas (in Gr. Μαρσύας): in Greek mythology, (1) originally a Phrygian god, who gave his name to the river Marsyas at Celænæ, but after the myth-makers associated him with Athene and Apollo he was degraded to the rank of a Satyr or Silenus. Athene had invented the flute, but threw it away and cursed it when she saw how distorted her features became by playing it. Marsyas found the discarded flute, and became so skillful in playing it that he challenged Apollo, who played the lyre, to a musical contest, with the Muses for judges. The decision was in favor of Marsyas, but Apollo by adding song to the melody of the lyre maintained that he had won, and bound Marsyas to a tree, flayed him alive, and hung up his skin in the cavern at Celænæ from which the Marsyas river flows. The myth was utilized by both painters (Zeuxis, etc.) and sculptors (Myron, etc.). An excellent copy of the Marsyas that belonged to the group of Athene and Marsyas by Myron is preserved in the Lateran Museum in Rome. It represents Marsyas in the act of finding the flute. In Florence there are several statues of Marsyas suspended from a tree and about to be flayed. All are copies from a Pergamene group to which the barbarian whetting his knife (an original statue also in Florence) belongs. As he whets his knife the barbarian looks up grimly at the suspended Marsyas. For a detailed discussion, see any history of Greek art and the articles *Marsyas* and *Myron* in Baumeister's *Denkmäler*; also Hirschfeld, *Athene und Marsyas* (Berlin, 1872), and Mich-

aelis, *Apolline e Marsia* (Rome, 1858). (2) A river that wells out in two impetuous streams from beneath a precipitous cliff in Celænæ (Dineir) in Phrygia. It got its name from the fact that the skin of Marsyas was hung up in the cavern from which the river issues. There is a discussion as to the identification of the sources of the Marsyas and the Mæander. See Hirschfeld, *Ueber Kelainai-Apameia Kibotos* (Berlin, 1875); Hogarth, *Notes upon a Visit to Celænæ-Apamea* (in *The Journal of Hellenic Studies*, 1888, p. 343 ff.); Ramsay, *Historical Geography of Asia Minor* (London, 1890, p. 403); Weber, *Dinair Célènes Apamée-Cibotos* (Besançon, 1892). (3) Two historians of Macedonia: (*a*) Marsyas of Pella was a schoolfellow of Alexander the Great, a stepbrother of Antigonus, and a general of Demetrius Poliorcetes; (*b*) Marsyas of Philippi. See Ritschl, *De Marsyis rerum scriptoribus*, in his *Opuscula* (i., pp. 449–470).

J. R. S. Sterrett.

Marteau, Henri: See the Appendix.

Martel, Charles: See Charles Martel.

Martello Tower: a kind of tower which derives its peculiar name either (1) from the name of the Corsican engineer who is said to have first designed them; or (2) from Ital. *martello*, a hammer used to strike a bell, because they were used as watch-towers and were provided with alarm-bells; or (3) in corrupted form from Mortella (Corsica), from the vigorous defense of one of those towers in 1794. A martello tower is round, is about 30 feet high, and has walls 5 or 6 feet thick. The cellar and lower floor contain ammunition and supplies, the second and third living-rooms and armory for the garrison, and the vaulted roof is provided with a parapet and mounts one or more guns. The entrance is on the second floor by a ladder or drawbridge. A number of these have been built at different dates along the coasts of Italy, Sardinia, and Corsica, and during the French wars along the coasts of England, principally in Kent and Sussex. Similar towers of larger size were built by the Austrians along the Danube after the Napoleonic wars. At Lintz an intrenched camp was constructed with thirty-two connected towers, about 30 feet high and 80 feet in diameter, each mounting ten siege-guns. The Austrians called fortifications of this type Maximilian towers. In the U. S. Tower Dupré, Louisiana, and the tower on Tybee island, Ga., belong to this general class.

James Mercur.

Marten [earlier *martern*, from O. Fr. *martre*, probably of Teuton. origin; cf. Germ. *marder*: O. Eng. *mearþ*, though the Late Lat. *martes* has been by many regarded as the source]: the common name of several carnivorous fur-bearing animals of the family *Mustelidæ*. In North America is found the Hudson's Bay sable or pine marten (*Mustela americana*), which produces a very valuable fur, inferior in value to that of the Russian sable only. The latter animal (*M. zibellina*) is caught in Siberia. The pine marten of Europe (*M. martes*) and the stone marten or common European marten (*M. foina*) produce great quantities of cheap and useful fur. The Fisher (*q. v.*) belongs also to this genus. Martens are lithe, active creatures, with long bodies and very short legs; the claws are long and sharp, the tail bushy. Their movements are graceful, and they are expert in climbing trees. The marsupial analogue of the martens is the spotted marten, or long-tailed dasyure, a small but fierce carnivorous mammal of Australia, *Dasyurus viverrinus* or *macrurus*. It has a chestnut-colored fur spotted with white, and is 18 inches long, exclusive of the tail. It inhabits marshy places, and is nocturnal in its habits, sleeping during the day in a hollow tree.

Revised by F. A. Lucas.

Mar'tensen, Hans Lassen, D. D.: theologian; b. at Flensborg, Denmark, Aug. 19, 1808; studied theology at the University of Copenhagen. In 1832 he visited Berlin, Vienna, Munich, and Paris; and in 1838 was appointed professor at the university, first in philosophy, afterward in theology. His first book, *Meister Eckart*, which appeared in 1840, is an essay on the mysticism of the Middle Ages, and made a great sensation, both in Denmark and Germany, on account of the wonderful intuition and singular eloquence with which the old mysticism was interpreted and represented. In 1841 followed *Outline of a System of Ethics*, and in 1849 *Christian Dogmatics* (Eng. trans. Edinburgh, 1866), which found many admirers in Denmark, Germany, Sweden, Holland, and Scotland. As a disciple of Hegel, Martensen here undertakes to reconcile faith and reason, revelation and science, but, deeply impregnated by the Christian ideas as he is, he defines this process, with respect to the Bible, as "a reckoning of an account whose balance has been struck elsewhere; if we bring out another figure, we have reckoned wrong." The problem is solved, as far as it is solved, with great acuteness and ingenuity. In 1845 he was appointed preacher to the court, and in 1854 Bishop of Seeland, the highest dignity of the Danish Church. As such he took a very active part in the religious movements going on in the Danish community, and by the repose of his character, the superiority of his intelligence, and his sympathy with all that is genuine he exercised a great and beneficial influence. He published several collections of sermons, and in 1872 a *System of Christian Ethics*, second part, treating of the *State* (1878; Eng. trans., 3 vols., Edinburgh, 1873–83). German translations have appeared of *Jacob Böhme*, *Theosophische Studien* (Leipzig, 1882); *Aus meinem Leben* (2 vols., Karlsruhe, 1883–84); and his *Briefwechsel* with Dorner (Berlin, 1888). D. in Copenhagen, Feb. 4, 1884.

Revised by C. K. Adams.

Martha's Vineyard: the principal island of Dukes co., Mass., in the Atlantic. It is 19 miles long, averages 5 miles in breadth, is rather level, and in part has a very productive soil. It contains the towns of Edgartown, Chilmark, Tisbury, Gay Head, and Cottage City. The latter is a noted camp-meeting ground and watering-place on the northeast shore of the island.

Marti, José J.: See the Appendix.

Martia'lis, Marcus Valerius: poet; b. at Bilbilis, in Spain, Mar. 1, about 40 A. D.; went during the reign of Nero (in 64) to Rome, where he resided for thirty-four years, and achieved a great literary fame. He returned in 98 to his native city, where he seems to have died a few years afterward, not later than 104. Of his works, fifteen books, containing about 1,500 small poems, *epigrammata*, are still extant, all distinguished by cutting wit, an elegant and pointed form, a high degree of felicity of expression, and very interesting for the moral study of the time to which they belong, but sometimes revealing an offensive sensuality and a talent for flattery of a very doubtful character. There is a good edition of his works by Schneidewin (2 vols., Grimma, 1842), and one with excellent notes and indices by L. Friedländer (2 vols., Leipzig, 1886), a complete translation into French by E. T. Simon (1819), into German by A. Berg (Stuttgart, 1864), and numerous translations of single parts in English.

Martial Law [*martial* is from Lat. *martia'lis*, pertaining to Mars, pertaining to war, deriv. of *Mars*, *Mar'tis*, the god of war]: the law which is administered by the military power over a district or country in which the civil authority has been superseded by, or made subordinate to, the military for the purpose of subduing invasion or insurrection by opposing forces, or of restoring to power the civil courts in case of their inability to secure the administration of justice. It differs widely from "military law" and "military government," with each of which it is often confounded. *Military law* is a department of the municipal law prescribing the code of rules for the regulation of the army and navy alone, either in war or in peace; and in the U. S. it is enacted by Congress in the same manner and with the same force and effect as any other legislation, and civilians are expressly exempt from its operation. *Military government* is the government which the commander of an invading army exercises for the time being over a conquered country. Martial law can exist only in time of war or when the civil authorities are rendered powerless to enforce the laws of the land by the presence of hostile or rebellious forces, and it applies to civilians as well as to the military, and, unlike military government, is established only over those districts or territories which are friendly in fact or in contemplation of law.

The right to establish martial law is one of the sovereign powers essential to the existence of every government, the exercise of which, however, can be justified only by paramount necessity, what constitutes such necessity varying with the circumstances of the case. Restrictions and rules as to what may be lawfully done by the authorities administering martial law may be prescribed by the statutes of a State, as in many European countries in providing for the "state of siege"; or it may be left to be determined, as in Great Britain and in the U. S., by the question whether the acts of the officials were such as were necessary, or reasonably supposed to be necessary, to accomplish the object for which martial law was established, or whether their authority has been abused. At the time of the actual exercise of this species of military rule the commander is under no present limitation or restraint other than his own will or

discretion and his sense of ultimate responsibility to the civil authorities, which for the time are either entirely supplanted by martial law or are in subjection to it.

The officials in the exercise of their powers may, if necessary, resort to the destruction of property or the taking of life to any extent and in any manner that may be required for the purpose of the war or of suppressing the rebellion or insurrection and restoring the civil authorities to power; but they are not justified in resorting to means which under the circumstances are cruel or unusual, or which under the circumstances there was no reasonable ground for believing to be necessary or justified. For any violation of these restraints the officials are responsible, civilly and criminally, before the civil courts on their restoration to power; but in determining the reasonableness of an act due allowance is properly made for the lack of time for consideration, the necessity for immediate action, and other peculiar circumstances in which the commander is placed.

In Great Britain martial law may be declared either by the crown or by the Parliament; in the U. S. on the part of the Federal Government the power is vested in the President, and (according to some authorities) also in Congress; on the part of the State governments in the Legislature, and in the Governor. The President may declare and enforce martial law in a State either independently of, or even in opposition to, the State authorities; or he may do so at the request of the State authorities made under the clause of the Constitution (Art. IV., Sec. 4) which provides that "the United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and, on application of the Legislature or of the executive (when the Legislature can not be convened), against domestic violence." This power of the Federal authorities to aid in suppressing local uprisings has become of great importance in quelling lawlessness and destruction of life and property in labor riots in the States where the State authorities were unable to put down the insurrection.

No definite rule capable of exact application can be laid down by which to determine whether or not it is necessary to establish martial law, but what shall constitute such necessity will vary with the circumstances. In the celebrated case of Milligan, growing out of the civil war, the Supreme Court denied the lawfulness of martial law within the U. S. except in districts actually occupied by the opposing forces, which are the very theater of hostilities, and in which the civil courts are for the time being completely displaced. This was an *obiter dictum*, however, given in the opinion of a divided court (five to four), and the subsequent "reconstruction acts," with the decisions upholding them, have been by eminent authorities considered to be inconsistent with them; and by some authorities it is maintained that martial law may be declared in a place where there is no actual overthrowing of the civil authorities, but where invasion is threatened, or where the purposes of the war render the existence of the martial law a necessity. In Great Britain Lord Chief Justice Cockburn also, in 1867, declared in an opinion that the crown has no authority to enforce martial law in any part of the British realm where the laws of England prevail; but he admitted that Parliament, by virtue of its unlimited power, might call it into operation. The general principles governing the existence and exercise of martial law in Great Britain and the U. S. are in effect the same, and the differences which exist are too technical for discussion here, and do not affect the application of the preceding general statement of the law. For a fuller treatment of the subject, consult Finlason's *Treatise on Martial Law in Time of Rebellion* (London), and the same author's *Review of the Authorities as to the Repression of Riot or Rebellion*; Stephen's *History of the Criminal Law of England* (London); Dicey's *Law of the Constitution* (London); Birkhimer's *Military Government and Martial Law*; Hares's *American Constitutional Law*; and Pomeroy's *Constitutional Law of the United States*. F. Sturges Allen.

Martin (Fr. *martinet*): a name given to several birds of the swallow family (*Hirundinidæ*). The purple martin of the U. S. (*Progne subis*), so called from the lustrous purplish-blue color of the male, is the largest of the North American swallows. It often inhabits boxes put up near houses, and is a popular favorite, being regarded as a bird of good omen. It ranges from the frontier of Patagonia to within the Arctic circle, but its numbers are in certain years and certain localities subject to sudden diminutions which have never been satisfactorily accounted for. The house-martin of Europe (*Chelidon urbica*) frequently attaches its nest to the walls of houses even in towns. The nests are extremely variable in shape and size, no two being exactly alike in both respects. Generally the form is cup-shaped, with the rim closely pressed against the wall, and having a small semicircular aperture cut out of the edge in order to permit the ingress and egress of the birds. Sometimes, however, the nest is supported on a kind of solid pedestal, composed of mud, and often containing nearly as much material as would have made an ordinary nest. The sand-martin (*Cotile riparia*) of Europe and North America is smaller, of a dull color, and builds its nest at the end of a long horizontal gallery, which it bores in some natural or artificial escarpment. Although its small beak and slender claws would seem at first sight to be utterly inadequate for the performance of miner's work, the sand-martin is as good a tunnel-driver as the mole or the rat, and can dig a burrow of considerable length (from 2 to 8 feet), and in soil which is by no means easy to excavate. The sand-martin hatches several broods during the year and is very gregarious, sometimes making its burrows so near together as to honeycomb the bank in which they are situated.

The European house-martin (*Chelidon urbica*).

Revised by F. A. Lucas.

Martin, Saint: Bishop of Tours and patron saint of France; b. in 316 at Sabaria, in Pannonia, the present Stein in Lower Hungary, of pagan parents, his father being a military tribune; visited the pagan school of Pavia, early showed an inclination to a monastic life, but was compelled by his father to enter the army in his sixteenth year, an imperial edict having ordered the enrollment of the sons of veterans, and he served under Constantine and Julian the Apostate. Having left the army at the age of twenty, he became a disciple of Hilary, Bishop of Poitiers; returned to Pannonia; converted his mother to Christianity, but suffered much from the persecutions of the Arian party, which finally expelled him from the country. Once more he went to Gaul; was made Bishop of Tours in 371, and founded the monastery of Marmontiers, where he died about 400 (perhaps Nov. 11, 397). His life has been described by a contemporary of his, Sulpicius Severus, adorned with many miracles and wonderful stories; and by the Roman Catholic Church he was made a saint, and his festival appointed on his death-day, which was considered his heavenly birthday. Nov. 11. In Scotland this day marks the winter term (*Martinmas*), and was formerly celebrated with feasting and drinking. The French expressions, *martiner, faire le St. Martin*, and *mal de St. Martin*, show that the same custom has existed in France. It arose from an old story, that at a great festival the Emperor Maximinus offered the drinking-cup first to the bishop, in order that he might receive it from his hand. The treatise *Professio Fidei de Sancta Trinitate*, ascribed to Martin, is generally considered spurious. See his *Life* by F. Chamard (Paris, 1873), and by J. G. Cazenove (London, 1883). Revised by S. M. Jackson.

Martin I.: pope and saint; b. in Todi, in Umbria; elected Bishop of Rome July 5, 649, succeeding Theodore I.; called the first Lateran Council, which met on Oct. 5, 649, and which affirmed the doctrine of two wills and operations in Christ. The Emperor Constans II. was a violent upholder of the doctrines condemned by the council: consequently he had the pope brought as a prisoner to Constantinople, 654,

on the trumped-up charge of treasonable designs against the emperor. He was cruelly treated, banished to Cherson, a town in the Crimea, and there died Sept. 16, 655.—MARTIN II. (or MARINUS I.), b. at Montefiascone became pope in 882, and d. Feb. 14, 884.—MARTIN III. (or MARINUS II.) succeeded Stephen VIII. in 942, d. 946; a man of learning and noble character.—MARTIN IV. (*Simon de la Brie*), b. in Touraine of very humble parentage; became a Franciscan at Tours; was patronized by St. Louis; became a cardinal in 1262; was long papal legate at Paris; became pope in 1281. The Sicilian Vespers soon followed (1282), and he excommunicated the enemies of the French, thereby greatly weakening his own cause in Italy. D. in Perugia, Mar. 28, 1285.—MARTIN V. (*Otho Colonna*), b. of noble stock in Rome 1363; became auditor of the rota 1394; cardinal-deacon 1405; was chosen pope by the Council of Constance 1417; fulminated a bull against the Hussites 1418; and soon proved himself one of the ablest and boldest of the popes. His policy overcame the reform movements begun at the Council of Florence. He healed the divisions of the Church, restored the diminished splendors of Rome, pacificated Europe, and advanced the cause of learning. In carrying out the orders at Constance he called a council at Pavia 1423, transferred it to Siena, but dissolved it the next year. D. in Rome, Feb. 20, 1431. Revised by S. M. JACKSON.

Martin, AUGUST, M. D.: gynæcologist; b. at Jena, Germany, July 14, 1847; was a special student of his father, E. A. Martin, graduating M. D. at the University of Berlin in 1870; has been assistant in the Berlin gynæcological clinic, and docent at the university since 1872. He has published valuable reports of his operative cases. Among his works are *Leitfaden der operativen Geburtshülfe* (Berlin, 1877); *Pathologie und Therapie der Frauenkrankheiten* (Vienna and Leipzig, 1885). S. T. A.

Martin, BON LOUIS HENRI: historian; b. at St.-Quentin, France, Feb. 20, 1810; began his literary career by writing historical novels and dramas, but turned soon to a more serious and thoroughgoing treatment of history. Of his *Histoire de France* there are three different editions: one in 15 vols. (1833–36); one in 19 vols. (1837–54), parts of which, such as vols. x. and xi., narrating the religious wars, and vols. xiv.–xvi., describing the age of Louis XIV., made a great sensation and were crowned by the Academy; and one in 16 vols. (1855–60), embodying the latest researches in Celtic antiquities, mediæval society, etc. The most prominent of his other writings are *De la France, de son Génie et de ses Destinées* (1847), which gives the ideal view on which his narrative of the history of France is based; *L'Unité Italienne* (1865), *La Russie d'Europe* (1866), etc. He became a senator in 1876, and member of the academy in 1878. D. Dec. 14, 1883.

Martin, EDUARD ARNOLD, M. D.: gynæcologist and obstetrician; b. at Heidelberg, Germany, Apr. 22, 1809; studied law from 1826–28 at the Universities of Jena and Göttingen, and then took up medical studies, graduating M. D. at Göttingen in 1833; studied in Prague, Vienna, Berlin, England, and France; settled in Jena in 1835; in 1837 was appointed Extraordinary Professor of Obstetrics, in 1838 was appointed director of the lying-in asylum, and in 1850 Professor of Obstetrics in the University of Jena. He here in 1843 established the first gynæcological clinic in Germany. In 1858 he went to the University of Berlin. His work and teaching exercised great influence in creating a scientific basis for gynæcology and obstetrics. He was the author of many monographs and works, some of which are *Zur Gynäkologie* (Jena, 1848); *Lehrbuch der Geburtshülfe für Hebammen* (Erlangen, 1854). He was coeditor of the *Jenaisches Annalen für Physiologie und Medicin* 1849–51, and of the *Zeitschrift für Geburtshülfe und Frauenkrankheiten* 1875. D. Dec. 5, 1875. S. T. ARMSTRONG.

Martin, HENRY AUSTIN, M. D.: surgeon; b. in London, England, in 1824; graduated M. D. at Harvard Medical School in 1845; practiced in Boston; in 1862 passed the examinations for a commission as staff surgeon in the U. S. volunteers, and was promoted to the rank of lieutenant-colonel and medical director; during his army service he performed many notable operations. At the close of the war he resigned his commission and returned home to practice. In 1870 he introduced the Beaugency animal vaccine virus into the U. S. In 1877 he brought before the profession the various uses for the rubber bandage, and in 1878 his operation of tracheotomy without tubes. D. Dec. 7, 1884. S. T. ARMSTRONG.

Martin, HOMER DODGE: landscape-painter; b. in Albany, N. Y., Oct. 28, 1836. He received no art instruction except a few weeks' study with William Hart in New York, and began exhibiting pictures at the National Academy about 1857. He became an Academician in 1875, and was elected a member of the Society of American Artists in 1877. His pictures are noted for quiet but effective color schemes and simple treatment. *Sand Dunes on Lake Ontario* (1878); *Adirondacks*, which was exhibited at the Centennial Exhibition at Philadelphia in 1876, and belongs to the Century Club, New York; *High Tide at Villerville* and *Lighthouse at Honfleur*, also the property of the Century Club, are some of his best-known works. D. Feb. 12, 1897.

Martin, HENRY NEWELL: See the Appendix.

Martin, JOHN: painter; b. at Haydon Bridge, near Hexham, Northumberland, July 10, 1789. He was made apprentice to a painter on porcelain; went to London and married very young, supporting himself by decorative painting while he went on with his studies. In 1812 he exhibited several pictures at the Royal Academy, and was a constant exhibitor from that time at both the Academy and the British Institution. In 1816 was shown his *Joshua Commanding the Sun to Stand Still*, and in this were visible many of the peculiarities of his art. A city with gigantic edifices in long perspective crowns a rocky hill to the right; on the left the plain stretches away to distant heights, on which are other large buildings; armies fill the plain and pour down from the city. The effect aimed at is the gigantic and overwhelming. *Belshazzar's Feast*, exhibited in 1821, carried still further the effect of architecture of colossal size and in long perspective. His painting for thirty years followed in these lines of composition, and his fame is that of an artist who, not a colorist and not a master of figure-drawing, nor very strong in chiaroscuro, nor in any of the qualities which make up the great artist, had a singular gift at producing grandiose effects. Such art as this is of course perilously near the ridiculous, but Martin generally knew how to avoid that result. He was greatly admired during his life, received several prizes at the British Institution, and a special medal from the French Government. Large mezzotint engravings exist of some of his works, and it is thought that some of these are by himself. D. at Douglas, Isle of Man, Feb. 17, 1854. At the South Kensington Museum are *A Mountain Landscape* and several water-colors. In the Manchester Gallery is *The Destruction of Herculaneum*. An edition of Milton's *Paradise Lost*, illustrated with mezzotints, which have much of Martin's peculiar power, was issued in 1826, and another with larger plates in 1827; later and inferior editions are numerous. RUSSELL STURGIS.

Martin, LOUIS AIMÉ: author; b. at Lyons, France, in 1781; d. in Paris, June 22, 1847. He was member of the Chamber of Deputies in 1815, then professor at the Ecole polytechnique till 1831, and after that keeper of the library of St. Geneviève. He wrote commentaries on Racine and Molière, a *Vie de Bernardin de Saint-Pierre*, and a book on the *Éducation des mères de famille*. A. G. C.

Martin, ROBERT MONTGOMERY: b. in England about 1803; author of a series of valuable geographical and statistical works—*The Colonies of the British Empire* (1834–38); *The British Colonial Library* (1836–37); *The History, Antiquities, Topography, and Statistics of Eastern India* (1838); *Ireland before and after the Union* (1843); *China, Political, Commercial, and Social* (1847); *The Hudson's Bay Territories* (1848); *The Indian Empire* (1858–61); and *Progress and Present State of British India* (1862). He also edited *The Colonial Magazine* for some years, superintended the issue of *The Illustrated Atlas and Modern History of the World*, and arranged for publication the papers of the Duke of Wellington. D. in 1868.

Martin, Sir THEODORE, LL. D.: author; b. in Edinburgh, Scotland, in 1816; settled in London as a solicitor in 1846; in 1851 married a lady who was prominent as an actress (see FAUCIT, HELEN); wrote verses for the magazines over the signature of *Bon Gaultier*; published *The Book of Ballads* in conjunction with Prof. Aytoun; translations of the *Poems and Ballads of Goethe* (1858); of several Danish dramas by H. Hartz and Oehlenschläger (1854–57); of the *Odes of Horace* (1860). and of his whole works (1882); of the *Poems of Catullus* (1861); of Dante's *Vita Nuova* (1862); of Goethe's *Faust* (1863, 1886); Heine's *Poems and Ballads* (1878); and Schiller's *Song of the Bell* (1889); and printed for private circulation translations of various miscellaneous poems by Goethe and Uhland. He also wrote a biography

of Prof. W. E. Aytoun (1868): *Life of the Prince Consort* (1874–80) from materials furnished by Queen Victoria; *Lives* of Princess Alice (1883) and Lord Lyndhurst (1885). In 1880 he was elected rector of the University of St. Andrews.

Martin, Thomas Mower: See the Appendix.

Martin, William Alexander Parsons, D. D., LL. D.: missionary and educator; b. at Livonia, Ind., Apr. 10, 1827; graduated at the Indiana State University at Bloomington 1846, and the Presbyterian Theological Seminary of New Albany, Ind. (now McCormick, Chicago), 1849; was acting Professor of the Classics in Anderson Collegiate Institute 1849–50; missionary under the Presbyterian board at Ningpo, China, 1850–60; founder of the Presbyterian mission at Peking in 1863, and was in charge till 1868; he was then appointed Professor of International Law in the Tung wên College of Peking, of which he has been president since 1869. In 1885 he was elected first president of the Oriental Society of Peking; he is a member of the European Institute of International Law, and of other similar societies. In 1880–81 he was sent by China to Europe and the U. S. to report on methods of education; and in 1885 he was made mandarin of the third rank. Dr. Martin has published, in English, *The Chinese: their Education, Philosophy, and Letters* (New York, 1881), and articles in reviews and periodicals; in French he has published papers in the *Transactions* of various learned societies of Europe; in Chinese he has published *Evidences of Christianity* (1855; reprinted in many editions, both in China and in Japan); *The Three Principles* (1856); *Religious Allegories* (1857); translations for the Chinese Government of de Martin's *Guide Diplomatique* (1874); of treatises on *International Law*, Wheaton's (1863–64), Woolsey's (1875), and Bluntschli's (1879); compilation of text-books on *Physics* (1868), and on *Mathematical Physics* (1885; both revised and reprinted for the emperor, 1889); and a number of widely circulated tracts. C. K. Hoyt.

Martina Franca, maăr-tee'năă-fraan'kaă: town; in the province of Lecce, Southern Italy; about 17 miles N. of Taranto (see map of Italy, ref. 7–H). This beautiful little city is built on a hill near the sources of the Tara. The churches and other buildings, private and public, are handsome; the ducal palace is one of the most magnificent in the south of Italy. Martina Franca was the feudal possession of the Caraccioli, and is not a very old town. Pop. about 18,100.

Martin de Moussy, maăr'tăń'de-moo'see', Jean Antoine Victor: physician and traveler; b. at Moussy-le-Vieux, June 26, 1810. He studied medicine in Paris, served as army health commissioner, and in 1841 went to South America, establishing himself in 1842 at Montevideo, Uruguay. During the war known as the nine years' siege (1843–52) he was medical director of the French and German legions raised in the city. He established at his own expense a meteorological observatory. From 1855 to 1859 he traveled extensively in Argentina and Paraguay, visiting the frontiers of Bolivia and Chili. The results of his explorations were published in Paris as *Description géographique et statistique de la Confédération Argentine* (3 vols. and atlas, 1860–64); this is a work of great value. Martin de Moussy wrote various minor works and papers on the Platine region, and was a contributor to encyclopædic works. D. at Bourg-la-Reine, near Paris, Mar. 26, 1869. Herbert H. Smith.

Mar'tineau, Harriet: author; sister of Rev. James Martineau; b. at Norwich, England, June 12, 1802, was descended from a family of Huguenot exiles; was educated under the auspices of her uncle, a distinguished surgeon; entered upon literary life in 1823, and published a very great number of works, including many tales, of which those illustrating the principles of political economy, the operation of the poor laws, and kindred subjects are especially noteworthy. She removed to London in 1832, but subsequently lived at Tynemouth and Ambleside; visited the U. S. in 1834, and traveled in Palestine and the East in 1846. Among her important works are *Society in America* (1837); *A Retrospect of Western Travel* (1838); *Eastern Life, Past and Present* (1848); *British India* (1851); a condensed translation of Comte's *Positive Philosophy* (1853); *History of England during the Thirty Years' Peace* (1849–50); *The Factory Controversy* (1855); and *Biographical Sketches* (1869). A Unitarian Christian in early life, she gradually assumed in her writings more radical religious opinions. She was a frequent contributor to newspapers and reviews. D. at Ambleside, England, June 27, 1876.

Revised by H. A. Beers.

Martineau, James, D. D., LL. D.: theologian; b. at Norwich, England, Apr. 21, 1805, of Huguenot extraction. His father was a manufacturer of bombazines, in humble circumstances. Dr. Martineau studied in the Unitarian College at York; was minister of societies first in Dublin, and afterward in Liverpool in Hope chapel. While in Liverpool in 1839 he took part, in connection with J. H. Thom and Henry Giles, in a controversy with thirteen clergymen of the Church of England on questions of Christian theology. Martineau's themes were—*The Bible*, *The Deity of Christ*, *Vicarious Redemption*, *The Christian View of Moral Evil*, and *Christianity without Priest and without Ritual*. All the lectures were published. *The Rationale of Religious Inquiry* and *Endeavors after the Christian Life*, two volumes of remarkable sermons, appeared in 1843–47; a volume of *Miscellanies*, edited by T. Starr King, was printed in Boston in 1852; in 1858, another volume, entitled *Studies of Christianity*, was collected by W. R. Alger, and published by the American Unitarian Association; two volumes of *Essays, Theological and Philosophical*, were issued by W. V. Spencer in Boston, 1866 and 1868, comprising significant papers from various English periodicals. The *Westminster*, *Prospective*, and *National* reviews contained his most elaborate essays. In 1853 Dr. Martineau was called to the chair of Moral and Metaphysical Philosophy in Manchester New College, London, whither he went to live, and in 1858 assumed joint pastorship with J. J. Tayler of the Unitarian chapel in Little Portland Street, of which, on the death of Mr. Tayler, he became sole incumbent. He has been distinguished as the defender of spiritual faith against the different schools of atheism, materialism, and skepticism, taking sharp issue with the negative tendencies of science and philosophy, not in the interest of any dogma, creed, or Church, but in the interest of the moral and spiritual nature of man. (See his *Religion and Modern Materialism*, New York, 1874.) Thackeray called him the greatest theologian in England. Ill-health compelled Dr. Martineau to desist from preaching. The Boston magazine *Old and New* (1874) contained able articles in criticism from his pen. He is the author of *Types of Ethical Theory* (1886); *A Study of Religion: its Sources and Contents* (1888); and *The Seat of Authority in Religion* (1890). His *Essays, Reviews, and Addresses* were published in four volumes in 1890–91. His *Study of Spinoza* is an extremely unsympathetic study of that great philosopher. His critical conclusions, which are extremely radical, have done much to qualify the admiration which his philosophical conclusions have excited in conservative minds. After the death of Cardinal Newman Dr. Martineau was the most conspicuous figure in English theological and religious thought. D. Jan. 11, 1900. Revised by J. W. Chadwick.

Martinez, town; capital of Contra Costa co., Cal. (for location of county, see map of California, ref. 7–C); on Carquinez Strait, which accommodates the largest sea-going vessels, and on the S. Pac. Co.'s Railway; 35 miles N. E. of San Francisco. It is in a rich grain, nut, and fruit region, has a delightful and uniform climate, and contains 5 churches, graded public school, and 2 weekly newspapers. There are coal, copper, and quicksilver mines in the vicinity, and 12 miles distant is Mt. Diablo, 3,986 feet high, whose summit commands an unobstructed view of an area of about 40,000 sq. miles. Pop. (1890) 1,600; (1900) 1,380.

Editor of "Contra Costa Gazette."

Martinez, maăr-tee'năth, Tomás: statesman; b. at Leon, Nicaragua, about 1812. He was engaged in trade and mining and took no active part in public affairs until 1854, when he became a colonel in the conservative forces. As general he fought successfully against Walker 1856–57, and on June 24, 1867, he and Jerez were appointed temporary dictators. War having been declared on Costa Rica, Martinez was about marching against that country when he was almost unanimously chosen president, assuming office Nov. 15, 1857. Peace was quickly established, and his administration was the most prosperous that the country had known. In Sept., 1862, war broke out with Honduras and Salvador, but ended in a victory gained by Martinez Apr. 29, 1863. Martinez was re-elected for four years Mar. 1, 1863, and he declined a third term in 1867. D. at Managua, Mar. 12, 1873. Herbert H. Smith.

Martinez Campos, -kaam'pōs, Arsenio: soldier and politician; b. at Segovia, Spain, Dec. 14, 1834; fought under O'Donnell in Africa and under Prim in Mexico; served against the revolutionists in Cuba 1869–72, and soon after his return was made *mariscal de campo* and captain-general

of Valencia; for his services against the Carlists he was promoted to lieutenant-general. The *pronunciamiento* made by him and Gen. Jovellar paved the way to the accession of Alfonso XII., and the final downfall of the Carlists was mainly due to his victory at Pena de Plata (1876). From 1876 to 1878 he was captain-general of Cuba, and during this period he extinguished the rebellion in that island, more by conciliation than by arms. From Mar. to Dec., 1889, he was Minister of War. On Feb. 8, 1881, he combined with Sagasta to form a new ministry, taking the presidentship of the council and the portfolio of war; and he retained the latter position in the cabinet of Jan. 9, 1883, finally resigning Jan. 18, 1884; took command of the army of the north, and commanded the army sent against the Riffs in 1894, when that tribe attacked Melilla. In 1895 he was appointed captain-general of Cuba. D. Sept. 3, 1900. HERBERT H. SMITH.

Martinez de Irala, DOMINGO: See IRALA.

Martínez de la Rosa, maăr-tee'nāth-dā-laă-rō'saă, FRANCISCO: statesman and writer; b. at Granada, Spain, Mar. 10, 1789; d. in Madrid, Feb. 7, 1862. A brilliant youth, he became Professor of Philosophy at Granada in 1808: but the war of independence against the French excited his enthusiasm, and he joined eagerly in the efforts to rid Spain of its invaders. He was deputy from Granada in 1813, and the Cortes employed him for a time as an agent in London. There, hearing of the heroic defense of Saragossa, he wrote his epic *Zaragoza*. In England, however, he became a believer in constitutionalism, and accordingly, after the return of Ferdinand VII., he was arrested, imprisoned, and then sent to the penal settlement Gomera, on the coast of Africa. Here he wrote his tragedy *Morayma*. After the uprising in 1820 he was recalled to Spain, and was for a time Minister of Foreign Affairs. On the subversion of the constitution through French intervention in 1823 he was obliged to go into exile, living for a number of years in Italy and Paris. In 1833, however, he returned, and in 1834 he again became Minister of Foreign Affairs as leader of the moderate party. From this time on he was recognized as the chief representative of constitutionalism in Spanish politics. Under Espartero he was ambassador to France, and in 1858 he was the leader of the ministry, becoming president of the senate in 1860. During all these years he had been writing much, always largely under the influence of French models. Among his literary works may be mentioned his tragedy *Edipo*; his comedies *El Español en Venecia* and *La hija en casa y la madre en la máscara*; his romance *Doña Isabel de Solis* (3 vols., 1837–40); his didactic poem *El arte poética*, elegant, but learnedly dull; his *Hernan Perez de Pulgar* (1834); and his *Espíritu del Siglo* (10 vols., 1835–51), a history of the French Revolution, but really only a reworking of Thiers's *Histoire de la Révolution française*. His lyric poems were collected in Madrid (1833; 2d ed. 1847). His *Obras completas* appeared in 5 vols. (Madrid, 1835; again Paris, 1844–46). His *Obras dramáticas* were published in 3 vols. (Madrid, 1861 and again in 1884). See L. Godard, *Martínez de la Rosa, ses œuvres, etc.* (Paris, 1862). A. R. MARSH.

Martinez de Rozas, -dā-rō'thaas, JUAN: Chilian patriot; b. at Mendoza (now in Argentina), 1759. He graduated at the University of Cordoba, taught in Chili, held various official positions there, and finally was made intendant of Concepcion. During his long residence in that city he acquired almost unbounded influence in the south of Chili, which at that time had little sympathy with the north; by disseminating republican ideas he prepared the way for the revolution. In 1808 Rozas was appointed secretary of the captain-general, Carrasco, a weak man who at first was much under the influence of his subordinate. Rozas used this power to effect reforms, but eventually Carrasco quarreled with him and he was dismissed. On the breaking out of the revolution Rozas became a member of the first popular junta (Sept. 18, 1810), and eventually acquired complete control over it. Among his important acts was the sending of a force to aid the patriots of Buenos Ayres. Carrera, who was jealous of Rozas, intrigued against him, and when the first congress met, July 4, 1811, a new junta was chosen. Rozas retired to the south, and his differences with Carrera for some time threatened a civil war; eventually Carrera gained entire ascendency, and in 1812 Rozas was banished to Mendoza. He died there Mar. 3, 1813. HERBERT H. SMITH.

Martinique, maăr-tēē-neek' (corruption of *Madinina*, the Carib name): an island of the Lesser Antilles, West Indies, belonging to France; lying between the two British islands of Dominica and St. Lucia, 25 miles S. of the former and 20 miles N. of the latter. Area, 381 sq. miles. It is of very irregular outline, the greatest diameter being from N. W. to S. E.; S. of the middle it is nearly cut in two by the opposite bays of Fort de France and François. The surface is mountainous, the highest peak being the Morne Pelée, near the northern end (4,430 feet); it is a volcano, but seldom active; the last eruption occurred in 1851. Other peaks are evidently ancient volcanoes to which the island owes its origin. The climate is generally healthful, though warm on the coast (mean temperature about 77·5° F.). Yellow fever is now rarely epidemic. Hurricanes are occasionally destructive during the months from June to October; in the great one of Oct. 10, 1780, 9,000 persons perished. Most of the interior is still covered with forest and uninhabited; notwithstanding this the island is one of the most thickly populated regions in the world, averaging 464 souls to the square mile. The cultivation of sugar-cane and the manufacture of sugar and rum are at present almost the only industries; coffee-planting, formerly prominent, has been almost abandoned, and cacao-planting has only recently been taken up. Much of the sugar is prepared in central usines, to which the planters sell their products. There are over 6,000 peasant proprietors. The exports, mainly of sugar and rum, average about 20,000,000 francs annually. Martinique is a colony of France, has a governor and a council elected by limited suffrage, and sends a senator and two deputies to the French parliament. Capital, Fort de France (formerly Fort Royal). The largest town is St.-Pierre, near the north end of the west coast (23,755 inhabitants). The island was one of the strongholds of the Carib Indians. It was settled by the French under d'Esnambuc, who founded St.-Pierre 1635; it became a crown colony 1675, and the Caribs were soon exterminated or exported. Sugar cultivation was introduced by Dutch colonists, who had been driven out of Brazil, about 1655. It was held by the British 1794–1802. Slavery was finally abolished in 1848, but many of the slaves had been freed before. Pop. (1890) 177,000, of whom a large proportion (probably at least 80 per cent.) are Negroes or colored. Of late years coolie (Asiatic) laborers have been introduced. See Daney, *Histoire de la Martinique* (6 vols., 1846); Rey, *Étude sur la colonie de la Martinique* (1881); *Annuaire de la Martinique* (annual, official); Ober, *Camps in the Caribbees* (1886). HERBERT H. SMITH.

Martinsburg: town; capital of Berkeley co., W. Va. (for location of county, see map of West Virginia, ref. 5–M); on the Balt. and O. and the Cumberland Val. railways; 80 miles W. of Washington. It has 12 churches, 6 public schools, U. S. Government building (cost $100,000), gas and electric lights, electric street-railway, 3 national banks with combined capital of $275,000, and a daily and 5 weekly newspapers. The manufacturing establishments include railway repair-shops, distilleries, lime and phosphate works, woolen and hosiery mills, planing-mills, bicycle-factory, etc. The vicinity produces much wheat, corn, and grass. Pop. (1890) 7,226; (1900) 7,564. EDITOR OF "INDEPENDENT."

Martin's Ferry: city (laid out in 1795); Belmont co., O. (for location of county, see map of Ohio, ref. 5–I); on the Ohio river, and the Cleve., Lorain and Wheel., the Penn., the Wheel. and Lake Erie, and the Wheel., Bridge and Term. railways; opposite Wheeling, W. Va. It contains 9 churches, a parochial and 3 public schools, an incorporated bank with capital of $25,000, a private bank, and daily, weekly, and monthly periodicals. Nearly $5,000,000 are invested in its manufactories, the products of which include sheet and bar iron, steel, pig metal, nails, glass, engines, kegs, barrels, boxes, stoves, and many kinds of heavy castings. Pop. (1880) 3,819; (1890) 6,250; (1900) 7,760.
EDITOR OF "TIMES."

Martinsville: city; capital of Morgan co., Ind. (for location of county, see map of Indiana, ref. 7–D); on the White river, and the Cleve., Cin., Chi. and St. L. and the Penn. railways; 29 miles S. W. of Indianapolis. It is in an agricultural region, and has numerous artesian mineral wells that have become noted for their curative properties in cases of rheumatism and kidney troubles. There are 5 sanitariums, 5 churches, 2 public schools, a daily and 2 weekly newspapers, a national bank with a capital of $70,000, and manufactories of foundry products, machinery, lumber, flour, and buckets. Pop. (1880) 1,943; (1890) 2,680; (1900) 4,038. EDITOR OF "REPORTER."

Martius, CARL FRIEDRICH PHILIPP, von: naturalist; b. at Erlangen, Bavaria, Apr. 17, 1794. He graduated in medi-

cine at the university of his native city, and studied botany at Munich. In 1817, when the Austrian Archduchess Leopoldina went to Brazil to become the wife of the crown prince, a number of Austrian and Bavarian naturalists were added to her suite, Martius and Spix being chosen for Bavaria. They remained until the end of 1820, and during this period traveled through the interior from Rio de Janeiro to Pará, and ascended the Amazon. Their narrative was published as *Reise in Brasilien* (3 vols. 4to and atlas, 1823–31), the greater part written by Martius, Spix having died in 1826. Their extensive collections were described in various large works with the collaboration of Agassiz, Perty, Andreas, Wagner, and others, the plants by Martius in *Nova Genera et Species Plantarum Brasiliensium* (3 vols., 1823–30), and *Icones Selectæ Plantarum Cryptogamicarum Brasiliæ* (1826–31). All these works were printed at the expense of the Bavarian Government, and were richly illustrated. Martius was knighted on his return from Brazil, was made Professor of Botany at the Munich University in 1826, and conservator of the botanical gardens in 1832. His greatest work, the *Natural History of Palms* (*Historia Naturalis Palmarum*) was published from 1823 to 1850 in three magnificent volumes, with 245 plates; 582 species are described. He planned and edited the first volumes of the great *Flora Brasiliensis*, begun in 1840, and wrote several of the monographs. His *Beiträge zur Ethnographie und Sprachenkunde Amerikas, zumal Brasiliens* (2 vols., 1867) was the greatest contribution ever made to the ethnography of Brazil. His minor publications are very numerous, embracing no less than 160 titles. In 1854, the Government having decided to erect an exposition building in the botanical garden, Martius resigned his positions after unavailing remonstrances. He died at Munich, Dec. 13, 1868. See Meissner, *Denkschrift auf Carl Friedr. Phil. von Martius* (Munich, 1869); Charles Rau, *Memoir of C. F. P. von Martius* (Washington, 1871).

HERBERT H. SMITH.

Martius Yellow: See NAPHTHALENE COLORS.

Mar'tos: town; in the province of Jaen, Spain; 16 miles W. S. W. of the town of Jaen (see map of Spain, ref. 18–E). It is celebrated for its cold mineral springs, which are much used for bathing, and much resorted to in cases of cutaneous diseases. The streets of Martos are crooked, steep, and narrow, and its public buildings are commonplace. The surrounding districts produce an excellent oil, the principal article of commerce of the town. Pop. about 14,700.

Martyn, HENRY, B. D.: missionary; b. at Truro, Cornwall, England, Feb. 18, 1781; graduated as senior wrangler at Cambridge in 1801; became a fellow of his college, St. John's, 1802; was ordained deacon of the Anglican Church 1803; priest in 1805, and went to Bengal 1806 as a missionary; subsequently was stationed at Dinapore and Cawnpore (1809); set out to return to England on account of his broken health in 1811, but remained more than a year in Persia, laboring for his faith. D. at Tokat, Asia Minor, Oct. 16, 1812, among strangers. A monument to his memory was erected there in 1856. Martyn translated the New Testament and Book of Common Prayer into Hindustani, the New Testament and Psalms into Persian, and the New Testament into Arabic. He wrote *Controversial Tracts* (1824); *Sermons* (1822); *Journals and Letters* (1837, 2 vols.); *Five Sermons* (1862). See *Memoir* by Rev. John Sargent (1819), often reprinted, and *Life* by George Smith (1892).

Martyn, WILLIAM CARLOS: See the Appendix.

Martyr [O. Eng., from Lat. *mar'tyr* = Gr. *μάρτυρ*, *μάρτυς*, martyr, liter., witness]: one who dies for his belief. In our New Testament the Greek word is generally rendered by its English translation, *witness*, "martyr" occurring but in three places—Acts xxii. 20; Rev. ii. 13; xvii. 6. The number of martyrs during the first three centuries has been variously estimated. H. Dodwell (the elder), in his *Dissertationes Cyprianicæ*, declares it to have been inconsiderable; and this opinion is shared by Gibbon (*Decline and Fall*, ch. xvi.), who cites Origen as his authority. Monkish enthusiasts, on the other hand, exaggerated both the strength of the "noble army of martyrs" and the sufferings of those who composed it. The truth lies between these extremes. If these martyrs died unbaptized their death was regarded as a nobler baptism, and they were believed to enter paradise at once (Matt. v. 10, 12; x. 39). Each anniversary of a martyr's death, called *natales*, or *natalitia* (birthdays), because on it he was born to eternal life, was commemorated at his grave, and by degrees it became usual to build over such honored tombs churches called *martyrii*, or *memoriæ*, each named after the saint buried beneath it. There his festival was kept yearly, his "acts" were read; prayers were offered, the Eucharist was celebrated, and *agapæ*, or love-feasts, were held. The patiently borne sufferings of martyrs made many converts. Their blood, truly declared Tertullian, "was seed" —*Semen est sanguis Christianorum.* (*Apol.*, c. 50.) Orations were spoken in their honor, and poems were written to celebrate them. As the days of martyrdom were left further behind the martyrs received higher honor. Heathen converts adored them as they had adored the heroes of paganism. Their remains were disinterred and laid under the altars of churches. Every relic of theirs became a sacred treasure. Their intercession was deemed all-powerful with God. Martyrs formerly unheard of announced themselves in visions and told the place of their graves.

All religions and forms of religion have had their martyrs. Jews have been scorned, oppressed, and murdered for holding fast to their ancient belief; Mohammedans have died calmly for their prophet; Buddhist missionaries have fallen victims to their zeal; Roman Catholics have burned Protestants, who, when their day of power came, retaliated. The word *martyr* is often applied to those who lose life or wealth in scientific research. It is used to denote innocent sufferers from almost any cause, and has also been affixed to the names of kings who underwent the last penalty for misgovernment. See Ruinart, *Acta Martyrum* (Paris, 1682), and the great Bollandist *Acta Sanctorum*; for Protestant martyrs, see Foxe, *Book of Martyrs.* Revised by S. M. JACKSON.

Martyr, PETER: See ANGHIERA, PIETRO MARTIRE, de; also VERMIGLI, PIETRO MARTIRE.

Martyrol'ogy [from Lat. *martyrolo'gium* = Gr. *μαρτυρολόγιον*, liter., register of martyrs; *μάρτυς*, martyr + *λέγειν*, reckon, count, tell]: a term which, used in a narrow sense, denotes the list of martyrs who have suffered for the Christian faith, arranged in chronological order. Usually, however, it signifies one of the official liturgical books of the Roman Catholic Church, and as such contains not only the names of martyrs, but many saints likewise. We know from the Epistle of the Church of Smyrna on the death of St. Polycarp, the letters of St. Cyprian, the *Liber Pontificalis*, and other sources, that the early Church kept accurate lists of those who died for Christ, and celebrated yearly feasts in their honor. During the persecution of Diocletian the Acts of the Martyrs were in great measure destroyed, partly by the pagans, partly by the acts of the Christians who gave them up to save the copies of the Scriptures especially sought for. In the following period of peace the churches sought to restore their ancient lists, but not always with success. They depended on the remnants of their archives, personal recollections, and local traditions. The decline of the Græco-Roman culture, the invasions of the barbarians, the absence of a trained critical sense, made the task a difficult one, and in the course of time much that was legendary or untrustworthy was accepted as truth. This, however, is different from a process of wholesale fabrication of acts, etc., of which there is no trace in Church history. The most reliable accounts of the pre-Constantinian martyrdoms are to be found in the small volume of Ruinart *Acta Sincera Martyrum* (Paris, 1690). Later martyrdoms are most easily found in the *Acta Sanctorum* of the Bollandists. The oldest extant Oriental martyrology is found in the well-known Nitrian manuscripts published by Wright in *The Journal of Sacred Literature* (1865–66), and belongs to the year A. D. 412. The oldest Western martyrology is the so-called *Martyrology of St. Jerome*, a compilation of the latter half of the fifth century out of the great collection (now lost) of Eusebius, and Roman and African Church calendars. In its present form, it bears traces of adaptation to the Gallic ecclesiastical life of the sixth century. In the eighth and ninth centuries several other martyrologies made their appearance, based substantially on the preceding. In 1586 Baronius revised the Roman martyrology by order of Gregory XIII., and enriched it with valuable notes. Under Benedict XIV. (1740–58) this edition was reissued with a learned preface. See de Smedt, *Introductio generalis ad historiam ecclesiasticam critice tractandam* (1876). JOHN J. KEANE.

Marvell, ANDREW: poet; b. at Winestead, Yorkshire, England, Mar. 2, 1621; was educated at Cambridge and on the Continent; became the friend and assistant of Milton in the Latin secretaryship. He was for many years member for Hull in the House of Commons; was the constant friend of liberty both under the Commonwealth and after the Res-

toration; from his probity was called the "British Aristides"; refused to be moved by the bribes of Charles II. or the persecutions of royalists, who frequently threatened his life. His political satires, although often vehement and coarse, are full of noble and generous thoughts, and much of his verse is very sweet and beautiful. Among his best-known poems are the *Song of the English Exiles in Bermuda* and the *Horatian Ode on Cromwell's Return from Ireland*. D. in London, Aug. 17, 1678. Revised by H. A. Beers.

Marwar, or **Jodhpur**: a feudatory state of Rajputana, British India. It occupies the basin of the river Luni, between lats. 24° 35′ and 27° 19′ N., and lons. 70° 8′ and 75° 23′ E. Area, 37,445 sq. miles. Pop. (1891) 2,521,727. Capital, Jodhpur. Nearly all the population is in the S. E. of the state, through which runs the Rajputana Railway. The Luni and its tributaries rise in the Aravalli Mountains, and are dry in some seasons. To the westward of the Luni the country is a sandy desert. The ruling people are Rahtor Rajputs, the subject classes mostly Jats. Among the latter are the Marwari traders, the Jews and Armenians of the East, well known through all Hindustan. Nearly all are Hindus, 10 per cent. Jains, and 4 per cent. Mohammedans. The chief industry is the rearing of cattle and sheep. The cattle of Marwar are renowned throughout India, and the camels of Pali (in the northern part of the state) are esteemed for their agility and endurance. The state pays a tribute to the British. The reigning dynasty dates from 1194, the direct line was extinguished in 1843, but a maharajah was selected from a collateral line, that of the rajahs of Ahmednagar in Guzerat. M. W. Harrington.

Marx, Karl: founder of modern German socialism; b. of Jewish parents at Treves in the Rhine Province, May 5, 1818; studied at Bonn and Berlin, and became in 1842 editor of the *Rheinische Zeitung*, a radical journal published in Cologne, which was suppressed in 1843 for its attacks on the Prussian Government. Having settled in Paris, he continued his attacks on Prussia in a socialistic sheet called the *Vorwärts*; was expelled from France in 1845, and stayed for a time in Brussels, where he founded a German workingmen's association, a type of the future German democracy, and issued in connection with his friend Engels his famous *Manifesto* to the laboring classes of all civilized nations, setting forth the creed of the communists. Driven in turn from Belgium, he returned in 1848 to Cologne and there published the *Neue Rheinische Zeitung*, but his revolutionary zeal brought down upon him the wrath of the Government, and he was obliged to leave Germany. He withdrew in 1850 to London, which thenceforth remained his headquarters. His activity both as a writer and as an agitator was now almost incessant. In 1859 appeared his *Zur Kritik der Politischen Ökonomie*, containing the principles afterward elaborated in his masterpiece *Das Kapital* (1867; 3d ed. 1883 and 1885). In 1864 at a meeting of workingmen in London he laid the foundation of the International (*q. v.*), which held its first regular congress two years later and continued under his direction till 1872. During the sixties his energies were also devoted to the formation of a democratic party in Germany in opposition to the followers of Lassalle, and in 1869 this object was attained largely through the efforts of Liebknecht and others of his disciples, who formed the Social Democratic Labor party. Marx died in London, Mar. 14, 1883. His influence on the workingmen of all civilized countries can scarcely be estimated. His theories, in spite of the often obscure language in which they were expressed, constantly appear in one form or another in the writings of modern socialists. The salient features of his social philosophy are the theory of surplus value and the belief in the inevitable downfall of capitalism, i. e. the possession of the instruments of labor by the capitalist class. He recognizes no other source of the different exchange values of commodities than the different amounts of labor that enter into their production. According to his view the gain of the capitalists proceeds from the exploitation of the laborers, whose remuneration is limited by the "iron law of wages," while the surplus value which their labor has created goes in the form of profits to their employers. "Capital," he says, "is dead labor, which, vampire-like, becomes animate only by sucking living labor, and the more labor it sucks the more it lives." He considers that the present system of distribution will inevitably give place to one in which capital will be held in common for the good of all, and in the meanwhile he favors agitation as a means of hastening that result. See Jäger, *Der moderne Socialismus* (1873); Rae, *Contemporary Socialism* (1884); and Dawson, *German Socialism* (1888). The first volume of *Das Kapital*, containing all the essential points of his theory, has been translated into English (London, 1887). F. M. Colby.

Mary [from Lat. *Maria* = Gr. Μαρία, Μαριάμ, from Heb. *Miriām*, liter., rebellion. See Miriam], **The Blessed Virgin**: the mother of Christ. Concerning the birth and parentage of Mary the Gospels tell us nothing; as to her share in the Incarnation, they are explicit, dwelling especially upon the events that immediately preceded the birth of Christ and upon certain circumstances of his childhood. The years at Nazareth, after the finding of Jesus in the temple, are summed up in the words, "He was subject to them," i. e. to Mary and Joseph. During the public life of Christ his mother appears but rarely. At the foot of the cross the "beloved disciple" takes her unto his own [home], and again on the day of Pentecost she is present in the "upper chamber." After that the sacred record in regard to her is silent.

It is natural, however, to suppose that the first followers of Christ knew more of Mary than is narrated in the Gospels; and it is therefore easy to understand how traditions concerning her originated either from actual information or from surmises based on her singular prerogatives. To such sources may be traced the belief that she was the daughter of Joachim and Anna; that her early years were spent in the service of the temple; that after death her body was assumed, together with her soul, into heaven. Exaggerated attempts to supplement the Gospel account, such as the *Protevangelium Jacobi Minoris* and the *Evangelium Nativitatis Mariæ*, were condemned by ecclesiastical authority. And while the teachings of the early Fathers concerning Mary have weight as showing the traditional belief of the Church, the numerous legends woven about her in subsequent ages are the outcome, not the cause, of the devotion paid her by Roman Catholics.

Its fundamental reason is the fact that Mary is the mother of the God-man. Since the Creator has so exalted her, she deserves from creatures the highest degree of veneration that is not divine worship. This veneration is called by theologians *hyperdulia*, to distinguish it from the *dulia* or veneration of the saints, and from the *latria* which can be offered to God alone. Catholics do not *worship* or *adore* Mary, though they honor her in a manner befitting her unique dignity. Nor can they conceive that the reverence shown to his mother should be offensive to Christ or detract from his glory; also they pray to Mary, not as though she were the source of grace, but because they believe that her prayers in behalf of men will avail more in proportion, as her merit is greater than that of any other mere creature. Finally, Mary is proposed as a model for imitation, inasmuch as she is the ideal of womanhood, in whose person "woman rose into a new sphere and became the object of a reverential homage of which antiquity had no conception."

That Mary was peculiarly venerated by the earliest Christians is evident from the frescoes and inscriptions of the Roman catacombs. A powerful impetus was given to her cult by the Council of Ephesus (431), in which Nestorius was condemned and the term θεοτόκος, God-bearing, was formally applied to Mary. The council had been held in a church dedicated to her, and in the next two centuries churches were built in her honor in various cities both of the East and of the West. As the Liturgy developed, the festivals of Mary became more numerous, and popular devotion assumed a variety of forms according to the circumstances of time and place. Christian art drew some of its best inspirations from the cult of the "Madonna," and helped in turn to strengthen the devotion. Mysticism and theological speculation united to develop the ideas implied in Mary's prerogatives, and thus to form a systematic "Mariology." The Church has fostered this outgrowth, and left it free scope on the condition that it should always be in harmony with revealed truth and in keeping with Mary's dignity. It is hardly necessary to add that expressions of enthusiastic devotion, in writing or in practice, are not to be judged by the rigorous criteria which are properly applied to dogma.

Literature.—Northcote, *Mary in the Gospels* (London, 1885); Liell, *Darstellungen der allerseligsten Jungfrau in den Katakomben* (Freiburg, 1887); Livius, *The Blessed Virgin in the Fathers of the First Six Centuries* (London, 1893); Newman's *Development*. J. J. Keane.

Mary, Queen of Scots: See Mary Stuart.

Mary I.: Queen of England; b. at Greenwich Palace, Feb. 18, 1516; a daughter of Henry VIII. by his first wife, Catharine of Aragon; educated entirely in Spanish fashion —Roman Catholic. In 1522 she was betrothed to the Emperor Charles V., but after the divorce of Henry VIII. from Queen Catharine the emperor broke the contract, and other marriage negotiations with Francis I. and his second son, the Duke of Orleans, failed. Meanwhile her strong adhesion to her mother's cause alienated her father's affection. Later she came naturally to be considered the head of the Roman Catholic party, which made her suspected in the king's eyes, and after the birth of Elizabeth her position became really perilous. James V. of Scotland asked her in marriage, but the proposition was refused on account of the consequences which such a union might have for the children of Anne Boleyn. She was even compelled to sign articles acknowledging that her mother's marriage was illegal and her own birth illegitimate, which involved a renunciation of her right to the succession. In the last years of the reign of Henry VIII. her position became better, however; she lived on a good footing with Catharine Parr, and her right to the succession was restored to her. During the reign of her half-brother, Edward VI., she lived in retirement and took no part in politics: the different suitors to her hand were not accepted. On the death of Edward VI. (July 6, 1553), she succeeded to the throne after a short struggle with the party supporting the claims of Lady Jane Grey; and a reaction immediately took place in the government, headed by Gardiner, who was made lord chancellor Aug. 23, 1553, and by Bonner. It was not until after her marriage with Philip II. of Spain, which took place July 25, 1554, that those persecutions against the Protestants began which have made her name so odious in the history of England. She experienced great disappointments in her marriage from the coldness of her husband and from her childlessness; a mistake she made on the occasion of an attack of dropsy even subjected her to great mortifications. Her character, by nature cheerless, sullen, and singularly mixed, seemed to change for the worse under these influences, and she yielded willingly to the counsels of Philip and Gardiner. On Nov. 30, 1554, Cardinal Pole declared England and Rome reconciled, and on Feb. 4, 1555, John Rogers was burned at the stake. Cranmer, Latimer, and Ridley shared the same fate, and were followed by 200 or 300 more, and the ruin of the country seemed impending, when in the summer of 1558 the queen was attacked by an intermittent fever, of which she died at St. James's Palace, Nov. 17, 1558. Tennyson calls her "unhappiest of queens and wives and women."

Mary II.: Queen of Great Britain; b. Apr. 30, 1662; daughter of James II. by Anne Hyde; was educated in the Protestant faith, and on Nov. 4, 1677, married her cousin, the Prince of Orange (King William III.), with whom she was declared joint sovereign in 1689. She died of smallpox Dec. 28, 1694. For details of the reign, see WILLIAM III.

Maryborough: an important port of Queensland, Australia; 144 miles N. of Brisbane, on the Mary river at its entrance into Hervey Bay; lat. 25° 35′ S. (see map of Australia, ref. 5–J). It is the terminus of the railway to Gympie, an excellent and large port, the receiving-point for the agricultural districts of Wide Bay and Burnett, and for the gold, copper, and coal of the districts of Gympie and Derry. It has several refineries, distilleries, sawmills, and iron-foundries. Pop. (1891) 8,700. M. W. H.

Maryland: one of the U. S. of North Ameriea (South Atlantic group); the first of the thirteen original States that ratified the Federal Constitution.

Location and Area.—It lies between 37° 53′ and 39° 44′ N. lat., and 75° 2′ and 79° 33′ W. lon.; is bounded on the N. by Pennsylvania, on the E. by Delaware and the Atlantic Ocean, on the S. and S. W. by Virginia, and on the W. by West Virginia. Its gross area is 12,210 sq. miles, of which 9,860 are land surface. Chesapeake Bay reaches to within a few miles of its northern boundary, dividing the State into what are known as the Eastern and Western Shores.

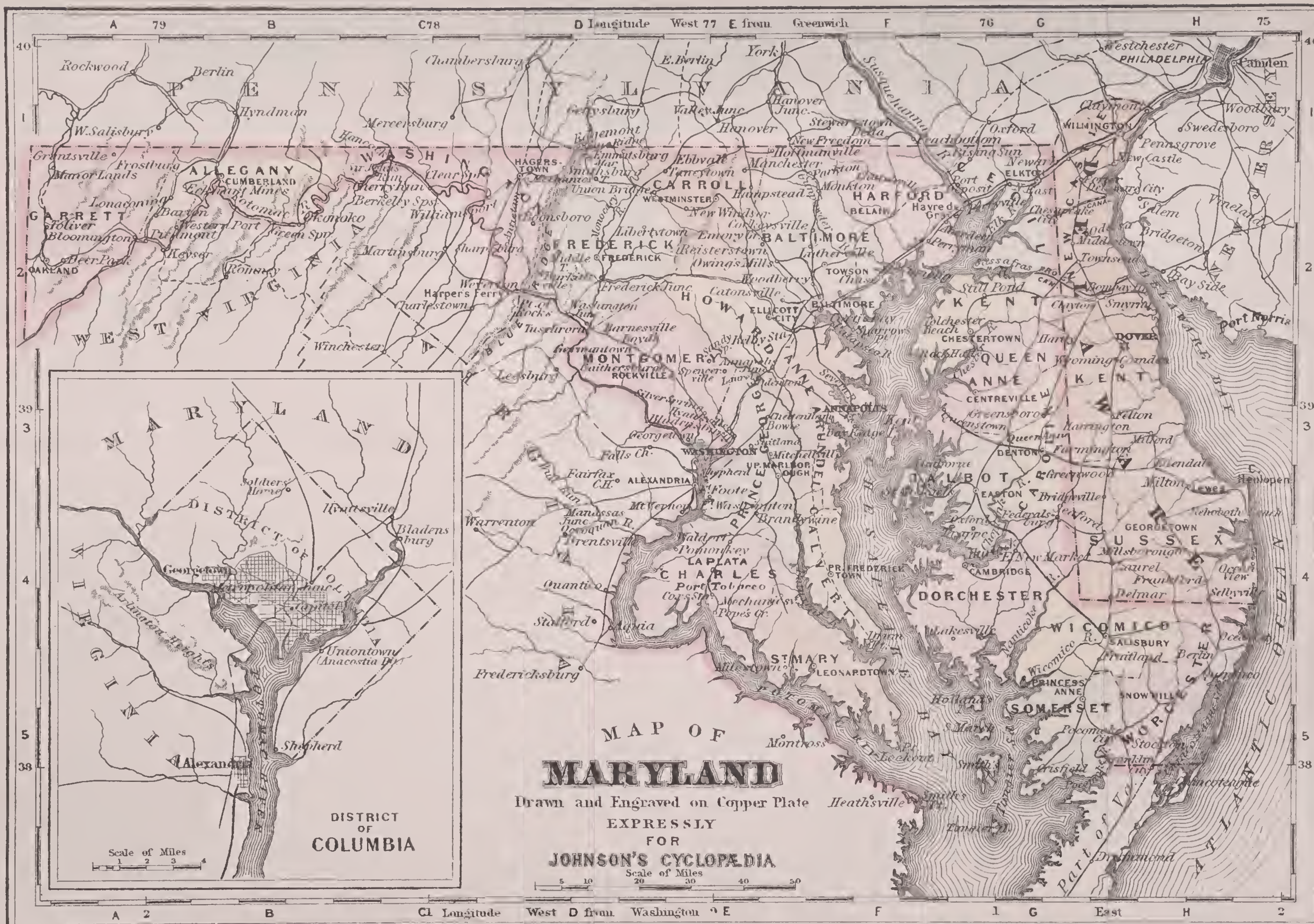
Topography.—The three great topographical areas into which the U. S. E. of the Mississippi is divided—the Coastal Plain, the Piedmont Plateau, and the Appalachian Region—are all represented in Maryland. To the Coastal Plain belongs that part of the State which lies to the E. of a line passing through Baltimore and Washington. It includes the whole Eastern Shore and part of the Western, and comprises about half the land area of the State. E. of the bay this region is very flat, but on the W. it is more rolling. The Piedmont Plateau lies to the W. of the Coastal Plain, and extends to the Catoctin Mountains. It contains about 2,500 sq. miles, and is broken into series of undulating

Seal of Maryland.

hills, increasing in height westward. The Appalachian Region begins at the Catoctin Mountains, and extends to the western boundary of the State, having an area of over 2,000 sq. miles. It may be divided into three districts—the eastern (Blue Ridge and great valley), the central (Appalachian Mountains), and the western (Alleghany Mountains). These mountains all lie in parallel ranges, with deep valleys between, and the height rises in places to over 3,000 feet. Maryland has no good harbor on the Atlantic coast, but the coast-line of Chesapeake Bay is deeply indented with larger and smaller estuaries and coves, giving a multitude of harbors suitable for vessels of light draught, and affording, with the rivers running into these, unusual facilities for water transportation. Of the numerous islands in the bay Kent island is the largest. Along the ocean frontier runs a reef of sand, inclosing and sheltering Synepuxent and Chincoteague Bays, and giving inland navigation along the coast. The rivers of Maryland are, on the Western Shore, the Potomac, Patuxent, Patapsco, Gunpowder, and Susquehanna; and on the Eastern, the Elk, Sassafras, Chester, Choptank, Nanticoke, Wicomico, and Pocomoke, besides a number of estuaries bearing the names of rivers. These all empty into Chesapeake Bay. To the W. of the central watershed the Monocacy, Antietam, and Youghiogheny flow into the Potomac. The western part of the State is traversed in a northeast and southwest direction by the Catoctin, Blue Ridge, Appalachian, and Alleghany Mountains.

Geology.—Maryland, notwithstanding her small area, contains a remarkably complete sequence of all the geological formations, not merely of the great eras, but of the subordinate periods. In Western Maryland are found the Silurian, Devonian, and Carboniferous series; in the Piedmont Plateau, granite, marble, gneiss, basalt, and other igneous and metamorphosed rocks; and in the Coastal Plain, the sands, clays, and gravels of more recent epochs. The mineral products are too numerous to specify, but of those possessing industrial value she has iron, copper, antimony, lead, zinc, gold, and chrome; coal; building and decorative stones in great variety; granite, sandstone, marble, and limestone; brick, potter's, and porcelain clays; sand, soapstone, and hydraulic cement. The semi-bituminous coal of the Cumberland basin is noted for its steam-generating qualities, and is the basis of one of the most important industries in the State, the total output in 1899 being 4,711,248 tons. The iron ores are chiefly hematite and magnetite.

Soil and Productions.—In the earlier history of the State tobacco, wheat, and maize were almost the sole crops. Of late years agricultural conditions have been much modified, and while these still remain staple products, they no longer hold an exclusive position. The emancipation of the slaves, leading to the subdivision of large estates, the growth of cities, the extension of steam transportation, and other causes have made a thorough cultivation of smaller areas the most profitable kind of farming, and particularly favored the increase of market-gardening and truck-farming, to which the lighter soils are especially adapted. Western Maryland has fine grass and wheat lands, and has developed an important industry in its extensive peach-orchards.



MAP OF
MARYLAND
Drawn and Engraved on Copper Plate
EXPRESSLY
FOR
JOHNSON'S CYCLOPÆDIA
Scale of Miles
Longitude West 77 from Greenwich
Longitude West from Washington
PENNSYLVANIA
WEST VIRGINIA
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
HOWARD
MONTGOMERY
ANNE ARUNDEL
PRINCE GEORGE
CHARLES
CALVERT
ST MARY
KENT
QUEEN ANNE
TALBOT
CAROLINE
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
SUSSEX
DELAWARE
NEW JERSEY
CHESAPEAKE BAY
DELAWARE BAY
ATLANTIC OCEAN
DISTRICT OF COLUMBIA
Scale of Miles

Northern Central Maryland has soils well suited to grass, wheat, and maize. Dairy-farming is an important industry, and much live stock is raised. Southern Maryland has a soil for the most part too light for grass and wheat, but excellent for early fruits and vegetables; and this industry is rapidly extending. Tobacco, though less cultivated than formerly, remains a staple crop in this section. The Eastern Shore has good corn and wheat soils, and others suited to fruits and vegetables, of which peaches and tomatoes are the most important. The canning and packing of fruits, vegetables, and oysters is the largest industry in the State. According to the report of the Maryland Bureau of Statistics, in 1900 there were packed 33,600,000 cans of tomatoes, of an average of three pounds each; 11,400,000 cans of corn, of two pounds each; 11,200,000 cans of peas, of two pounds each; and 19,200,000 cans of peaches, of three pounds each. The total pack of fruit and vegetables amounted in value to at least $15,000,000.

The following summary from the census reports of 1880 and 1890 shows the extent of farm operations in the State:

FARMS. ETC.	1880.	1890.	Per cent.
Total number of farms	40,517	40,798	* 0·7
Total acreage of farms	5,119,831	5,952,390	† 3·3
Total value of farms	$165,503,341	$175,058,550	* 5·8

* Increase. † Decrease.

The following table shows the acreage, yield, and value of the principal crops in the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	585,877	15,232,802 bush.	$6,245,449
Wheat	778,864	15,187,848 "	10,783,372
Oats	74,309	1,783,416 "	552,859
Rye	24,729	408,028 "	212,175
Buckwheat	7,435	111,525 "	63,569
Tobacco (1896)	15,995	9,277,100 lb.	398,915
Potatoes	23,081	1,269,455 bush.	685,506
Hay	277,332	302,292 tons	4,247,203
Totals	1,587,622		$23,189,048

On Jan. 1, 1900, the farm animals comprised 130,959 horses, valued at $6,950,014; 12,891 mules, value $937,005; 154,712 milch cows, value $4,610,418; 102,723 oxen and other cattle, value $2,604,643; 138,177 sheep, value $485,553; and about 300,000 swine, value $2,000,000; total value, $17,587,633.

Climate.—The climate is mild, the chief differences being due to elevation. No part of the State is without some snowfall in the winter. The average temperatures of the four climatic divisions of the State are:

MEAN TEMPERATURE.

MONTHS.	Eastern Maryland.	Southern Maryland.	Northern Central Maryland.	Western Maryland.
January	34·8°	35·3°	30·7°	30·5°
February	36·1	37.4	33·9	31·6
March	40·5	42·3	38·2	37·2
April	52·6	53·4	50·9	49·8
May	62·1	63·9	63·5	60·7
June	72·8	74·1	72·8	70·3
July	75·8	77·7	75·7	73·8
August	74·8	75·7	72·4	74·2
September	67·5	68·6	65·8	65·3
October	56·5	56·5	54·2	51.4
November	55·3	46·5	42·8	41·2
December	37·3	37·6	34·0	33·0

The climate, however, is not quite so equable as these figures indicate. In the winter "cold waves" often send the temperature (in the central and western regions) down to 10°, or even 0°, for a few hours, and in summer it sometimes rises to 95° or over in the warmest part of the day. The monthly means of rainfall are:

MONTHS.	Eastern Maryland.	Southern Maryland.	Northern Central Maryland.	Western Maryland.
January	3·51	3·20	3·50	3·01
February	3·22	3·51	3·10	2·45
March	4·06	4·20	4·39	3·02
April	4·04	4·11	3·62	3·23
May	4·29	4·40	4·06	4·08
June	3·18	3·70	3·48	4·53
July	4·78	4·42	4·45	2·77
August	3·78	3·84	3·98	3·48
September	3·39	3·80	4·03	3·46
October	3·04	2·86	2·74	2·35
November	2·70	4·11	3·25	2·82
December	2·67	2·60	3·13	2·35

Divisions.—For administrative purposes, Maryland is divided into twenty-three counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION.

COUNTIES.	* Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Allegany	1-B	41,571	53,694	Cumberland	17,128
Anne Arundel	3-F	34,094	40,018	Annapolis	8,402
Baltimore city	2-F	434,439	90,755	Baltimore	508,957
Baltimore Co.	1-F	72,909	508,957	Towson	.....
Calvert	4-F	9,860	10,223	Pr. Frederickt'wn	.....
Caroline	3-G	13,903	16,248	Denton	900
Carroll	1-E	32,376	33,860	Westminster	3,199
Cecil	1-G	25,851	24,662	Elkton	2,542
Charles	4-E	15,191	18,316	La Plata	.....
Dorchester	4-F	24,843	27,962	Cambridge	1,417
Frederick	2-D	49,512	51,920	Frederick	9,296
Garrett	1-A	14,213	17,701	Oakland	1,170
Harford	1-F	28,993	28,269	Bel Air	961
Howard	2-E	16,289	16,715	Ellicott City	1,166
Kent	2-G	17,471	18,786	Chestertown	3,008
Montgomery	2-D	27,185	30,451	Rockville	1,110
Prince George	3-E	26,080	29,898	Up. Marlborough	449
Queen Anne	2-G	18,461	18,364	Centreville	1,231
St. Mary	4-E	15,819	18,136	Leonardtown	454
Somerset	5-G	24,155	25,923	Princess Anne	854
Talbot	3-G	19,736	20,342	Easton	3,074
Washington	1-C	39,782	45,133	Hagerstown	533
Wicomico	4-G	19,930	22,852	Salisbury	4,277
Worcester	5-H	19,747	20,865	Snow Hill	1,596
Totals	.....	1,042,390	1,190,050		

* Reference for location of counties, see map of Maryland.

Principal Cities and Towns, with Population for 1900.—Baltimore, 508,957; Cumberland, 17,128; Hagerstown, 13,591; Frederick, 9,296; Annapolis, 8,402; Cambridge, 5,747; Frostburg, 5,274; Salisbury, 4,277; Havre de Graee, 3,423; Westminster, 3,199; Crisfield, 3,165; Easton, 3,074; Chestertown, 3,008.

Population and Races.—In 1790, 319,728; 1880, 934,943; 1890, 1,042,390 (natives, 948,094; foreign, 94,296; males, 515,691; females, 526,699; whites, 826,493; colored. 215,657, of whom 189 were Chinese, 7 Japanese, and 44 civilized Indians); 1900, 1,190,050.

Fisheries.—One of the most important industries of Maryland is the oyster-fishery. The oysters of Chesapeake Bay are famed for their size and exeellenee, and the beds producing them aggregate over 200 sq. miles. During the season about 7,000 small vessels are employed in "dredging," "seraping," and "tonging" the oysters from the beds, the take being partly sent to the markets for immediate consumption, but the greater part being sealed up in air-tight eans for export. The catch of 1891 was about 10,000,000 bushels, worth, at the water-side, over $5,000,000; and 32,000 persons (besides the can-makers) are employed in taking and packing the oysters. A small fleet of armed boats, called the oyster navy, belonging to the State, polices the beds to enforce the laws and prevent illegal fishing. The present management of the beds is wasteful and injurious. The supply of shad was rapidly falling off until the U. S. Fish Commission introdueed a scientific system of artifieial propagation in 1880, when the take rose in eight years from 4,000,000 to 8,000,000. The menhaden, though not used for food, has a considerable commercial value, yielding in oil and fertilizing materials a product of over $300,000 per annum. The bay maekerel, crabs, wild ducks, and terrapin yield delicaeies to the market, and give employment to a large number of persons. In 1899 41,000 persons were reported as engaged in the fisheries; the capital invested, $8,000,000; and the value of the catch, $7,000,000. The oyster catch in 1900 was very small.

Finance.—The funded debt of the State on Sept. 30, 1900, was $6,309,326.13; sinking funds aggregated $3,424,057; leaving net debt $2,885,269.13. The reeeipts of the year ending Sept. 30, 1900, were $3,622,493.42; balance in the treasury Sept. 30, 1899, $707,926; other funds, $206,326.80; total, $4,536,746.22. The expenditures were $3,480,534.26. The assessed valuation for 1899 was $603,326,096.

Banking.—On Sept. 5, 1900, there were 72 national banks, with a combined capital of $15,122,660, surplus and undivided profits of $8,789,924.48, and individual deposits of $42,941,480.88. There were, on June 30, 1900, 26 State banks—capital, $1,783,410; surplus and profits, $824,613; and deposits, $7,106,607; 6 loan and trust companies—capital, $4,616,000; surplus and profits, $2,069,250; and deposits, $4,201,875; 6 private banks—capital, $50,501; surplus and profits, $7,324; and deposits, $229,653; and 18 mutual savings-banks, with $2,069,250 in surplus and profits, and $57,857,976 from 171,130 depositors.

Means of Communication.—The Baltimore and Ohio Railroad, the first opened in the U. S., extends N. E. to Philadelphia and New York and W. to Chicago and St. Louis, and has a branch to Washington. It operates 3,240.8 miles of lines. The Northern Central connects Baltimore with the great Pennsylvania system. It owns 145 miles of railway and leases 227. The Baltimore and Potomac operates 97 miles, and the Philadelphia, Wilmington and Baltimore has a main line of 95 miles, and operates 534 in addition. The Western Maryland (275.7 miles) traverses the State in a westerly direction, and opens communication with Southern Pennsylvania. The Baltimore and Lehigh (84 miles) extends to York, Pa. The Eastern Shore is opened up by a number of local railways connecting with the peninsula stem of the Pennsylvania system. The Chesapeake and Ohio Canal extends from Georgetown, D. C., to Cumberland, Md., and the Chesapeake and Delaware gives direct water communication with Philadelphia. A great part of the transportation of the State is effected by lines of steamers and sailing vessels running between Baltimore and the towns and landings on the bay. About twenty regular lines of seagoing steamers ply between Baltimore and foreign ports, and there are a number of coastwise lines.

Churches.—The U. S. census of 1890 gives the following statistics of the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	186	183	157,429	$2,449,440
Methodist Episcopal	925	919	82,069	3,771,717
Protestant Episcopal	166	244	23,938	2,381,406
Lutheran, General Synod	96	96	17,288	843,050
Methodist Protestant	174	173	13,283	654,625
African Methodist Episcopal	58	93	12,359	266,370
Reformed Church in the U. S.	67	65	10,741	484,225
Methodist Episcopal South	142	141	10,604	361,990
Presb. Church in the U. S. of A.	77	94	10,593	1,488,124
Baptist Church South	47	48	8,017	651,050
Baptist, Colored	38	34	7,750	150,475
United Brethren	57	55	4,736	113,789
Germ. Evang. Synod of N. A.	12	12	4,405	223,500
Lutheran, Synodical Conference	14	12	3,208	129,975
Jews, Reformed	9	9	2,800	223,500
Lutheran, Independent Cong.	7	7	2,535	66,000
Brethren, Conservative	29	41	2,446	60,200

The large number of Roman Catholics is to a great extent due to the fact that the colony was founded by a Roman Catholic, and religious toleration proclaimed at a time when adherents of that faith were persecuted in England. The Archbishop of Baltimore is the primate of the Church in the U. S.

Schools.—Francis Nicholson, royal governor of the province 1694–98, was the father of the public-school system of Maryland. Under his influence the Assembly founded King William School at the capital, and provided revenue for its support. This school afterward became St. John's College, which still flourishes. Under the present law the public schools of each county are controlled by local school boards, and those of Baltimore by commissioners, one from each ward. The schools are supported by State and local taxation. In 1899 there were 2,503 public schools, with 5,127 teachers with an average monthly salary of $32.43; there were 229,332 pupils enrolled, and an average daily attendance of 132,685. The expenditure for schools was $2,912,527. Of other educational institutions, the most important are Johns Hopkins University (*q. v.*), endowed with about $3,500,000, opened in 1876; the University of Maryland (faculties of medicine and law), chartered in 1807; the Peabody Institute, endowed by George Peabody, of London, which has a conservatory of music, a great library, and art galleries; the Baltimore City College and Polytechnic Institute (both connected with the public-school system); St. John's College, Annapolis, and the Woman's College of Baltimore. There are also colleges of medicine, pharmacy, and dentistry, and theological seminaries in the city and State.

Charitable, Reformatory, and Penal Institutions.—The charitable associations and institutions are numerous, and minister to every form of indigence and distress. Of the hospitals, the finest is that endowed by Johns Hopkins. The prison system consists of a State penitentiary in Baltimore, jails in the several counties and in Baltimore, a house of correction for minor offenses, and six reformatories for juvenile delinquents. Besides the official supervision of these institutions, a private organization, the Prisoners' Aid Association, is recognized by law, and has powers of visitation. Its exertions are directed to the reformation of prisoners, relieving their families, if dependent, during their incarceration, and finding them employment when discharged. The average population of the three principal prisons is: Penitentiary, 652; city jail, 497; house of correction, 275: the aggregate average of the county jails, 249. The Negro population, though only a fifth of the whole, furnishes half the occupants of the prisons.

Political Organization.—The government of the State is vested in a Governor, Legislature, and judiciary. The Governor is elected by popular vote for four years, and appoints all State, civil, and military officers, with consent of the Senate. The Legislature consists of a Senate and House of Delegates. Each county of the State and each of the three legislative districts of Baltimore city (which is coextensive with Baltimore County) elects one Senator for a term of four years. The delegates are elected by the counties and city in proportion to population, the lowest representation being two and the highest six. Each district of Baltimore has six. The delegates serve for two years, and the Legislature meets biennially at Annapolis. By a law dating from early colonial times, no priest, clergyman, or minister is eligible to the Legislature. The judiciary consists of a court of appeals, circuit courts, orphans' courts, Baltimore city courts, and justices of the peace. All the judges, except those of the orphans' courts, are elected by popular vote for a term of fifteen years. Maryland is divided into six congressional districts, of which two are entirely and two partly within Baltimore city. The U. S. Senators are chosen by the Legislature, one being always taken from the Eastern and one from the Western Shore. In politics the Democratic party is predominant, having a majority not only in the State at large, but (1894) in each congressional district.

History.—The foundation of Maryland is primarily due to George Calvert, first Baron of Baltimore. He had already settled a colony in Newfoundland, but the rigor of the climate and sterility of the soil determined him to ask of King Charles I. a grant of territory N. of the Potomac, which had been within the jurisdiction of the Virginia Company before the abrogation of its charter, but no part of which had been granted to any settlers. Calvert's request was granted, but before his charter had passed the great seal he died, and it was made out (1632) in the name of his eldest son, Cecilius, who named the province Maryland in honor of the queen. The privileges conferred by this charter were unusual. The proprietary was invested with all royal rights over the soil and inhabitants, subject only to the nominal yearly rent of two Indian arrows. He appointed all officers, civil and military, made war and peace, and writs ran in his name. The colony was governed by its own laws, made by the freemen or their representatives, and confirmed by the proprietary, and was entirely independent of Parliament. The king renounced for himself and his successors all rights of taxation. Thus of all the colonies Maryland was the most independent and autonomous. As Cecilius Calvert was a Roman Catholic, it was his intention to make Maryland a refuge for those of his own creed, but not to found a distinctly Catholic colony. In the next year he sent out his first colonists, consisting of twenty gentlemen and about 200 workingmen and servants, in two vessels, the Ark and Dove, under the government of his brother Leonard, assisted by two councilors. In the instructions for their guidance Cecilius charged them to be strictly impartial between those of different faiths, and established religious toleration as the policy of the colony. On their arrival on Mar. 25, 1634, at an island at the mouth of the Potomac, the colonists celebrated divine service and planted a cross. They then bought from the Indians a tract of land on the Potomac, and laid out a town which they called St. Mary's. The missionaries who had accompanied them began their labors among the Indians, who were uniformly friendly, and readily embraced Christianity, their chief asking to be baptized and married according to the Christian rite, and bringing his little daughter to be educated at St. Mary's. The enemies of the new colonists were men of their own race. William Claiborne, a Virginian, had established (without any grant of land) a trading-post on Kent island in Chesapeake Bay; and though Calvert proffered friendship, he remained bitterly hostile to the new colony. A battle was fought on Pocomoke river between a vessel of Claiborne's and two belonging to Maryland, in which blood was shed and Claiborne's shallop surrendered. Claiborne soon after went to England, and the establishment on the island was taken possession of by his

principals, a firm of London merchants. The residents on the island acknowledged Maryland's jurisdiction and received titles to the land they were occupying. The civil troubles in England produced some disturbance in Maryland. In 1644 Richard Ingle, professing to have letters of marque from the Parliament, seized St. Mary's with an armed force which plundered the province and kept it in a state of anarchy for about two years, when it was recovered without bloodshed by Gov. Calvert.

In 1648 the proprietary sent out a new great seal, consisting of an escutcheon with the bearings of the Calvert and Crossland families, surmounted by a coronet symbolic of his palatinate authority, with a farmer and fisherman as supporters. This device is still the great seal of Maryland; the escutcheon is placed on the State flag, and the Calvert colors, gold and black, are the colors of the State.

In 1649 the Toleration Act, as it was called, was passed, which formulated in a statute what had been the uniform policy of the province. It forbade the molestation or discountenancing of any believer in Christ on account of his religion, or in its free exercise. A number of Puritans, persecuted for their faith in Virginia, in 1643 had asked and received an asylum in Maryland, and had settled about the site of the present city of Annapolis, where they rapidly increased in numbers. These new settlers were strongly in sympathy with the Parliamentary party in England. Calvert's desire was to keep Maryland from being embroiled in the troubles of the civil war, but Parliament sent out commissioners under whose authority Gov. Stone was deposed, and Maryland placed under control of William Fuller, one of the Puritan immigrants. The Toleration Act was at once rescinded. Stone attempted to regain his authority by arms, and in a battle fought at the Severn, in 1655, was defeated; but the Protector, Cromwell, whose decision was invoked, referred the matter to commissioners, who restored Baltimore to his authority. Maryland had now no serious trouble until 1690, when a party headed by one Coode, an apostate clergyman, by false reports of an intended massacre of the Protestants by the Roman Catholics, succeeded in terrifying the people to such an extent that he and a small body of armed adherents were able to seize the government. This accomplished, they petitioned King William to take the government into his own hands, which he did, sending out a royal governor, though the charter was not abrogated; and the province remained under royal government until 1716, when it was restored to Charles Calvert, fifth Lord Baltimore, a Protestant.

Little of moment occurred in Maryland until the French and Indian war of 1754, in which Maryland took an active part, and her western counties suffered severely. The resistance to the stamp-tax (1765) was very fierce in the province, and that to the tea-duty still fiercer. A firm of Annapolis merchants having ventured to import a quantity of tea in 1774, public indignation rose so high that the owner of the brig—the Peggy Stewart—to avoid worse consequences, set fire to his vessel with his own hand, and burned it with its obnoxious cargo. The province entered with zeal into the measures of resistance to England, and declared its independence on July 3, 1776, but did not enter the Confederation until 1781, though it took an active part in the Revolution, and its troops did gallant service in both the northern and southern campaigns. The State government was inaugurated Mar. 21, 1777, with Thomas Johnson as first elected Governor.

In the war of 1812 Baltimore privateers did so much damage to British commerce that it was resolved to make an example of the city, and a formidable force was sent to attack it by land and water. The approach to the city was defended by Fort McHenry at the mouth of the harbor, and by several hastily constructed batteries and earthworks. The British land forces, under Gen. Ross, disembarked at North Point, at the mouth of the Patapsco, and on the march were met by a force of Baltimoreans, and a skirmish ensued (Sept. 12, 1814) in which Ross was killed. The fleet bombarded Fort McHenry for a day and night without success, and an attempt to land troops from boats having been repulsed with severe loss, the combined attack came to nothing. It was on the occasion of this bombardment that Francis Scott Key, a Marylander detained on the British admiral's ship, composed the patriotic song—*The Star-spangled Banner*. After the peace the history of the State was an unbroken record of peaceful prosperity until the outbreak of the war between the States in 1861, when a Massachusetts regiment on its way to Washington was pelted with stones by a mob (Apr. 19), and fired on the people, with loss of life on both sides. The only considerable battle of that war fought on Maryland soil was that of Sharpsburg, Sept. 16 and 17, 1862. With the restoration of peace the State again entered upon a career of prosperity and substantial development.

LORDS PROPRIETARY AND GOVERNORS OF MARYLAND.

Lords Proprietary.

Cecilius Calvert, second Lord Baltimore	1632–75
Charles Calvert, third Lord Baltimore	1675–1715
Benedict Leonard Calvert, fourth Lord Baltimore	1715
Charles Calvert, fifth Lord Baltimore	1715–51
Frederick Calvert, sixth Lord Baltimore	1751–71
Sir H. Harford, last proprietary	1771–76

Governors appointed by the Lords Proprietary.

Leonard Calvert	1633–47
Thomas Greene	1647–49
William Stone	1649–54
Commis. under Parl.	1654–58
Josiah Fendall	1658–61
Philip Calvert	1661–62
Charles Calvert	1662–67
Charles, third Lord Balt.	1667–78
Thomas Notley	1678–81
Charles, third Lord Balt.	1681–85
Wm. Joseph, president of Deputies	1685–89
Conven. of Prot. Asso.	1689–92

Royal Governors.

Sir Lionel Copley	1692–93
Sir Edmond Andros	1693–94
Francis Nicholson	1694–99
Nath. Blackistone	1699–1703
Thomas Tench, pres.	1703–04
John Seymour	1704–09
Edward Lloyd, pres.	1709–14
John Hart	1714–15

Proprietary Governors.

John Hart	1715–20
Charles Calvert	1720–27
Benedict Leonard Calvert	1727–32
Samuel Ogle	1732–33
Charles, fifth Lord Balt.	1733–35
Samuel Ogle	1735–42
Thomas Bladen	1742–47
Samuel Ogle	1747–52
Benjamin Tasker, pres.	1752–53
Horatio Sharpe	1753–69
Robert Eden	1769–74

The Revolution.

The Convention and Council of Safety	1774–76

State Government (1777–1838), Annual Elections.

Thomas Johnson	1777–79
Thomas Sim Lee	1779–82
William Paca	1782–85
William Smallwood	1785–88
John Eager Howard	1788–91
George Plater	1791–92
Thomas Sim Lee	1792–94
John H. Stone	1794–97
John Henry	1797–98
Benjamin Ogle	1798–1801
John Francis Mercer.	1801–03
Robert Bowie	1803–06
Robert Wright	1806–09
Edward Lloyd	1809–11
Robert Bowie	1811–12
Levin Winder	1812–15
C. Ridgely of Hampton	1815–18
Charles Goldsborough	1818–19
Samuel Sprigg	1819–22
Samuel Stevens, Jr.	1822–25
Joseph Kent	1825–28
Daniel Martin	1828–29
Thomas King Carroll	1829–30
Daniel Martin	1830–31
George Howard (acting)	1831–32
George Howard	1832–33
James Thomas	1833–35
Thomas W. Veazey	1835–38

Const. of 1838, Three-year Terms.

William Grayson	1838–41
Francis Thomas	1841–44
Thomas G. Pratt	1844–47
Philip F. Thomas	1847–50
Enoch Lewis Lowe	1850–53

Const. of 1851, Four-year Terms.

Thomas Watkins Ligon	1853–57
Thos. Holliday Hicks	1857–61
Augustus W. Bradford	1861–65

Const. of 1864, Four-year Terms.

Thomas Swann	1865–69

Const. of 1867, Four-year Terms.

Oden Bowie	1869–72
Wm. Pinckney White	1872–75
J. B. Groome	Mar. 1875–Jan. 1876
John Lee Carroll	1876–80
Wm. T. Hamilton	1880–84
Robert M. McLane	1884–85
Henry Lloyd	1885–88
Elihu E. Jackson	1888–92
Frank Brown,	1892–96
Lloyd Lowndes	1896–1900
J. Walter Smith	1900–

AUTHORITIES.—The most accurate and compendious authority on Maryland is *Maryland: its Resources, Industries, and Institutions*, edited by members of Johns Hopkins University, and published by the State in 1893.

WILLIAM HAND BROWNE.

Mary Stuart: Queen of Scots, daughter of James V. by Mary of Guise, and great-granddaughter of King Henry VII. of England through his daughter, Margaret Tudor; b. at Linlithgow, Scotland, Dec. 8, 1542. Her father died a few days after her birth, and on Sept. 9, 1543, she was crowned Queen of Scotland, the Earl of Arran, and afterward her mother, conducting the Government. In 1548 she was affianced to Francis, Dauphin of France, son of Henry II. and Catharine de' Medici, and in the same year she was brought to France to be educated at the French court. Buchanan and Ronsard were among her teachers, and when she grew up she added to a striking and fascinating personal beauty all the accomplishments and charms which a perfect education can give. Her marriage with the dauphin was celebrated Apr. 24, 1558, in the Church of Notre Dame, and when Mary I. of England died in the same year (Nov. 17) she had her arms quartered with those of England, and threatened to rouse the Catholics against Elizabeth's title. On July 10, 1559, Henry II. died, and was succeeded by Francis II. Mary thus became Queen of France, but Francis died Dec. 5, 1560; she was childless, and had little power at court, where the influence of Catharine de' Medici was now paramount. In the same year her mother died, and she then re-

turned to Scotland, landing at Leith in Aug., 1561. Brought up a Roman Catholic and used to the gay life of the French court, she found the dominant Protestantism and austere manners of her subjects almost intolerable. It was only under protest that she was allowed to hear mass in her own chapel, and she was repeatedly lectured by Knox for her levity and worldliness. Nevertheless, the first period of her reign was fairly successful. She followed the advice of James, her half-brother, whom she created Earl of Murray, and strove to conciliate the Protestants. The latter, however, were soon estranged by her unfortunate marriage (July 29, 1565) with her cousin Henry Stuart, Lord Darnley, a Catholic, and next to herself in the hereditary line of succession to the English throne. Murray and his party among the nobility were opposed to this marriage, and revolted; but, although she succeeded in suppressing the revolution, she came to despise her profligate and treacherous husband, whose jealousy and ambition soon showed themselves in an act of violence. On Mar. 9, 1566, he burst with Ruthven, Morton, and others into her chamber, dragged Rizzio, an Italian adventurer who had become her councilor after the breach with Murray, out into the corridor, and stabbed him. The horror of this night Mary never forgot or forgave. She detached Darnley from the other conspirators, fled with him to Dunbar, became reconciled with Murray, entered into an intimate alliance with the Earl of Bothwell, and thus strengthened began to persecute the murderers of Rizzio without mercy. On Feb. 9, 1567, the house in which Darnley lay sick was blown up by gunpowder, and his body was found at a distance. Bothwell's connection with this murder was apparent; his trial was a mere mockery; and when Mary married him, three months after the death of her husband (May 15), a general rising took place. In the battle of Carberry Hill (June 15) Bothwell was defeated and fled, and Mary was confined in Lochleven Castle and compelled to abdicate. She escaped, however, from Lochleven May 2, 1568, and rallied a new force, but was defeated at Langside, May 13, and fled to England. Here she was immediately imprisoned—first at Carlisle, afterward in various other places, and at last in Fotheringay Castle. After eighteen years' imprisonment, during which she was the center of Catholic plots, she was tried on a charge of complicity in the conspiracy of Antony Babington against the life of Elizabeth, and on Oct. 25, 1586, a sentence of death was pronounced against her. On Feb. 1, 1587, Elizabeth signed the warrant of execution, and on Feb. 8 Mary Queen of Scots was beheaded, persisting to the last in her innocence of Babington's plot. She was buried at Peterborough, whence in 1612 her body was removed to Henry VII.'s chapel at Westminster. That her life was not one of unmingled innocence and virtue is abundantly evident, but the exact measure of her guilt or the exact degree of her complicity in the crimes committed for her sake and in her name has not been made out. And still more obscure and entangled seem those ideas and passions from which such guilt sprung. There are two brilliant dramatical delineations of her character by Schiller and by Björnstjerne Björnson, and among the numerous prose works relating to her history the most interesting is perhaps Labanoff de Rostov's *Lettres, Instructions et Mémoires de Marie Stuart* (7 vols., 1844). See also Philippson's *Histoire du Règne de Marie Stuart* (1891–92); Skelton's *Life of Mary Stuart* (1893); and the works of Hosack, Strickland, Robertson, Hume, Burton, Laing, Tytler, Froude, etc.

Revised by F. M. Colby.

Marysville: city (incorporated in 1851); capital of Yuba co., Cal. (for location of county, see map of California, ref. 5–C); at the junction of the Yuba and Feather rivers, and on the S. Pac. and the N. Cal. railways; 52 miles N. of Sacramento. It is in an agricultural and mining region. Contains 6 churches, graded public schools, the College of Notre Dame (Roman Catholic), high school, a State bank with capital of $150,000, an incorporated bank with capital of $250,000, a savings-bank with capital of $40,000, and 2 daily and 2 weekly newspapers; and has flour and woolen mills, foundry and machine-shop, carriage-factory, winery, and 2 large fruit-canneries. Pop. (1880) 4,321; (1890) 3,991; (1900) 3,497.

Editor of "Appeal."

Marysville: city; capital of Marshall co., Kan. (for location of county, see map of Kansas, ref. 4–H); on the Big Blue river, and the St. Jos. and Grand Is. Railroad; 112 miles W. of St. Joseph, Mo. It contains 8 churches, 4 public schools, water-works, electric-light plant, a national bank with capital of $75,000, a State bank with capital of $75,000, and 4 weekly newspapers. The principal manufactures are flour and cigars. Good water-power is obtained from the river by means of a stone dam. Pop. (1880) 1,249; (1890) 1,913; (1900) 2,006.

Editor of "Democrat."

Marysville: city; capital of Union co., O. (for location of county, see map of Ohio, ref. 4–E); on Mill creek, and the Cleve., Cin., Chi. and St. L. and the Tol. and O. Cent. railways; 30 miles N. W. of Columbus, the State capital. It is in an agricultural region, and has 3 State banks with combined capital of $126,000, a private bank, an Odd Fellows' library (founded in 1877), and 2 weekly newspapers. Pop. (1880) 2,061; (1890) 2,810; (1900) 3,048.

Maryville: city; capital of Nodaway co., Mo. (for location of county, see map of Missouri, ref. 1–D); on the Chi., Burl. and Quincy and the Om. and St. L. railways; 45 miles N. of St. Joseph. It is in a farming and stock-raising region, and has 2 national banks with combined capital of $150,000, a private bank, and a daily and 4 weekly newspapers. Pop. (1880) 3,485; (1890) 4,037; (1900) 4,577.

Maryville: village; capital of Blount co., Tenn. (for location of county, see map of Tennessee, ref. 6–I); on the Knox. and Augusta Railroad; 16 miles S. of Knoxville. It is in an agricultural region; is the seat of Maryville College (Presbyterian, opened in 1819), which in 1900 had 16 instructors, 380 students, 12,000 volumes in its libraries, and $5,000 invested in scientific apparatus, $99,420 in grounds and buildings, and $198,000 in productive funds; and has manufactories of flour, woolen goods, and sash, doors, and blinds. Pop. (1880) 1,098; (1890) 1,686; not returned separately in 1900.

Marzials, Théophile: poet; b. of French parentage in Brussels in 1850. He was educated in Belgium, Switzerland, and England, and has been employed in the British Museum since 1870. His *Gallery of Pigeons and Other Poems* (1873) gave him a high place among the æsthetic or pre-Raphaelite school of poets, who were, in general, followers of Rossetti.

H. A. Beers.

Masaccio, maă-saat'chō (true name, Tommaso Guidi; nicknamed *Tommasaccio*, Hulking Tom, shortened to Masaccio): painter; b. in Florence in 1402. At the age of nineteen he was enrolled in the guild of the apothecaries, but at twenty-two he was registered in the guild of painters. He is supposed to have worked under Masolino, who encouraged a frank study of the nude and a direct recognition of nature in the details of his figures. The greatest work of Masaccio now remaining is the decoration in fresco of the Brancacci chapel in the Carmine at Florence. Its importance in the history of art may be judged by the fact that at one and the same time Michaelangelo, Raphael, and Leonardo da Vinci were engaged in studying these frescoes; and they have served as models to artists of succeeding generations. The only other probable work of Masaccio's, and the earliest, is in a chapel of San Clemente at Rome; it is a series of frescoes relating to the history of St. Catherine of Alexandria. On account of the naturalistic treatment of the subjects this chapel was attributed to Masolino; indeed, so little is known of the life of these two painters that their work is frequently confounded. D. in Rome in 1428 or 1429.

W. J. Stillman.

Mas-á-fuera: See Juan Fernandez.

Masal'skiĭ, Konstantin Petrovich: author; b. in Yaroslav, Russia, in the year 1802; studied at the University of St. Petersburg, and was in the Government service until 1842. In 1824 he first began to send short poems to the newspapers. In 1829 he published a novel in verse, *Terpi Kazak*, etc. (Have patience, Cossack, you will be Hetman), which was a great success. He is chiefly remembered, however, as a writer of historical novels, among the best known of which are *The Streltsi*, *The Black Trunk*, *The Regency of Biron*, *The Siege of Uglich*, *The Russian Icarus*, and *The First Love of the Last of a Race*. In 1838 he published a translation of *Don Quixote*. An edition of the works he had then written was brought out in 1843–45 (St. Petersburg, 5 vols.). D. in 1861.

A. C. Coolidge.

Masaniel'lo [Ital., clipped from full name, Tommaso Aniello. Cf. Masaccio]: revolutionist; b. at Amalfi, Italy, in 1623. He was a fisherman of Sorrento, and in 1647 excited a popular insurrection in Naples against the Duke of Arcos, the Spanish viceroy. Some state that the immediate cause of the tumult was the imposition of a new and oppressive tax; others, an attempt to establish the Inquisition as a means of extirpating the Reformed religion, then in

great favor in this city. It is certain that the previous forty years of Spanish misrule had exasperated all classes. Masaniello, stung to fury by indignities offered his wife for attempting to smuggle a few handfuls of flour, at the moment when the authorities were fixing on the doors of the duomo the detested inquisitorial brief tore it down amid the applause of the bystanders, and soon after raised the cry, *Morte al mal governo!* In an instant the whole population, even to the women and children, were in arms; the Spanish authorities were maltreated, the soldiers successfully resisted, and after great loss of life among the Spaniards the insurgents obtained from the terrified viceroy the revocation of the order for the Inquisition, the abolition of many cruel taxes, and a full pardon for all who had taken part in the rebellion. Whether Masaniello was really frenzied by his great success, or whether his enemies were crafty enough to magnify his excesses into insane crimes, it is now difficult to say; at any rate, the populace itself rose against him soon after his triumph, and he was assassinated on July 16, 1647.

Masaya, mă̆a-sī'yă̆a: a city of Nicaragua; 9 miles W. of Granada; at the foot of the volcano of Masaya or Popogatepec (see map of Central America, ref. 6–H). Pop. about 14,000, nearly all of Indian race. The situation is very picturesque, and the soil of the vicinity, composed of volcanic ash, is extremely fertile, being especially good for tobacco, which forms the prineipal product. The inhabitants are noted for their industry, exporting hammocks, cordage, straw hats, and other articles of native workmanship. Water is obtained from a erater lake at some distance from the town. Eruptions of the volcano occurred in 1670, 1782, and 1857. Masaya was attacked and burned by Walker in Nov., 1856. HERBERT H. SMITH.

Mascagni, mă̆as-kaan'yĕĕ, PIETRO: composer; b. in Leghorn, Italy, in 1863; the son of a basket-maker; studied music at home, and had composed two cantatas by the time he was seventeen; then went to the Conservatory at Milan and studied under Ponchielli, at the expense of Count Florestano de Landarel. He became leader of a traveling opera company, and wrote his first opera in 1883, but it is unpublished, and he declines to allow it to be performed. In May, 1890, his opera *Cavalleria Rusticana* appeared, and at once became famous. It was composed for a competition instituted by a firm of music publishers. Since then he has composed *Amico Fritz* and *I Rantzau*. D. E. HERVEY.

Mascalonge, Muskellunge, or **Muskinunge** [from Amer.-Indian name]: the largest, finest, and best-flavored fish of the pike family, *Esox* or *Lucius maskinongy*, especially abundant in the St. Lawrence basin, but frequently found in the basin of the Ohio and the upper Mississippi; reaches a length of 4 to 6 feet and a weight of 60 lb. or more. It is an extremely bold and vigorous biter, and is caught by the hook or the net. It is an excellent food-fish. It is distinguished from the true pike by the presence of dark spots or the absence of pale ones, and by the want of scales on the lower half of the cheek. See PIKE. Revised by D. S. JORDAN.

Mascara, mă̆as-kă̆a-raa': town; in the province of Oran, Algeria. It occupies the site of an old Roman colony on the slope of the Atlas Mountains, among fertile and well-cultivated surroundings. Pop. (1886) 15,453.

Mascarene, Isles: the collective name comprising the islands of Bourbon, Rodrigues, and Mauritius, situated in the Indian Ocean. The name is derived from Garcia Mascarentas, a Portuguese navigator who discovered the islands in 1505. Mauritius and Rodrigues belong to Great Britain; Bourbon belongs to France.

Mascart, mă̆as'kaar', ÉLEUTHÈRE ÉLIE NICOLAS: physicist; b. at Quarouble, France, Feb. 20, 1837. Mascart was educated at the College of Valenciennes and at the École Normale Supérieure. He was assistant successively at the lyceums of Lille and Douai and at the Éeole Normale; was professor in the lyceums of Metz and Versailles and in the Collège de France. In the last-named institution he succeeded to the chair of Physics so long filled by Regnault. Mascart has published many important papers, and he is the author of three great treatises, all of which are universally accorded a place in the first rank. These are his *Traité d'électricité statique* (2 vols., 1876); *Leçons sur l'électricité et le magnétisme* (2 vols., 1882), in collaboration with Prof. Joubert; and his *Traité d'Optique* (3 vols.), the last volume of which appeared in 1893. Aside from his collegiate work, Prof. Mascart has performed many scientific and technical labors for the French Government. During the Franco-German war he superintended the manufacture of cartridges and chassepots. Since 1878 he has been the director of the weather bureau. He took an important part in the Paris exhibitions in 1881 and 1889, and was a member of the electrical congresses held in Paris in those years, over the latter of which he presided. He was also present at the congress held in Chicago in 1893. He is a member of the French Academy (since 1884), commander of the Legion of Honor (1889), and is member or correspondent of many learned societies. E. L. NICHOLS.

Mascoutah: city; St. Clair co., Ill. (for location of county, see map of Illinois, ref. 9–D); on the Louis. and Nash. Railroad; 11 miles E. by S. of Belleville, 25 miles E. S. E. of St. Louis. It is in an agricultural region, has valuable coal mines in its vicinity, and contains steam flour-mills and two weekly newspapers. Pop. (1890) 2,032; (1900) 2,171.

Maseres, FRANCIS: See MAZERES.

Mashon'aland: a plateau region N. E. of Matabeleland, South Africa, to whose ruler it was subject when it was acquired from him (1890) by the British South Africa Company. A pioneer expedition was sent to take possession of the land, which was believed to abound in gold reefs. Careful investigation proved that the region was rich in gold and other valuable minerals; that its agricultural resources were worth developing; and that the undulating plateau is so high above the sea that white colonists may live there in comfort. Towns were soon founded along the wagon road built through the country from S. to N. The most important settlements are Fort Salisbury, Hartley Hill, Victoria, Umtali, and Fort Charter. A telegraph connects the principal centers with Cape Town, and a railway is building (1897) from Beira, on the Indian Ocean, to the northeastern part of the colony. Expensive machinery is required for mining, and no placer-gold finds have been discovered. Over 400 miles of gold-bearing formations have been located, and the region has been proved to be among the richest of the South African gold-fields. Salisbury, the chief town, has a bank, churches, hospitals, hotels, a newspaper, and many substantial brick structures. Many of the colonists, numbering (1894) about 3,000, engage in agriculture. All the small grains, most vegetables, and cattle-raising thrive. The native Mashonas, scattered throughout the country, are greatly depleted in numbers, having long been the victims of Matabele raids. The refusal of the white colonists to permit the continuance of these raids precipitated a war (1893) in which the Matabeles were defeated, and their country, also rich in gold, is opening to white settlement. In Mashonaland are found a considerable number of ancient stone structures and walls, large and solidly built, whose origin is not yet known. See Selous, *Travel and Adventure in Southeastern Africa*; Keltie, *The Partition of Africa*; Greswell, *Geography of Africa South of the Zambesi*; and Bent, *The Ruined Cities of Mashonaland.* C. C. ADAMS.

Masinis'sa, or **Massinissa**: King of the Massylians, one of the most powerful Numidian tribes; b. about 240 B. C.; a son of Gala. Hasdrubal having promised to give him his daughter Sophonisba in marriage, he attacked the Massæsylians, also a powerful Numidian tribe, which in the struggle between Rome and Carthage sided with Rome; defeated their king, Syphax, in 213; crossed over to Spain and fought with success against Cneius and Publius Scipio; but when Hasdrubal broke his promise and gave his daughter to Syphax in order to win him over from the Romans, Masinissa attacked Carthage. In the beginning he was unsuccessful, but when (in 204) Scipio landed in Africa, Masinissa entered into a firm alliance with him, routed the Massæsylians, fought with great distinction in the battle of Zama, and received by the peace of 201 the territories of Syphax. Sophonisba, who in the course of the war had become his prisoner, he now married, but Scipio, fearing her influence on her husband, demanded her as a Roman captive, and Masinissa, not venturing to refuse, sent her a cup of poison, which she drank. Steadily extending his dominions at the expense of Carthage, he occasioned the third Punic war, but died before its close 148 B. C. Numidia was then divided between his three sons, of whom the youngest, Mastanabal, was the father of Jugurtha.

Mask: See MASQUES.

Maskat: maritime city of Southeastern Arabia. See MUSCAT.

Maskegons: See ALGONQUIAN INDIANS.

Maskell, William: theological writer; b. at Bath, England, in 1814; was educated at University College, Oxford; took orders in 1837, and was instituted to the rectory of Carscombe, Dorset, in 1842. In 1846 he resigned that position, and in the following year he was appointed chaplain to the Bishop of Exeter and instituted to the vicarage of St. Mary's church, Devon. When the Gorham case, in which Mr. Maskell took an active and prominent part, was decided by the judicial committee of the privy council, early in 1853, he resigned all his preferments and was received into the Roman Catholic Church, but never took orders therein. His chief literary works were *The Ancient Liturgy of the Church of England* (London, 1844; 3d ed. 1882); *A History of the Martin Marprelate Controversy* (1845); *Monumenta Ritualia Ecclesiæ Anglicanæ* (1846–47, 3 vols.; 2d ed. Oxford, 1882); *A Dissertation on Holy Baptism* (London, 1848); *An Inquiry into the Doctrine of the Church of England upon Absolution* (1849); *Letters on the Position of the High Church Party in the Church of England* (1850), etc. After his conversion to Romanism he published *Odds and Ends* (1872); *A Dissertation on Ancient and Mediæval Ivories* (1875); and *What is the Meaning of the Infallibility of the Pope?* (1871). D. at Penzance, Apr. 12, 1890.

Mas'kelyne, Nevil, D. D.: b. in London, England, Oct. 6, 1732; graduated at Cambridge 1754; took orders in the Church of England; became a fellow of the Royal Society in 1758; was sent to St. Helena in 1761 to observe the transit of Venus, and to Barbados in 1762 to experiment with and report upon Harrison's chronometers; succeeded Nathaniel Bliss as astronomer-royal 1765, which post he retained through life, never absenting himself from the Greenwich Observatory except once in 1772, when he went to Scotland to experiment upon the aberrations of the plumb-line as fixing the mean density of the earth. He is the author of the method of determining longitudes by lunar distances. He published *The British Mariner's Guide* (1763); the *Nautical Almanac and Astronomical Ephemeris* (46 vols., annual, 1767–1811); *Astronomical Observations made at Greenwich from 1765 to 1810* (4 vols.); and several papers in the *Philosophical Transactions*. D. at Greenwich, Feb. 9, 1811. Revised by S. Newcomb.

Masolino da Panicale: See Panicale.

Mason: city (settled in 1835, incorporated in 1875); capital of Ingham co., Mich. (for location of county, see map of Michigan, ref. 7–J); on the Mich. Cent. Railroad; 12 miles S. of Lansing, 25 miles N. of Jackson. It is in an agricultural and dairy region, and has water-works, electric lights, 2 State banks with combined capital of $125,000, 2 weekly newspapers, and considerable mercantile and manufacturing interests. Pop. (1880) 1,809; (1890) 1,875; (1900) 1,828. Editor of "Ingham County News."

Mason, Charles, F. R. S.: b. in England about 1730; was assistant for several years at Greenwich Observatory to the celebrated astronomer-royal, Dr. James Bradley, and afterward to his successors, Dr. Nathaniel Bliss and Dr. Nevil Maskelyne; and with Mr. Jeremiah Dixon was sent to the Cape of Good Hope to observe the transit of Venus of June 6, 1761, while Dr. Maskelyne proceeded with them to St. Helena for the same purpose. In 1763 Messrs. Mason and Dixon were commissioned by the proprietors of Pennsylvania and Maryland to survey the boundary-line between their American possessions; arrived at Philadelphia Nov. 13, and were engaged upon this task until Dec. 26, 1767. (See Mason and Dixon's Line.) Messrs. Mason and Dixon embarked at New York for Falmouth Sept. 9, 1768. Dixon died at Durham, England, in 1777. Mason observed the transit of Venus of June 3, 1769, at Cavan, Ireland, and published his observations in the *Philosophical Transactions* for 1770; was employed by the bureau of longitudes to verify the celebrated *Lunar Tables* of Tobias Mayar, in which he made some changes and corrections, and they were published after his death by Dr. Maskelyne under the title *Mayer's Lunar Tables, improved by Charles Mason* (London, 1787). Mason returned to America, but at what date is unknown, and died at Philadelphia in Feb., 1787. His MS. journal and field-notes, from which the preceding account is chiefly drawn, was found at Halifax, Nova Scotia, in 1860, among a pile of waste paper flung into the cellar of the Government-house, whence it was rescued by a gentleman of that city. Revised by S. Newcomb.

Mason, Francis, D. D.: b. at York, England, Apr. 2, 1799; removed to the U. S. in 1818; worked as a shoemaker in several towns of Massachusetts; became connected with the Baptist Church at Canton, Mass., about 1825; married there; studied ancient languages under the guidance of his minister; entered Newton Theological Seminary in 1827, and was sent in 1830 as a missionary to Burma. He devoted himself chiefly to the Karens, among which tribe he had wonderful success, and with the aid of other missionaries made many thousands of converts among that wild but simple-hearted tribe. He translated the Bible into two Karen dialects, as well as numerous other religious books; educated many native preachers; prepared a work on the natural productions of Burma (1852), which contained a very valuable addition to the then existing scientific data on the subject; published a grammar, chrestomathy, and vocabulary of the Pali language; a *Life of Ko-Thah-Byu, the Karen Apostle*; a memoir of his wife, Mrs. Helen M. Mason (1847); a *Memoir of San Quala*, another Karen convert (1850); *Burma, its People and Natural Productions* (1860), being a revised edition of his earlier work on the same subject; and an autobiography, *The Story of a Workingman's Life, with Sketches of Travel* (1870). D. at Rangoon, Burma, Mar. 3, 1874.

Mason, George: a patriot of the American Revolution; b. at Doeg's Neck, Stafford (now Fairfax) co., Va., in 1725; settled after his marriage in Truro parish (which includes Mt. Vernon), built Gunston Hall on the banks of the Potomac, and became the intimate friend of Washington, his neighbor and fellow parishioner at Pohick church. Possessing considerable historical knowledge and legal attainments, as well as liberal sentiments, fine powers of reasoning, and a sound judgment, Mason was a valuable adviser to the future leader of the Revolution, for whom he drafted the "non-importation resolutions" which the latter presented to the Virginia Assembly, and procured their adoption 1769. One of these resolutions pledged the Virginia planters to purchase no slaves imported after Nov. 1 of that year. In support of the political rights of the "Old Dominion," Mason printed a pamphlet entitled *Extracts from the Virginia Charters, with Some Remarks upon them*, and at a meeting of the people of Fairfax, July 18, 1774, he presented a series of twenty-four resolutions on the questions at issue between Great Britain and the colonies, which were sanctioned by the Virginia convention in August, and substantially reaffirmed by the Continental Congress in October of the same year. In 1775 he was a member of the Virginia convention, declined an election to the Continental Congress, which was pressed upon him, nominated Francis Lightfoot Lee in his place, and reluctantly consented to serve as a member of the committee of safety. In May, 1776, he drafted the celebrated "Declaration of Rights" and the "Plan of Government," which were adopted June 12 and 29. In the revision of the statutes of Virginia his liberal sentiments were conspicuous, and his talents in debate elicited universal admiration. He was a member of the Continental Congress 1777, and of the convention for framing the Federal Constitution 1787. In the latter body Mason took a conspicuous part, proposing that the election for President should be direct, and for a single term of seven years, opposing the postponement of the repeal of the slave-trade, the counting of slaves as a basis for representation, and the establishment of a property basis for suffrage. Despite his efforts, several features which he considered dangerous were incorporated in the Constitution, which he consequently refused to sign; and having been elected to the Virginia convention to consider that instrument, he united with Patrick Henry in demanding its rejection unless some twenty amendments should be made. Several of these were subsequently adopted by the States and incorporated into the Constitution. He was chosen one of the first Senators from Virginia, but declined the post, and spent the remainder of his life in retirement, occupied in hunting, fishing, and congenial studies. D. at Gunston Hall, Oct. 7, 1792. His statue is one of the group which surrounds that of Washington in front of the State Capitol at Richmond, Va. See his *Life*, by Kate Mason Rowland (2 vols., New York, 1892).

Revised by C. K. Adams.

Mason, James Murray: Senator; grandson of George Mason; b. at Analosta island, Fairfax co., Va., Nov. 3, 1798; graduated at the University of Pennsylvania in 1818; studied law at William and Mary College; began practice in 1820; was prominent in the State Legislature; a member of Congress 1837–39; U. S. Senator 1846–61, and was the author of the Fugitive Slave law; entered in 1861

the Confederate Congress, and was sent with John Slidell as a commissioner to England and France; was taken off the British steamer Trent by Capt. Wilkes Nov. 8, 1861, and confined in Fort Warren, near Boston, Mass.; released on the demand of the British Government Jan. 2, 1862, and proceeded on his mission to Europe. D. near Alexandria, Va., Apr. 28, 1871.

Mason, Capt. JOHN: founder of the colony of New Hampshire; b. at Lynn Regis, Norfolk, England; served in 1610 in the navy against an insurrection in the Hebrides; went in 1616 as governor to Newfoundland, of which he published a description (Edinburgh, 1620) and a map (London, 1626); explored in 1617 the New England coasts; obtained in 1622 a grant of a region called Mariana, now the northeastern part of Massachusetts; procured in 1622, with Sir Ferdinando Gorges, a patent for the province of Maine; sent in 1623 a colony to the Piscataqua river. Mason was, 1624–29, treasurer and paymaster of the royal armies in the Spanish war. In 1629 he took a patent for the New Hampshire colony, and with Gorges took another patent for Laconia, a tract including Lake Champlain. Capt. Mason held various important positions in England. In 1635 he was a judge in Hampshire, and was appointed vice-admiral of New England. D. in London in Dec., 1635, and was buried in Westminster Abbey. Mason's rights in New Hampshire were sold to Gov. Samuel Allen in 1691, and proved a fruitful source of litigation to that gentleman and his heirs.—JOHN TUFTON MASON, one of John Mason's heirs, in 1746 sold his own rights to a Portsmouth company called the Masonian proprietors.

Mason, JOHN: soldier; b. in England about 1600; served in the Netherlands under Sir Thomas Fairfax; was one of the first settlers of Dorchester, Mass., 1630, and one of the founders of Windsor, Conn., 1635; was commissioned in 1637 to command an expedition against the Pequot Indians, who had massacred several settlers at Wethersfield, and with a party of 90 English, 70 friendly Mohegans under Uncas, and several hundred Narragansett warriors under Miantonomoh, he surprised one of the Pequot forts on Mystic river, between Groton and Stonington, before daybreak May 26, 1637, and destroyed more than 500 Indians, either by the sword or by the burning of the fort, his own loss being two killed and twenty wounded. Soon afterward he killed or captured most of the remaining members of the tribe in another expedition in Western Connecticut. Mason was appointed major of the Connecticut forces, retaining that office through life; settled first at Saybrook, and in 1659 at Norwich; was for many years a magistrate, and was deputy-governor 1660–70. At the request of the general court he published an account of the Pequot war, reprinted by Increase Mather in his *Relation of Trouble by the Indians* (1677), and by Prince (Boston, 1736). D. at Norwich in 1672. See his *Life*, by George E. Ellis, in Sparks's *Am. Biog.*, 2d series, vol. iii.

Mason, JOHN MITCHELL, D. D. (always called John M. Mason): pulpit orator; b. in New York city, Mar. 19, 1770; graduated at Columbia College 1789; studied theology under his father, Rev. John Mason, D. D., and later in the University of Edinburgh (1791–92). In 1793 he succeeded his father as pastor of the Cedar Street Associate Reformed church in New York city; in 1805 he established a theological seminary, which he taught himself; in 1806 he started *The Christian Magazine*, to which he was the chief contributor; in 1810 he resigned his charge and formed a new congregation, whose building, in Murray Street, was completed in 1812. In 1811 he became provost (i. e. really head) of Columbia College. In 1816 he broke down under these accumulated labors and traveled abroad for a year. In 1819 he had two paralytic strokes; in 1821 he resigned his charge. From 1821–24 he was president of Dickinson College, Carlisle, Pa. In 1822 he transferred his church relations to the Presbyterian Church. He returned to New York in 1824, and lingered, a mental wreck, until Dec. 26, 1829. He ranks by common consent among the greatest pulpit orators of the U. S., and his repute is the same in Great Britain. Two of his discourses, *Living Faith* and especially *Messiah's Throne*, are considered sufficient evidence of his pre-eminent ability. Famous also are his orations upon the deaths of Washington (1800) and of Hamilton (1804). Of note are his *Letters on Frequent Communion* (New York, 1798), which had the effect of inducing his denomination to celebrate the communion oftener than at most twice a year as had been the practice; and his *Plea for Sacramental Communion on Catholic Principles* (1816), which made a great sensation. His works were collected and edited by his son, Rev. Ebenezer Mason (New York, 1832, 4 vols.; 2d and enlarged ed. 1849); his *Life* was written by his son-in-law, Rev. Jacob Van Vechten (New York, 1856). SAMUEL MACAULEY JACKSON.

Mason, LOWELL, Mus. Doc.: musician; b. in Medfield, Mass., Jan. 8, 1792; began his career as instructor and leader of choirs in Savannah, Ga., 1812; in 1821 published the *Handel and Haydn Collection of Church Music*; removed to Boston in 1827, and gave himself entirely to the task of instructing classes in vocal music and encouraging the public taste for music. To him Massachusetts is indebted for the introduction of music into the public schools. His labors soon became arduous and extensive; his zeal was felt throughout New England; the Academy of Music was established in Boston; by means of classes, schools, lectures, institutes, text-books, glee-books, collections for family and Sunday use, a practical interest in the subject was awakened even in the Middle States. His own compositions were numerous, and his compilations exceeded in number those of any other man. Of juvenile collections, glee-books, compilations of church music, there are more than forty that bear his name, either alone or in association with George J. Webb. Besides these there were several small books and single pieces. In 1837 Mr. Mason visited Europe to study on the Continent and in Great Britain the latest methods of musical instruction, and whatever he approved he adopted and used. In 1855 the University of New York conferred on him the degree of doctor of music. D. Aug. 11, 1872.

Mason, OTIS TUFTON: anthropologist; b. in Eastport, Me., Apr. 10, 1838. Reared in Virginia, he was educated at Columbian University, Washington, D. C., and taught in that institution for a number of years. His whole life has been devoted to anthropological studies as they are related to geography. The first attempt to give public effect to his studies was the arrangement of the archæological and ethnological material of the Smithsonian Institution and the subsequent plan of the ethnological exhibit at the Centennial Exposition at Philadelphia in 1876. For many years he conducted the anthropological department of the *American Naturalist* and of *The Annual Record of Science and Industry*. Most of his works have been published by the Smithsonian Institution. Chief among them are *The Annual Summaries of Progress in Anthropology*, monographs on *The Antiquities of Guadeloupe*, *The Antiquities of Porto Rico*, *Basketry*, *Throwing-sticks*, *The Hupa Indian Industries*, *The Woman's Knife among the Eskimo*, *Woman's Work in Savagery*, *Cradles of the North American Indians*, and lectures on the general scope of anthropology. All of these are chapters in a comprehensive work on the primitive industries.

Mason, WILLIAM: poet; b. at Hull, England, in 1725; graduated at the University of Cambridge 1745; wrote *Musæus* (1747), a poem on the death of Pope; became a fellow of Pembroke College 1747; took orders in the Church of England 1754; became vicar at Ashton, Yorkshire, and later precentor and canon of York; wrote *Isis* (1748), a poem directed against Jacobitism in the university; *Elfrida* (1752) and *Caractacus* (1759), both dramatic poems, which were represented with moderate success; and *The English Garden*, a poem in four books (1772–82). Mason was a tasteful musician and painter as well as a poet, but will be best remembered as the intimate friend, executor, and biographer of the poet Gray—*Memoirs of Gray* (1775). D. at York, Apr. 7, 1797. His *Works* appeared in 1811.
Revised by H. A. BEERS.

Mason, WILLIAM, Mus. Doc.: pianist and teacher; b. in Boston, Mass., Jan. 24, 1829; the son of Dr. Lowell Mason; when twenty years old went to Leipzig, and continued at Prague and Weimar; studied under Moscheles, Moritz Hauptmann, E. F. Richter, and (1853–54) with Liszt. In 1853 he made a concert tour through Europe as a pianist; in 1854 returned to the U. S. as a professional pianist. In 1855, with Theodore Thomas, George Matzka, Joseph Mosenthal, and Carl Bergmann, he established the Mason and Thomas soirees of chamber music, which were continued until 1868. His life has been mainly spent in teaching. He received his degree from Yale College. His compositions, over forty in number, are almost entirely for the piano. He has published *A Method for the Piano-forte* (1867) and *System for Beginners in the Art of playing upon the Piano-forte* (1871), both in connection with Eli L. Hoadley;

and *Touch and Technic* (1878), in connection with William S. B. Matthews. D. E. Hervey.

Mason and Dixon's Line [named from the surveyors who projected it]: the line which forms the southern boundary of Pennsylvania, separating it from Delaware, Maryland, and Virginia. From the celebrity which this term acquired during the anti-slavery agitation as a synonym of the divisory line between free and slave territory, it has been generally confounded in Europe (and frequently in America) with the parallel of 36° 30′, fixed by the "Missouri compromise" of 1820 as the northern limit for the extension of slavery into the Territories. According to the original grants from the crown of England to William Penn and Lord Baltimore, the boundary between their respective colonies was fixed at the 40th parallel of N. lat. That line being found by subsequent observation to pass N. of Philadelphia, and to exclude Pennsylvania from Delaware Bay, negotiations ensued between the proprietors for the purpose of rectifying the blunder which the royal ignorance of geography had committed, and for the greater part of a century the matter was unsettled. An agreement was made between the proprietors (May 10, 1732) for fixing their boundary; and as Delaware then belonged by purchase to the heirs of William Penn, it was necessary to begin at its southeast extremity, then fixed at Cape Henlopen. The boundary between Pennsylvania and Delaware had been already defined to be the arc of a circle drawn with a radius of 12 miles from the court-house at New Castle from the Delaware to the Maryland line. It was now agreed to bisect the line drawn W. across the peninsula from Cape Henlopen to Chesapeake Bay, and from the point of bisection to project a line northward as a tangent to the arc which formed the northern limit, the same to constitute the western boundary of Delaware. From this point of tangency common to the three colonies, 12 miles N. E. of New Castle a line was to be projected due N. to a point 15 English statute miles S. of the southernmost point of the city of Philadelphia, and from this point a line was to be drawn due W. for 5° of longitude as the southern boundary of Pennsylvania. Commissioners were appointed to run these lines in 1732, 1739, and 1750, but disagreed, and chancery suits were the result. By decision of Lord Chancellor Hardwick of May 15, 1750, taken as the basis of a final adjudication signed July 4, 1760, commissioners and surveyors were again appointed, who began operations Nov., 1760, and spent three years in measuring the base and tangent lines separating Delaware from Maryland. The proprietors then determined to send out more skilled mathematicians to complete the operations, and selected Messrs. Charles Mason and Jeremiah Dixon, who verified the work of their predecessors, and ran the western line, fixed at lat. 39° 43′ 26·3″ N., since known by their names. They began work in Nov., 1763, and were stopped by the Indians in the summer of 1767 at a point 244 miles W. of the Delaware, and only 36 miles E. of the terminus they were seeking. Stones were erected at intervals of a mile, and every fifth stone was engraved on the opposite sides with the arms of the lords proprietors. The remaining part of the line was fixed in Nov., 1782, by Col. Alexander McLean, of Pennsylvania, and Joseph Neville, of Virginia, and was verified and permanently marked in 1784. In consequence of the accidental removal of the stone at the northeast corner of Maryland, commissioners were appointed by the three States in 1849 to revise the former survey, which was done by Lieut.-Col. James D. Graham, of the U. S. topographical engineers. The result of his revision was to confirm the work of Mason and Dixon, and Maryland gained less than 2 acres.

Mason-bee: a name applied to numerous bees, chiefly of the genus *Osmia*, which construct their cells of mud. They put their cells in the hollow stalks of plants, in empty shells, under flat stones, inside oak-galls, in chambers which they construct in rotten wood, etc. Some species form cells of great beauty and perfection, and line them with a kind of silk. The ceilings of many Egyptian temples are completely covered with these cells, masses of which hang down like stalactites. These bees are also very common in Northern Europe, in the regions of the Baltic, where they often cover the whole sunny side of the poor man's clay hut with their singular constructions. The cells are formed by boring into the clay wall, but at the orifice of each cell an outer tube is construeted, sometimes 2 or 3 inches in length, of pellets formed in the excavation. The U. S. has quite a number of mason-bees.

Mason City: city; capital of Cerro Gordo co., Ia. (for location of county, see map of Iowa, ref. 2–H); on the Ia. Cent., the Chi., Mil. and St. P. and the Mason City and Ft. Dodge railways; 150 miles S. of St. Paul, Minn. It is in an agricultural and stock-raising region; contains 13 churches, 4 public-school buildings, 2 national banks (combined capital $100,000), a State bank (capital $50,000), and a daily, monthly, and 4 weekly newspapers; and has limestone quarries, brick and tile works, flour-mills, machine-shops, and cold-storage houses. Pop. (1880) 2,510; (1890) 4,007; (1900) 6,746. Editor of "Times-Herald."

Masonry: a fraternal institution, existing in some form and to some extent in nearly every civilized country. Those seeking admission into it must be free men, and must be accepted with substantial unanimity; hence its members term themselves "Free and accepted Masons"; from this circumstance the institution is frequently called "Freemasonry."

Origin.—It is of ancient origin, so ancient that the time and place of its birth are unknown. Its legends say that it was organized at the building of the temple by Solomon; but while in former times Masons accepted this as fact, they no longer confound its legends with its history. That its origin is unknown is shown by the fact that almost every writer has found for it a source different from that found by any of his fellows: it has been ascribed to the Druids, to the Knights Templar, and to Pythagoras; and it has not even escaped the modern fad of attributing almost everything to the fertile genius and more fertile pen of Sir Francis Bacon! With considerable show of argument some writers trace it to the ancient mysteries (especially the Eleusinian), others to the Essenes, others to the Roman colleges, and still others to the Culdees. Within the past generation supposed traces of Masonry have been found in the Holy Land, on the Egyptian obelisks, and in the pyramids; indeed, it has been strenuously claimed in respect to the latter that the evidence found in their form, method of construction, and other particulars conclusively shows that they were built by masons from whom the present society has descended. Within fifty years a writer has demonstrated, to his own satisfaction at least, that the present system of masonry is directly attributable to the German stonecutters who flourished from as early as 1459 down to comparatively a modern date. But when all is said, it still remains a fact that the evidence in support of these claims rests wholly upon the discovery of characteristics, emblems, symbols, forms, ceremonies, and laws common—and in some cases to a very remarkable degree—to these ancient organizations and to Masonry; but while this evidence establishes the *possibility* of the truth of the theory which it is adduced to support, it utterly fails to establish the *certainty* of that theory. Those who would pursue the examination of this matter beyond the limits of an article of this character are referred to the able and exhaustive discussion of it in *The History of Freemasonry*, by Robert Freke Gould.

The theory that Masonry is an outgrowth of mediæval operative masonry has much greater support both from internal and external evidence. The magnificent cathedrals erected between the early part of the twelfth century and the close of the fifteenth were, in many if not in all cases, the productions of workmen united in organizations of a character precisely similar, in most material respects, to the Masonic organizations. The tradition of the society, from the earliest times, is that originally it was an operative institution. It is certain that when monasticism died out in England mediæval architecture went with it. When the building of churches ceased the builders' occupation was gone. There is abundant ground for the tradition that the originally flourishing brotherhood of operative masons at last fell into decay, and for the theory that some of its members, perceiving that as an operative institution it had no longer a reason for existence, determined to continue it as a "speculative" society to promote the practice of the moral, fraternal, and charitable principles which had characterized the old organization. The present form of organization was adopted in 1717, from which date the society has an authentic history; in the earlier times it was scarcely allowable to commit to writing anything relating to Masonry, and for that reason it has been all the more difficult to trace its history; but in spite of this, manuscript copies of old *charges* have been discovered, and are extant, made in the fourteenth, fifteenth, sixteenth, and seventeenth centuries. Some of them are not dated, and opinions differ as

to the time when they were written, but as one of them is dated Dec. 25, 1583, it shows the existence of an organization at that date which was not a new one. Some of these are entitled *The Constitution of Masonry* and some *The Constitutions of the Freemasons*. In 1646 Elias Ashmole was made a Mason, but previously to that date all the evidence of its existence in England is found in these old *charges* and in the statutes. In Scotland there is record evidence of its existence as early as 1599, for Edinburgh Lodge, No. 1, has a record continuous, save one break of less than twenty years, from that year to the present time. The conclusion can not be resisted that at a very early date there existed organizations of an operative character calling themselves "Masons," or "Freemasons," and the art or "mystery" which they practiced "Masonry," or "Freemasonry"; and it is equally certain that their operative character gradually changed until it became in their language "speculative"; and thus came into existence the Masonic institution of to-day.

Form of Government.—The primary organization is the lodge, with master, wardens, and other officers. Originally a master called the brethren together at his pleasure, and the assembly was called a lodge; but it was not till about 1717 that lodges of a permanent character were established. There is a dispute in relation to the character of the government previously to that date, but the evidence, tested by the rules which human experience has established, proves that before 1717 a grand-master governed the fraternity, which theoretically met annually in "general assembly" to choose a grand-master and make laws for the craft. It is true that in the decay of Masonry in the years immediately preceding 1717 the general assembly was not regularly held, and Masonry came near ceasing to exist. But on St. John the Baptist's Day in 1717 the brethren, chiefly members of four lodges, met in general assembly, chose a grand-master, and made changes of an exceedingly important nature in the form of government of the institution. The character of the lodges was entirely changed; theretofore they were merely temporary bodies without fixed membership, called together at the will of the master, but it was then enacted that in the future no lodge could exist without a charter or warrant from the grand lodge or the grand-master. The result of this was that lodges became permanent bodies with a fixed membership, with regular officers, and a prescribed place of meeting. In place of the general assembly provision was made for a grand lodge, composed of the grand officers (and later certain past grand officers) and the masters and wardens of the particular lodges. The grand lodge was thus made the supreme legislative, judicial, and executive authority of the fraternity; thereafter every lodge must be created by, and hold its existence at the pleasure of, the grand lodge, "for the members of the grand lodge are truly the representatives of all the fraternity." (Anderson's *Constitutions*, 1738.) Scotland and Ireland adopted the same system later. Lodges were in existence upon the Continent, but they established a different system of government. In a few jurisdictions this other system is not recognized as Masonic, but it is difficult to perceive how the four lodges had the right to prescribe the form of Masonic government for the whole Masonic world, or why the French lodges had not an equal right to establish a different system, provided the fundamental principles and landmarks of Masonry were preserved. Several grand lodges existed in England at different times, but one after another united with the grand lodge formed in 1717, although it was not till 1813 that one of them was merged in it.

The American Revolution was the cause of the affirmation for the first time of a principle growing out of the laws and usages of Masonry. In England, Scotland, and Ireland there then existed independent grand lodges for those several countries, the peers of each other. Each of them had established lodges in the U. S. Obedience to the law of one's country was then, as now, a law of Masonry. It was generally held in the U. S. that allegiance to the Masonic authority of another country was, or might be, incompatible with his duty to the government of his own country. The American lodges, therefore, took steps to form grand lodges of their own. This claim was at first resisted, but it has now become settled Masonic law that the majority of the lodges in a political division, possessing the right of self-government, not less than three in number, have the inherent right to form a grand lodge for such political division; this doctrine has been applied to the States and organized Territories of the American Union, as well as to the District of Columbia, and the several dependencies of the British crown. The consequence has been that the apparent intention of those who organized the grand lodge in 1717, that there should be but one grand lodge for the whole world, has been overthrown, and more than sixty grand lodges have been formed in the U. S., Great Britain, and the dependencies of the British crown.

Another law, growing out of the law just mentioned, and the creation under it of a plurality of grand lodges, has been asserted and finally acquiesced in by the British and American grand lodges, viz., that a grand lodge so created has at once exclusive and supreme jurisdiction over all lodges and Masons in its territory, with concurrent jurisdiction in autonomous territories in which no grand lodge exists. The grand lodges with their lodges and members of their respective obediences are Masonic nations, between whom the "necessary laws of nations" (that is, the laws growing out of natural justice) are in as full force as between civil nations. In the case of the British grand lodges there is a slight but necessary qualification of this law: each one of them has exclusive jurisdiction in its own home territory; but in the dependencies of the crown, in which no grand lodge exists, they have jurisdiction concurrent among themselves but exclusive as to all others.

The principal officers of a lodge are elected annually by the lodge, and the others are elected or appointed by the master, as the by-laws provide; they must be installed before entering upon their duties, and hold office until their respective successors are installed. Every lodge has the right to choose a proxy to represent it in the grand lodge in the absence of the master and wardens.

The principal officers of the grand lodge are elected by its members, and the others appointed by the grand-master. The same rule as to installation and tenure of office prevails in the grand lodge as in the lodge.

The British system provides for provincial or district grand lodges to aid in administering the affairs of the craft, in consequence of the large number of lodges and the extent of the territory over which they are scattered. At their head is a provincial or district grand-master appointed by the grand-master under the authority of the grand lodge; these officers and bodies have the powers and duties specifically defined in the constitution.

Although the proposition has in recent times been denied by some, it is generally held that there are powers inherent in the office of grand-master of which he can not be deprived; among these powers is that of dispensing with some of the provisions of the law in cases in which adherence to it would, in his judgment, be subversive of the interests of the craft.

The form of government of the institution seems happily calculated to secure strength, permanency, and prudent action. The representatives of the lodges represent the popular branch, while the permanent members are the senate of the order; the latter presumably, and in most cases actually, have no personal ambition to gratify; they have had a large experience, and have grown wiser thereby; these two elements, acting together in the same body, necessarily influence each other without any of the jealousies invariably arising between two sets of men acting separately in different bodies, whose action to be effective must be concurrent. Again, the permanent members are of the utmost importance when the grand lodge acts in its judicial capacity; its decisions are often more far-reaching than its legislation, while errors in the latter are much more easily corrected than in the former. It is believed that its form of government has contributed largely to its wonderful prosperity during the last half century.

Rites.—Thus far this sketch has been confined to what is usually called the "symbolic Masonry of the York Rite." But there are other bodies of this rite, and other rites. At one time there was an extensive manufacture of so-called Masonic degrees; some of them have survived, and this account would not be complete without some mention of those which have been very extensively cultivated.

The lodge has jurisdiction over three degrees, called Entered Apprentice, Fellow Craft, and Master Mason; about 1745 another degree began to be cultivated called the Royal Arch; other degrees were conferred in connection with it; finally, Thomas Smith Webb and John Hanmer in the latter part of the last century arranged a system including four degrees, those of Mark Master, Past Master, Most Excellent Master, and Royal Arch, given in bodies called chapters; they are conferred only on Master Masons in good standing.

In the early part of the nineteenth century three degrees (called Royal Master, Select Master, and Super-Excellent Master), which had been termed "side degrees," were combined in a system called the Cryptic Rite; they are conferred in bodies called councils and only upon Royal Arch Masons. The systems of government of Royal Arch Masonry and Cryptic Masonry are the same as that of symbolic Masonry, except that in the U. S. there are a general grand chapter and a general grand council, of which most of the grand chapters and grand councils are respectively constituents. The number of Royal Arch Masons in the U. S. and Canada is nearly 150,000, and the number of Royal and Select Masters between 30,000 and 40,000.

Mention should also be made of the order of Knights Templar, which is usually held to be a part of the American Masonic system. Candidates must profess a belief in the Christian religion, an important addition to the requisites for admission into symbolic Masonry. The orders are conferred only on Royal Arch Masons, in commanderies which in this country are subordinate to a grand commandery in each State and Territory (except there is only one in Massachusetts and Rhode Island), which in turn is subordinate to the grand encampment of the U. S., the supreme power of the order. The latter meets triennially, and its conclave is the occasion of the gathering together of a very large proportion of the 50,000 knights enlisted under its banner.

The Ancient and Accepted Scottish Rite is the only other rite that requires notice. Its scale of degrees, conferred upon Master Masons of the York Rite in good standing and in lodges, councils, chapters, and consistories, numbers twenty-nine, from the fourth to the thirty-second inclusive. It has also an official degree—the thirty-third. While the members of its obedience are less numerous than those of the York Rite, its cultivation is more widely extended throughout the world than that of the York Rite. In many jurisdictions, in which the York Rite does not exist, its governing body has jurisdiction over the symbolic degrees, and charters lodges to confer them. The governing body is a supreme council of the thirty-third degree, whose members have a life tenure; it alone confers the thirty-third degree upon postulants elected by itself, and fills vacancies in its membership. There may be one supreme council in each nation, but in the U. S. two—one in the North and one in the South. There are twenty-three supreme councils in the world recognized as regular. The Supreme Council of the Northern Masonic Jurisdiction of the U. S. has the largest obedience of the supreme councils of the world; the membership of its consistories is (1893) 17,553; of its chapters, 17,759; of its councils, 18,226; and of its lodges, 20,441.

There are organizations claiming to be legitimate bodies of this rite in the U. S. and other countries which are held to be clandestine by the other supreme councils in the world; they are also under the ban of very many of the grand lodges of the York Rite.

Principles.— The foremost fundamental principle of Masonry is *belief in God*, and, as a necessary incident, the acceptance of a Book of the Law as a revelation of his will. Attempts have been made to substitute a "creative principle" for God, the Creator, Ruler, and Father; but in the only case in which a governing body adopted the change, the other Masonic powers formally declared that, by that action, it has ceased to be a *Masonic* organization, and forbade Masonic correspondence with it, its subordinates, and the members of its obedience. "The fundamental principle of Masonry is the Fatherhood of God and the brotherhood of man" is another form in which the same idea has been expressed. To the Christian the Book of the Law is the Bible, and to the Hebrew the Old Testament; and no lodge can be lawfully opened unless the Book of the Law lies open upon the altar. Beyond this belief in God and a Book of the Law, no religious test is allowed; the laws governing Masons "oblige them to that religion in which all men agree, leaving their particular opinions to themselves"; but if a Mason "rightly understands the art, he will never be a stupid atheist, or irreligious libertine."

All rules of conduct growing out of this fundamental principle are taught and enforced by Masonry. It has been termed "a system of ethics—moral, religious, and philosophical—which relates to the social, ethical, and intellectual progress of man." "A Mason is obliged by his tenure to obey the moral law," as tersely stated in the ancient *charges*, which also declare that brotherly love is "the foundation and cope-stone, the cement, and glory of this ancient fraternity." The brethren are charged that "every human being has a claim upon your kind offices. So that we enjoin it upon you to 'do good unto *all*,' while we recommend it more especially to the '*household of the faithful*.'" The Mason is also taught that his duties to the institution and the fraternity do not conflict with, but are subordinate to, his duty to God, his country, his family, his neighbor, or himself; that the tenets of Masonry are brotherly love, relief, and truth; and that its "cardinal virtues" are temperance, fortitude, prudence, and justice. He is charged "to be a good man and true"; "to be a peaceful citizen, cheerfully to conform to the laws," and "to pay proper respect to the civil magistrate"; "to work diligently, live creditably, and act honorably by all men." To sum up, Masonry takes the law of God as the "rule and guide" of its *works* as well as of its *faith*.

It should be added that Masonry teaches most impressively the immortality of the soul, and the resurrection to a future life "in that celestial lodge above where the Supreme Architect of the Universe presides."

Laws.—The laws of Masonry are largely derived from the ancient usages of the craft; in its early days nothing was committed to writing, and naturally every one followed the practice which he had seen others follow; as a result, usage ultimately became law; but another result followed—that nothing was law that was not in accordance with ancient usage, and, as a consequence, that the law was unchangeable. It has become a maxim that "no man or body of men can make innovations in the body of Masonry." These unchangeable laws are termed landmarks. While grand lodges are the supreme governing bodies in their respective jurisdictions, they are subject to these laws. So absolute are they that if a governing body attempts to change them, it merely puts itself outside of the pale of Masonry. In all matters not controlled by the landmarks each grand lodge has full power of legislation. So we have three sources of Masonic law: (1) The ancient usages of the craft; (2) grand-lodge legislation; (3) by-laws of lodges. Masonry is so much a law unto itself that in deciding any question the first consideration is not "What are the general principles of civil law applicable?" but "What are the ancient usages of the craft?" There are many Masonic laws which would be held to be erroneous if tested by general principles of the civil law; for example, ancient usage requires the presence of the charter in order to open a lodge; on principle the charter is only *evidence* of the rightful existence of the lodge, and whether it be present or not there is no reason why the lodge may not be opened, and yet the Masonic law is that it *must be present*. In fact, the most frequent errors in the discussion of Masonic law arise from relying upon the principles of the common law and methods under it, instead of the ancient usages of the fraternity.

Methods of Teaching.—Masonry teaches by legends, allegories, symbols, forms, and ceremonies. This fact and the secrecy in its work indicate an ancient origin of the institution. Every ceremony, every badge of office, every adornment of the lodge, every article of Masonic clothing and furniture—in fact, every thing upon which the eye rests and every sound which reaches the ear in the working of a lodge—are intended to teach or impress upon the mind of the initiate a precept or principle of Masonry, while to the profane they are meaningless.

Masonic Charity.—While Masonry more than any other institution of human origin teaches the duty of charity in its largest and most sacred sense, it differs from other societies most essentially anent relieving distress and want. It has no system of "dues and benefits" by which one pays a fixed amount at regular intervals, and thereby entitles himself to relief in case of sickness without reference to his pecuniary condition. Every Mason is bound to relieve the distress of a worthy brother, his widow, or orphan to the extent of his ability, and of his ability he is himself the sole judge. It is true that dues are paid to lodges to create a charity fund, primarily to relieve the necessities of the members of the lodge, and secondarily any Mason in distress; but all claims for relief grow out of actual distress and not out of the payment of dues, and the lodge, as in the case of the individual Mason, is the sole judge of the amount of relief it is able to give in a particular case. Nor does Masonic relief give any ground for a claim to reimbursement. It must be admitted, however, that there has been a tendency to depart from the old rule, and to hold that a member of a lodge is *entitled* to relief from his lodge, even to a full support, without reference to the ability of the lodge; and also that a lodge which relieves a member of another lodge is entitled to reimburse-

ment; but it is generally held that both these claims are at variance with the law of Masonry in relation to charity. Another evil has grown out of affording relief by *lodges*; it has a tendency, and has had the result, to weaken the sense of obligation of individuals to give relief. Nevertheless, the right of every distressed Mason to ask relief and the duty of every Mason to grant relief according to his ability remain in all their primitive force; and under the landmarks of Masonry no power can take away this right, or relieve from this obligation.

Statistics.—Grand lodges or other governing bodies exist in almost every civilized country controlled by the Caucasian race, and there are lodges in almost every part of the habitable globe. In the very large proportion of them no statistics are published, and it is therefore impossible to give an accurate statement of the number of Masons in the world, or even of the number of lodges; an attempt to estimate them would be merely a guess based upon no reliable data. This is true of the whole Masonic world outside of the U. S. and the Dominion of Canada; in the former there are fifty grand lodges, and in the latter seven; the members of their respective obediences, according to the latest returns (for 1900), number 818,767 (in U. S.) and 38,810 (in Dominion of Canada).

This sketch would not be complete without the statement that among the people of color in the U. S. Masonry is claimed to exist, springing from the same source, professing the same principles, governed by the same laws, practicing the same rites, and organized in the same manner as the Masonry of the whites; but the latter do not recognize nor hold Masonic communication with these organizations or their members.

JOSIAH H. DRUMMOND.

Masonry [from O. Fr. *maçonerie*, deriv. of *maçon* (whence Eng. *mason*), from Low Lat. *ma'chio*, mason, of uncertain origin]: constructions in stone or brick with mortar, classified into stone masonry, brick masonry, and concrete or béton. *Stone masonry* is divided into *cut stone* (or *ashlar*) *masonry* and *rubble masonry*; and rubble may be *coursed* or *uncoursed*, while the uncoursed may be *squared rubble*, showing only vertical and horizontal joints on the face, or *irregular rubble*, with the joints running in random directions according to the shapes of the stones. *Concrete* may be *brick*, *stone*, *gravel*, or *shell* concrete, depending on the material used for ballast. The front of a wall is termed its *face*, and the material composing it *facing*, as distinguished from the *back* and *backing*, which apply to the rear or inner surface of the wall. The interior is called the *heart*, and the material *hearting* or *filling*. When the face or back of a wall is not vertical, but inclines toward the wall from bottom to top, the inclination is called the *batter* or *bâtir*. Thus "a face-batter of 1 in 20" means that in a height of 20 feet the face of the wall departs a foot from a vertical line. The method of arrangement of the stones or bricks in order to secure strength and unity of mass is called the *bond*. *Headers* are those stones or bricks which show an end upon the face and back of the wall, and therefore reach into the wall their entire length and bind it together transversely. *Stretchers* are laid to show their longest dimensions on the face or back, as the case may be, and to give longitudinal strength. For walls of stone masonry not exceeding 3 feet in thickness each header should extend through from face to back, and is termed a *through*. In thicker walls the headers should reach back at least 18 inches beyond the contiguous stretcher, and are termed *binders*. The lower surface of a stone is termed its *lower bed*, the upper surface its *upper bed*. All the spaces between contiguous stones are also called joints, whether above, below, or at the sides. *Ashlar* is an external facing of cut stone laid with close joints in courses, the quality of the face-dressing being such—either axed, tooled, rubbed, or polished—as will best suit the character of the material and the design of the work under construction. In *rock-faced* ashlar the face of each block is the natural fracture or split of the stone, left undressed or only deprived of large protuberances. The filling and backing behind an ashlar facing may be rough, irregular rubble, brickwork, or concrete, preferably the latter in most cases, unless rubble stones are plenty and cheap. The ashlar should be well bonded to the hearting, for which purpose one-fifth to one-third of the entire length of each course should be headers, and these should not be placed one above the other in contiguous course, but so that the headers of each course shall rest on or near the middle of the stretchers of the course below. In important work, such as sea-walls, for example, the face-ends of headers for a distance back equal to the breadth of the stretchers are usually cut dovetail on the sides, the ends of the stretchers fitting against them being cut to corresponding angles with the face of the wall, so as to give close joints. The *tails* of the headers, in order to secure a good bond with the hearting, are left with the rough rock-face on the sides, although the beds, for convenience of laying, are roughly dressed to general parallelism with each other. The vertical and horizontal joints for a distance back equal to the breadth of the stretchers should therefore be formed accurately and full. (Fig. 1 gives a transverse and a horizontal section of a sea-wall on a concrete foundation, with stone facing and concrete backing.) The practice of thinning off the blocks from a few inches from the face, so as to show close face-work, with little labor of stone cutting, as in Fig. 2, should be avoided. The method of building with headers and stretchers is not followed in laying the thin ashlar, a kind of veneering, generally not over 4 inches or 5 inches in thickness, used for facing the walls of city houses, in which the only bond-stones extending through or nearly through the wall are those forming the jambs to window and door openings. The face-stones, usually rubbed or finely axed brownstone or sandstone or polished marble, are tied to the brick backing with hoop-iron clamps, and even these are sometimes omitted where the distance between the jambs of the openings does not exceed 5 or 6 feet. The rise or height of headers should not exceed their width as seen on the face of the wall; that of stretchers should be somewhat less than their transverse breadth. Where the batter is great—say, exceeding an angle of 25° to 30° with the vertical—the bed-joints should not be carried out horizontally to the face of the wall, for the reason that the lower edge of each face-stone would present an angle so acute as to be liable to injury from accidents and the effects of weather. One method of construction recommended in such cases is to cut the beds of the stones so that at least 4 inches in width of the bed-joint shall be normal to the face of the wall, as shown in Fig. 3. There are objections to this device unless the wall is under water, for the joints will retain water, and will be injured by frost in cold climates, and from the growth of vegetation during the summer season in all climates. Moreover, the stone-cutting is expensive. A better design is to secure the requisite strength at the angle by allowing the stones to project beyond the face of the wall, as in Fig. 4. Indeed, it will generally be less expensive, and produce stronger work, to lay up the wall in offsets, as shown by the dotted lines of Fig. 4. In compressive soils, or where from any cause it is difficult to get a solid and unyielding foundation, additional thickness, so as to distribute the weight over a larger area, should be given to the wall at the base; and in order to lessen the weight and cost of the superstructure without endangering its stability it may be built hollow; a concave batter is sometimes given to the face. Fig. 5 shows a transverse section, and Fig. 6 a plan, of a structure of this description. It is a river-wall in Sheerness, England, designed by Rennie. Masses of cut stone in positions exposed to violent pressures and shocks, such as sea-jetties, piers, and lighthouses, should have the component parts fastened together with great

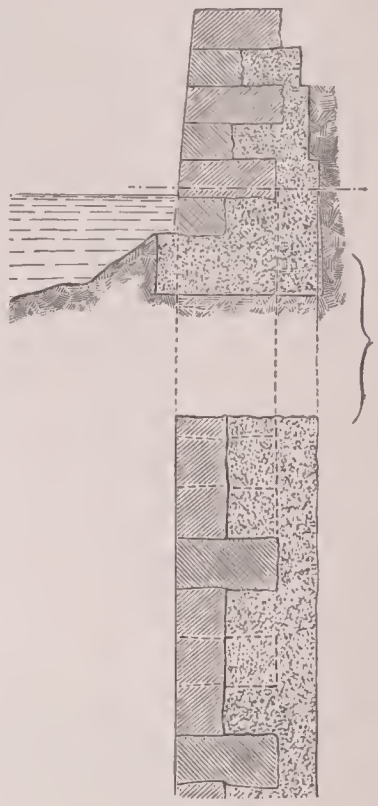


FIG. 1.

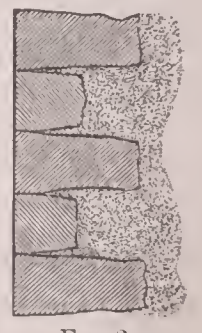


FIG. 2.

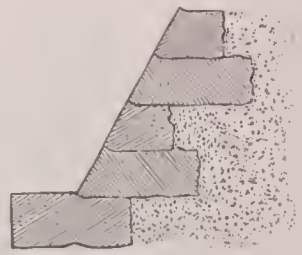


FIG. 3.

strength. Not only should the stones of each course be dovetailed and notched or clamped into each other, so that no single piece can move without displacing a large mass, but each course should be firmly connected with those above and below it. To prevent sliding projections may be left in the beds of one course to fit into corresponding cavities of the contiguous course, or cylindrical cast-iron dowels, 6 to 8 inches in diameter, may be placed in a vertical position between courses, extending some inches into the blocks above and below. Heavy wrought-iron bolts may be inserted vertically through several courses to prevent the uplifting of the mass.

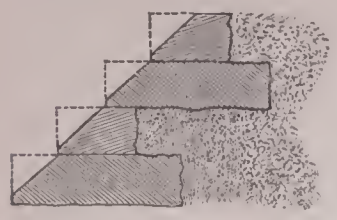


Fig. 4.

Common *uncoursed* rubble, generally styled random rubble, is built with stones of random shapes and sizes as they

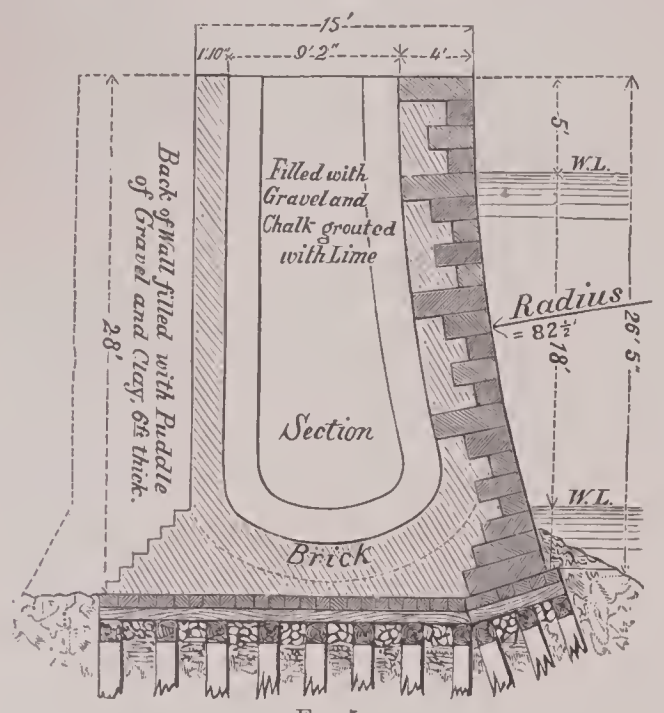


Fig. 5.

come from the quarry, with only their most salient protuberances broken off with the scabbling-hammer. The only implements used in laying are the trowel and plumb-rule, and no attention is paid to courses. The interstices of

Fig. 6.

the larger stones are filled in with those that are smaller and with spalls, all well bedded in mortar. The face and back of the wall should be well bonded to the hearting with headers, and the stones should be selected so as to fit to-

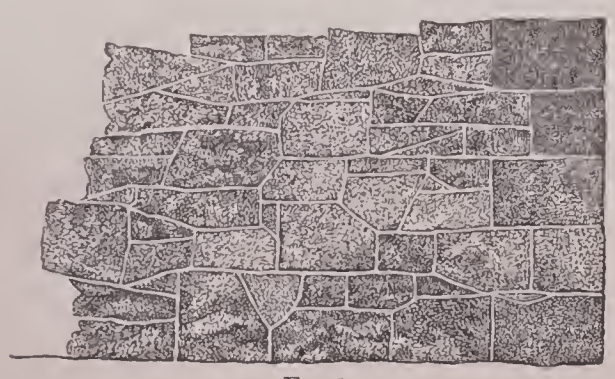


Fig. 7.

gether as closely as possible, and thus reduce to a minimum the volume of mortar necessary to completely fill all the voids; but no two stones should touch each other. For the angles or corners of a wall of this kind the stones should be as nearly rectangular as can be found. Ashlar is frequently introduced at the angles and around window and door openings to obtain architectural effect, after the manner of the *opus incertum* of the ancients. With stone of a dark color a fine effect can be produced by pointing the joints with white mortar (Fig. 7).

Coursed rubble, or squared rubble built in courses (Fig. 8), differs from *random* rubble in being built of stones that

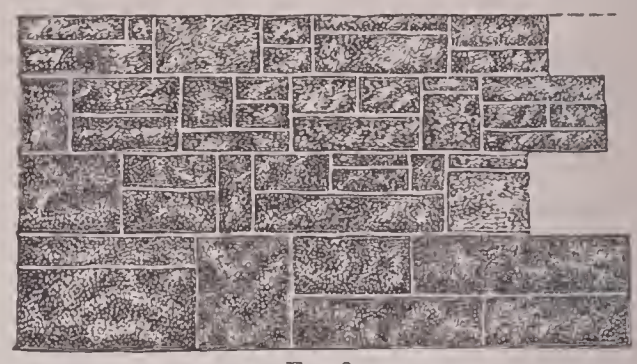


Fig. 8.

are, at least approximately, rectangular in form, so that only vertical and horizontal joints are shown upon the face of the wall, and they vary considerably in thickness. Although the stones are laid up in what are termed courses, there is no uniformity in the heights of the several courses, nor even in the stones of the same course, two or more small pieces being often employed to obtain a rise equal to that of a single large one; the height of a course being equal to that of the highest stone in it. The top of each course is carefully finished to a plane level surface by filling in voids and open spaces with rough rubble masonry or spalls set in mortar or with concrete, so as to get a good bed for the course which follows, especially for the headers, which should be set so as to be in close contact on their beds throughout their entire length. When the stones run very generally in rectangular blocks and of good size (containing,

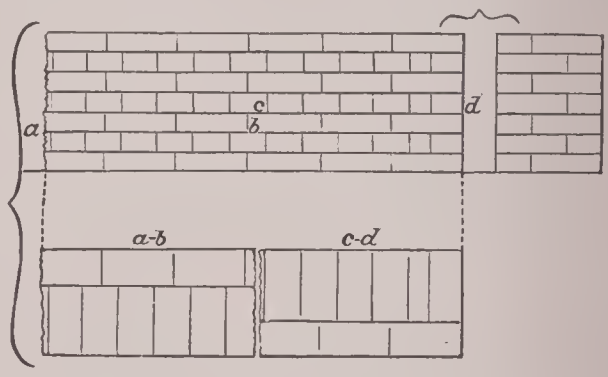


Fig. 9.

say, from 2 to 6 cubic feet), or are brought to that form by cutting, a good strong bond can be secured by frequent headers, and it is not desirable to lay them in *built* courses. Indeed, the wall will possess greater longitudinal strength by carefully avoiding continuous horizontal joints. Such work is sometimes called rubble masonry with horizontal and vertical joints, or simply *squared uncoursed rubble* or

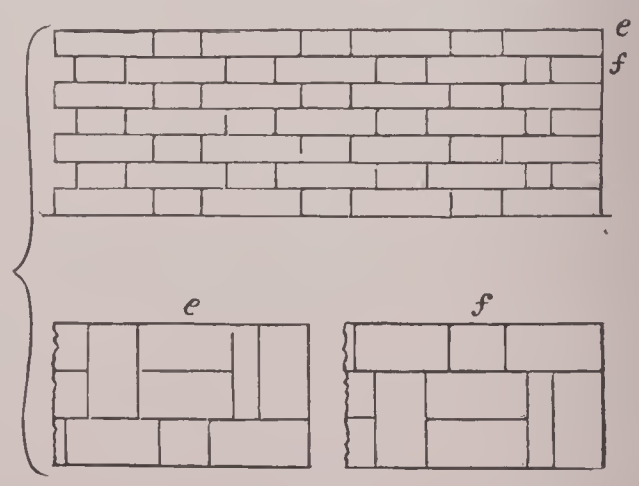


Fig. 10.

irregular coursed rubble. It is much used, and by most architects and builders is preferred to coursed rubble, and

by many to ashlar. With dark stone, showing a split rock-face, pointed with white mortar, a fine architectural effect can be produced. Stone having a fine cleavage is well suited to this kind of work. When rubble is laid without mortar it is called dry rubble. It is generally "random."

Brick masonry, when both the brick and mortar are of good quality and the work is well done, is strong and durable. Various kinds of bond are used, the most usual being

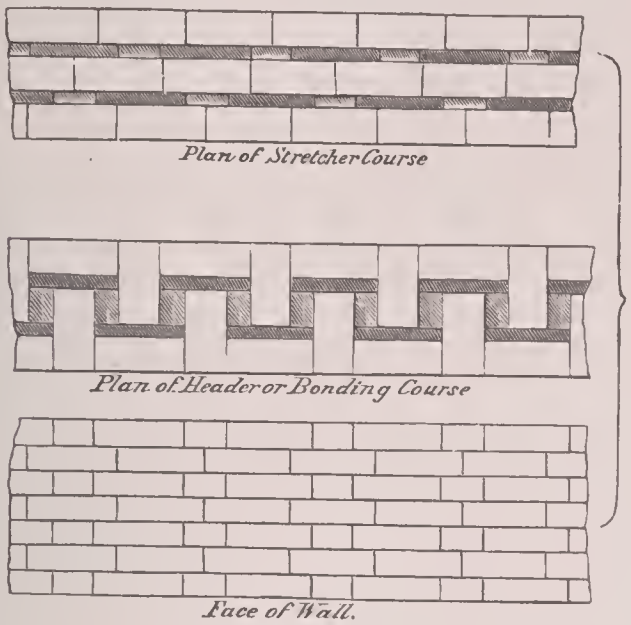
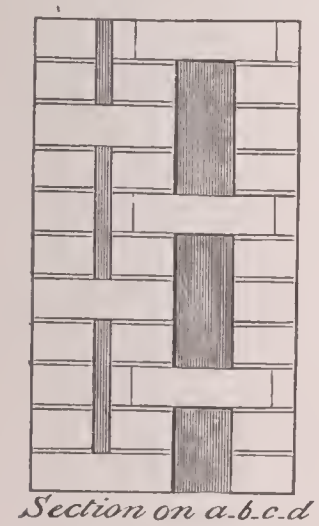


FIG. 11.

the *English* and *Flemish*. The first (Fig. 9) consists in arranging the courses alternately, entirely as *headers* or *stretchers*, the bricks through the course breaking joints. In the second (Fig. 10) the bricks are laid as headers and stretchers in each course. The first gives the strongest bond, and the second the best architectural effect. Hollow brick walls are much used, the thickness of the inner shell being usually 4 inches, or the width of one brick. It is tied to the outer wall at frequent intervals with iron clamps, or more generally with bricks laid transversely or diagonally (Figs. 11 and 12), and bonded into the masonry at both ends. Moisture will not condense on the inner face of such a wall. The expense of furring out with wood and lathing is therefore saved, and the danger from fire lessened. The mortar for brickwork should be made with clean, sharp, and rather fine-grained sand, or preferably grains of variable sizes. For common lime-mortar the proportions will be 1 volume of lime-paste to from 3 to 4 volumes of sand. Sea-sand, or sand rounded by attrition, is not suitable, and neither sea-water nor even brackish water should be used in mixing. (For the preparation of cement-mortar, for either stone or brick masonry, see CEMENT.) The bricks should be laid wet, so that they will not rapidly dry the mortar by extracting the moisture from it. All the void between the bricks should be completely filled with mortar, and no more mortar than will suffice for this purpose should be used. The joints, especially those between the courses, should not exceed a quarter of an inch in thickness.



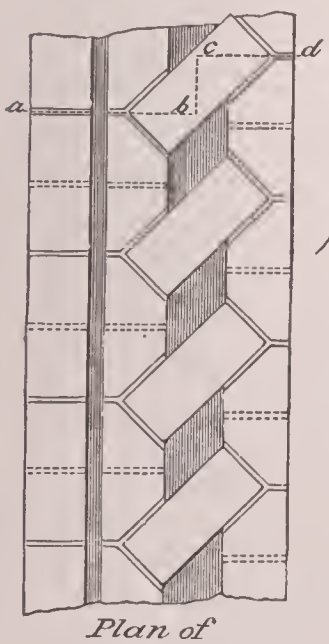


FIG. 12.

Concrete (*béton*) masonry is admirably adapted to many important purposes. A brief description of the method of preparing and laying it is given under CONCRETE. For foundations in damp and yielding soils and all kinds of submarine constructions; for quay-walls, jetties, piers; for foundations, hearting and backing of massive walls generally; for cisterns, reservoirs, and tanks; for tunnels and aqueducts, and for many other purposes, it possesses advantages over either brick or stone masonry. For submarine masonry concrete possesses the advantage that it can be laid without exhausting the water (which is an expensive operation under the most favorable circumstances), and also without the aid of a diving-bell or submarine armor. Groined and vaulted arches, and even entire bridges, dwelling-houses, and factories, in single monolithic masses, with molded ornamentation of no mean character, have been constructed of this material alone. By omitting the coarse fragments or ballast a smoother finish and a more elaborate ornamentation can be given to the surface. The material is then usually called artificial stone, of which an excellent variety may be made with Portland cement (dry) 1 volume and clean fine sand $2\frac{1}{2}$ volumes, mixed with little water, so as not to be plastic, and compacted in thin layers by ramming. The form to be given to the construction is accomplished by a plank molding. In Europe a portion of the Portland cement is usually replaced by siliceous hydraulic lime, like that of Theil, a good formula being $\frac{3}{4}$ volume of dry cement, 1 volume of dry (slaked) hydraulic lime, and 4 volumes of sand. This mixture was used in the construction of the aqueduct of the Vanne for supplying water to the city of Paris. The pipe is $6\frac{1}{2}$ feet in interior diameter, 9 inches thick at top, and 12 inches at the sides at the water-surface, resting on an arcade, the whole forming a single monolith. An entire Gothic church, with its foundation, walls, and steeple, was built of this material at Vesinet, near Paris, as well as several large houses in that city. It is extensively used in the U. S. A fine and highly ornamented bridge in Prospect Park, Brooklyn, and the fluted columns and other interior finish of St. Patrick's cathedral in Fifth Avenue, New York, are constructed of it. The foundation of the Statue of Liberty in New York harbor to a height of 60 feet above high water is a monolithic mass of concrete, 91 feet square at the base and 65 feet square at the top.

The strength of masonry is always less than that of the stone or brick of which it is formed, and it is a common rule that the greatest stress per square inch on the base of masonry structures should not exceed about 150 lb. per square inch. Stones should be laid in the wall in a similar position to that which they had in the quarry, as it is found that the greatest durability is thus secured. The joints should be laid so that the pressure is uniformly distributed, and so that the direction of the pressure is normal to them; in arched constructions this rule should be particularly observed. Masonry is measured by the cubic yard, except that trimmings and ornamental work is usually measured by the square foot of surface. The cost of rubble masonry ranges from $2 to $6 per cubic yard, that of ordinary bridge masonry from $6 to $12 for second-class and from $10 to $20 for first-class work, while dimension stone masonry in granite may often cost $40 to $60. See FOUNDATION, ARCHITECTURE, BRICK, BUILDING-STONE, and CEMENT; also see Mahan, *Civil Engineering* (1873); Rivingtons' *Notes on Building Construction* (1875); Gillmore, *Limes, Hydraulic Cements, and Mortars* (1874); same, *Béton-Coignet and other Artificial Stone* (1871); Baker's *Masonry Construction* (1890).

Revised by MANSFIELD MERRIMAN.

Masōrāh: See MASSŌRĀH.

Mas'pero, GASTON: Egyptologist; b. in Paris, France, June 24, 1846; was educated at the Lycée Louis-le-Grand and the École Normale; became Professor of Egyptian Archæology and Philosophy at the College of France in 1874; received the decoration of the Legion of Honor Jan. 15, 1879; founded a school of Egyptian archæology at Cairo in 1881; was director of the Boulak Museum from 1881 to 1886. Among his publications are *Essai sur l'Inscription Dédicatoire du Temple d'Abydos* (1869); *Une Enquête Judiciaire à Thèbes au Temps de la XX^e^ Dynastie* (1872); *Quelques Navigations des Égyptiens sur les Côtes de la Mer Erythrée* (1879); *Les Contes Populaires de l'Égypte ancienne* (1881); *Les Mastaba de l'Ancien Empire* (1882); *Guide du Visiteur au Musée de Boulaq* (1884; 2d ed. 1885); *Histoire Ancienne des Peuples d'Orient* (1885); and *L'Archéologie égyptienne* (1887). Editor of *Recueil de travaux*

relatifs à la philologie et à l'archéologie égyptiennes et assyriennes. C. H. THURBER.

Masquerade, mas'ke-rād [from Fr. *mascarade*, Span. *mascarada*, masquerade, from *mascara*, a mask]: an amusement generally consisting of a ball, public or private, in which the participators wear masks for purposes of disguise. An eccentric costume was an early feature of the masquerade, and under the form of a "fancy ball" has nearly superseded it in Great Britain and the U. S., each guest personating some mythological or historical character or assuming the costume of some remote people. The masquerade proper flourished in Italy in the fifteenth century, and was introduced at the French court by Catharine de' Medici, and at the English in the time of Henry VIII. It doubtless arose from the "miracles and mysteries" which were so popular in the Middle Ages. To the present day a masked ball is in Roman Catholic countries an invariable feature of the carnival, and on that occasion processions of maskers often pass through the streets playing wild pranks.

Masques: histrionic spectacles, Italian in origin, which were popular in Europe during the fifteenth and sixteenth centuries. "Properly speaking, a masque was nothing more or less than a dance with masks, and a dance always remained its central point." (Ward, i., 587.) In Italy, as the masque was developed during the sixteenth century, it was either "a kind of ballet-interlude, to relieve the graver attractions of a formal comedy, or assimilated the type of processional pageantry upon occasions of public rejoicing." (Symonds, 337.) In 1474 we hear of the form at the celebrations in honor of Leonora of Aragon when she passed through Rome on her way to marry Ercole d'Este. During the succeeding century the masque, particularly at Ferrara, Florence, and Venice, gained rapidly in ingenuity of plan, expense, and magnificence. Vasari, Palladio, Tintoret, and Veronese helped to develop it.

We first hear of the masque in England in 1512–13, at Epiphany. Then Henry VIII. and some of his courtiers were "disguised after the manner of Italy, called a mask"—the disguising which Shakspeare represents in act i., sc. 4, of *King Henry VIII.* In England the masque was at first much simpler than in Italy during the same period, and differed in little except the masking from the "disguisings" that before 1513 had been common at court. Only in a few instances during the sixteenth century, though the masque was liked by Henry and Elizabeth, and was sometimes given even in the reign of Mary, did it at all approach the magnificence of the Italian masques of the same century. A notable instance was the entertainment given to Queen Elizabeth by Lord Leicester at Kenilworth in 1575. (See Laneham's *Letter Describing the Pageants at Kenilworth Castle.*) When, however, James I. came to the throne the masque developed rapidly, for the form was a great favorite with him and his family. The courtiers took delight in the masques because in them they could dance and pose to their own admiration and that of their friends, and because in them they could vie with one another in splendid entertainments for James that made easy the most fulsome flattery of him and his. The masques became the amateur theatricals of the period—very costly, but very popular. The interest of the common people in them passed all bounds, and when a masque was to be given at Whitehall citizens and their wives fought and intrigued to win entrance to the hall where the masque was given. (See Robin Goodfellow's words in Jonson's *Love Restored.*) At Christmas and at Shrovetide the king and the queen, each of them, provided a masque for the entertainment of the court; nobles gave them, at weddings, at tilts, at their country-seats when visited by royalty; the Inns of Court and the universities were rivals in flattering the king and the queen with splendid masques devised in their honor. To meet the demand some of the dramatists turned aside from their regular dramatic work to write these airy trifles. Foremost among them stands Ben Jonson, followed by Chapman, Fletcher, Beaumont, Middleton, Shirley, Daniel, and others. Inigo Jones devised the mechanical contrivances for the masques; Ferrabosco wrote the music; Thomas Giles, master of the children of the Chapel Royal, arranged the dances. The form always remained elastic. "The degree in which a masque mixed the elements of declamation, dialogue, music, decoration, and scenery was determined by no inner law, but merely by the circumstances of each particular case. In its least elaborate form—from a literary point of view—it nearly approaches the pageant, so consistently favored by the citizens of London; where the characters were more carefully worked out, where something like a plot kept the whole together, and where something like an action was introduced, it trenched to some extent upon the domain of the drama." (Ward, i., 587.) In England one very marked addition was made to the masque: in Italy the work of the poet in a masque had been but slight; in England genuine poetry—lyric particularly—became one of the characteristics of the form. Jonson developed, too, the anti-masque—usually, though not always, preceding the masque proper—which served as a foil of comedy to the grace and the splendor of the main masque. In this anti-masque professional actors and dancers appeared; in the masque proper, as a rule, nearly everything was done by the noble amateurs interested in presenting the masque. Queen Anne, the Princes Henry and Charles, the Countesses of Arundel and Bedford, Lady Arabella Stuart, and many others of the court, acted in these entertainments. They were very expensive, averaging £1,400 apiece, equivalent, perhaps, to four times that amount at the present day; and in special cases much more was spent—for the *Triumph of Peace* of Shirley and Jones, given at Whitehall in 1634 by the Inns of Court, £20,000 were expended. The care put upon the scenic effects and the mechanical contrivances was very great.

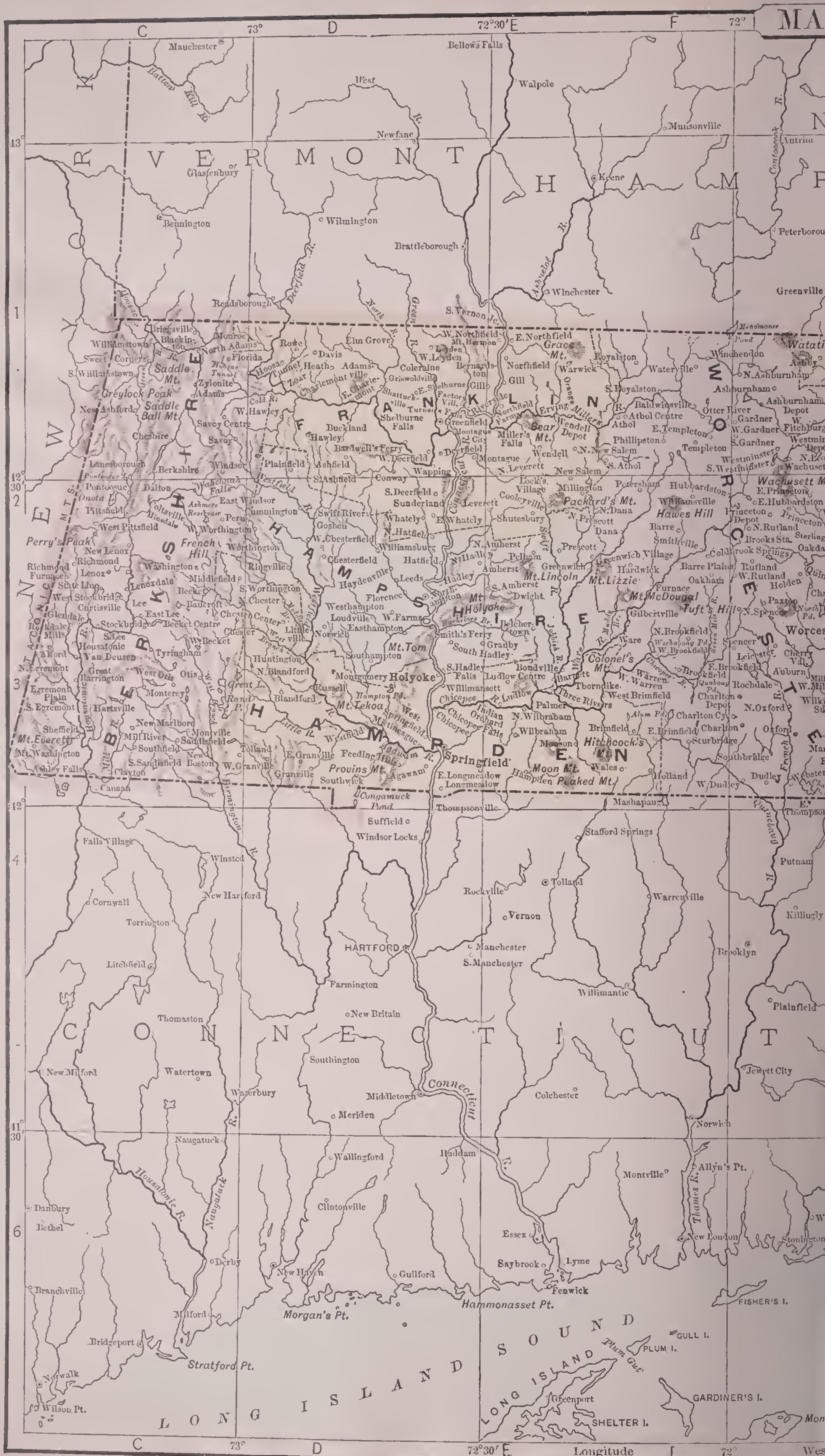
Necessarily, of course, the intense interest for a number of years of all ranks of the people in these masques had some effect on the regular drama of the time. The active part the nobility took in them aided in bringing the drama and the courtiers into that close connection of the two that marks the decadence of the Elizabethan drama; masques and masque-like effects appeared in plays of the time, for instance, in *The Tempest*, *The Maid's Tragedy*, and *The Duchess of Malfi*; and, chief influence of all, the attention paid to scenic effects must have done much to bring elaborate scenery to the rather barren boards of the regular theaters.

Charles I. by no means did without masques, but expended less upon them than did his father. As a whole, too, in his reign they fell off in literary value, though to this period (1634) belong the *Arcades* and the *Comus* of Milton, both of which show the influence of the masques that preceded them. Indeed, as Mr. Symonds has said, in *Comus* a reader sees "how the scenic elements of the masque, touching the fancy of a great poet, became converted into flawless poetry beneath his hand." With the coming of the Commonwealth and the cessation of all dramatic performances, the masque practically disappeared. See, in general, Symonds, *The Predecessors of Shakspere*; Ward, *A History of English Dramatic Literature*; for Jonson's masques, see Carisbrooke Library, *Masques and Entertainments of Ben Jonson.* GEORGE P. BAKER.

Mass: See FORCE and DYNAMICS.

Mass: in the Roman Catholic Church, the Eucharistic oblation. The derivation of the word is disputed. Most probably it comes from the termination of the service, *Ite, missa* (= demissio) *est* (sc. *ecclesia*)—Go, you are dismissed—and not from the Hebrew, מַסָּה, *missah*, or the Greek *μύησις*. The Mass is offered in obedience to Christ's command, "Do this for a commemoration of me." (See TRANSUBSTANTIATION.) It is a sacrifice in which the separate consecration of the bread and of the wine "shews the death of the Lord" (1 Cor. xi. 26), and in which his body and blood are received in communion. These essentials of the Mass are preceded and followed by extracts from the Psalms, Epistles, and Gospels, and by prayers, some of which are always recited, while others vary according to the season or according to the purpose for which the Mass is offered. These, as well as the ceremonies of the Mass, differ considerably in the various rites. In the Western Church, the Latin rite prevails; in the Eastern, the Greek, Syriac, Coptic, etc., are still distinct. A *Low* Mass is one which is celebrated without chant, incense, or the assistance of deacon and sub-deacon. With these additions it is called a *High* Mass. A *Requiem* Mass is offered for the dead, and *Pontifical* Mass is celebrated by a bishop. J. J. KEANE.

Mas'sa, or **Massa di Carrara**: town in the province of Massa, Italy; on the Frigido; 76 miles S. E. of Genoa (see map of Italy, ref. 4–C). The mildness and salubrity of the climate are almost unrivaled in Italy. The city is a bishop's see, and has several educational institutions and a public library. Tobacco, oil, and paper are manufactured. The national palace is a noble structure, built by the princes



MA
VERMONT
NEW YORK
HAMPSHIRE
CONNECTICUT
BERKSHIRE
FRANKLIN
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HAMPDEN
WORCESTER
LONG ISLAND SOUND
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72°
C
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Longitude
Wes
Bellows Falls
Walpole
Munsonville
Newfane
Manchester
Glastenbury
Bennington
Wilmington
Brattleborough
Keene
Winchester
Greenville
Peterborou
Antrim
Readsborough
S.Vernon Jc.
Williamstown
North Adams
Greylock Peak
Saddle Mt.
Saddle Ball Mt.
Cheshire
Lanesborough
Pittsfield
Dalton
Perry's Peak
Lenox
Lee
Stockbridge
Great Barrington
Sheffield
Mt.Everett
Mt.Washington
Ashley Falls
Canaan
Monroe
Florida
Rowe
Davis
Heath
Charlemont
Buckland
Shelburne Falls
Colerain
Greenfield
Deerfield
Montague
Northfield
Grace Mt.
Warwick
Royalston
Winchendon
Athol
Orange
Bear Mt.
Wendell
Templeton
Gardner
Ashburnham
Wachusett M
Watati
Plainfield
Ashfield
Conway
Sunderland
Leverett
Shutesbury
Packard's Mt.
Petersham
Hubbardston
Hawes Hill
Princeton
Amherst
Pelham
Mt.Lincoln
Mt.Lizzie
Hardwick
Barre
Rutland
Holden
Worces
Paxton
Mt.McDougal
Tuft's Hill
Spencer
Leicester
Auburn
Northampton
Hadley
Mt.Holyoke
Easthampton
Mt.Tom
South Hadley
Holyoke
Chicopee
Springfield
Westfield
Mt.Tekoa
Provins Mt.
Agawam
Longmeadow
Wilbraham
Palmer
Monson
Hitchcock's Mt.
Moon Mt.
Peaked Mt.
Colonel's Mt.
Ware
Brimfield
Sturbridge
Charlton
Oxford
Dudley
Holland
Wales
Thompson
Putnam
Killingly
Mashapaug
Stafford Springs
Suffield
Windsor Locks
Thompsonville
Congamuck Pond
Falls Village
Winsted
Cornwall
Torrington
New Hartford
Litchfield
HARTFORD
Rockville
Tolland
Vernon
Manchester
S.Manchester
Warrenville
Brooklyn
Willimantic
Farmington
New Britain
Thomaston
Plainfield
Southington
Watertown
New Milford
Waterbury
Middletown
Connecticut R.
Meriden
Colchester
Jewett City
Norwich
Naugatuck
Wallingford
Haddam
Montville
Allyn's Pt.
Thames R.
Danbury
Bethel
Clintonville
Housatonic R.
Naugatuck
Essex
Saybrook
Lyme
Fenwick
New London
Stonington
Derby
New Haven
Guilford
Branchville
Milford
Morgan's Pt.
Hammonasset Pt.
Bridgeport
Stratford Pt.
Norwalk
Wilson Pt.
FISHER'S I.
GULL I.
PLUM I.
Plum Gut
GARDINER'S I.
Greenport
SHELTER I.
LONG ISLAND
Mon

HUSETTS
Scale of Miles
0 5 10 15 20 25
County Towns
MAINE
Piscataqua R.
Portsmouth
ISLES OF SHOALS
ATLANTIC OCEAN
MASSACHUSETTS BAY
CAPE COD BAY
NANTUCKET SOUND
BUZZARDS BAY
VINEYARD SOUND
Cape Ann
Gloucester
Rockport
Eastern Pt.
Salem
Lynn
Nahant
Chelsea
Charlestown
BOSTON
Cambridge
Somerville
Newton
Lowell
Lawrence
Haverhill
Newburyport
Salisbury Beach
Mouth of Merrimac R.
Plum I.
Brockton
Taunton
Fall River
New Bedford
Plymouth
Plymouth Bay
Gurnet Pt.
Duxbury Beach
Pt. Allerton
Nantasket
Cape Cod
Provincetown
Truro
Wellfleet
Eastham
Orleans
Chatham
Harwich
Hyannis
Barnstable
Yarmouth Port
Sandwich
Falmouth
Woods Hole
Monomoy I.
Nauset Beach
Manomet Point
Elisha's Point
Lookout Pt.
PROVIDENCE
NEWPORT
Narragansett Bay
Narragansett Pier
Pt. Judith
BLOCK ISLAND
Kingston
East Greenwich
Coventry
Wickford
ELIZABETH IS.
NASHAWENA I.
CUTTYHUNK I.
NAUSHON I.
PASQUE I.
NONAMESSET I.
MARTHA'S VINEYARD ISLAND
Gay Head
Chilmark
Tisbury
Vineyard Haven
Edgartown
Cottage City
Cape Poge
CHAPPAQUIDDICK ISLAND
Muskeget Channel
MUSKEGAT I.
TUCKERNUCK I.
NANTUCKET ISLAND
Nantucket
Siasconset
Great Point
Sankaty Head
NO MAN'S LAND
DUKES
NANTUCKET
BARNSTABLE
PLYMOUTH
BRISTOL
NORFOLK
SUFFOLK
MIDDLESEX
ESSEX
RHODE ISLAND
NEW HAMPSHIRE
H
J
K
L
71°
70°30′
70°
71°30′
Greenwich
43°
42°30′
42°
41°30′
1
2
3
4
5
6

of the house of Cybo. Massa is first mentioned in the ninth century. It was for a long time subject to the republic of Lucca, but in the fifteenth century the Cybo family became its feudal lords, and Alberic I. built the new town and gave Massa a civil and penal code remarkable for that age. Pop. (1881) 8,998.

Massachusetts: one of the U. S. of North America (North Atlantic group); the sixth of the original thirteen States that ratified the Federal Constitution; popularly known as the Bay State.

Location and Area.—It lies between the parallels of 41° 14′ (south shore of Nantucket) and 42° 53′ N., and between the meridians of 69° 55′ and 73° 30′ W. lon. from Greenwich; bounded on the N. by Vermont and New Hampshire, on the E. by the Atlantic Ocean, on the S. by the Atlantic Ocean, Rhode Island, and Connecticut, on the W. by New York State; greatest length, from Nauset Beach, Cape Cod, to the western line of Mt. Washington township, 184 miles; distance from Cape Ann to the New York State line, same parallel, 138 miles; greatest breadth from the New Hampshire line at Salisbury to the southern line of Nantucket, 113¾ miles; average breadth between Vermont and New Hampshire on the N. and Connecticut and Rhode Island on the S., 47¾ miles. The measurement of its area, taken from the Borden State map in 1844, is 8,500 sq. miles; from surveys and maps of H. F. Walling, 8,160 sq. miles; from the map of the Coast and Geodetic Survey, 8,336 sq. miles; from the topographical survey in 1887, as given in the report of Henry Gannett of the U. S. Geological Survey to the commissioners, 8,315 sq. miles. The mean of these different estimates is 8,327 sq. miles. The area of ocean water from the low-water line of the coast, as defined by statute, to the "outer line of the Commonwealth," one marine league from this low-water shore-line, is 1,941 sq. miles, making the total area of land and water within the jurisdiction of the Commonwealth, as based upon the above estimates, 10,268 sq. miles. Its entire coast-line, including the shores of capes and bays, but excluding minor indentations and islands, is nearly 300 miles.

Seal of Massachusetts.

Physical Features.—The extreme western part of the State is crossed by two mountain chains—the Taconic, or Taghkanic, and the Hoosac, a continuation of the Green Mountains of Vermont. These inclose the Housatonic valley, which at its northern end is 1,100 feet above the sea, and at its southern 800 feet. The Taconic range contains the highest eminence in the State: Greylock, or Saddleback, in Adams township, Berkshire County, 3,505 feet high, and Mt. Everett, or Washington, in the southwestern corner of the same county, 2,624 feet high. The Hoosac range has a somewhat regular elevation of from 1,200 to 1,600 feet, and never exceeds 2,510 feet. A rugged table-land from 1,000 to 1,500 feet high, and cleft by deep river valleys, extends from the Hoosac Mountains to the Connecticut river valley. Here is found a series of distinct trap ridges, the continuation of a range having its southern end in West Rock, at New Haven, Conn. This, as it enters Massachusetts, approaches the Connecticut in a northeasterly direction until, near the western bank of the river, a few miles below Northampton, it rises to a height (Mt. Tom) of 1,200 feet. On the opposite side of the river, in South Hadley, it attains (Mt. Holyoke) a height of 1,120 feet; then curving more to the E. it extends for 10 miles. The valleys of the Connecticut, the Deerfield, and the Housatonic, are noted for their beautiful scenery. The surface between the Connecticut and Blackstone rivers is mainly a broken table-land about 1,000 feet high, containing a number of isolated summits, which belong to the mountain system of New Hampshire. Wachusett, the most conspicuous, is 2,018 feet high. The State, E. of Worcester County, is undulating or hilly, descending gradually toward the ocean. The coast counties, especially Bristol and Plymouth, contain large tracts of nearly level land, from which rise rounded hills. The highest point of land near the ocean (620 feet) belongs to the Blue Hills of Milton. The rocks at Cape Ann are bold and picturesque. Cape Cod, comprising the county of Barnstable, largely consists of glacial sands and gravels, interspersed with numerous ponds, but contains arable land. From the line separating the towns of Plymouth and Bourne it extends eastward about 35 miles, rarely exceeding 7 miles in width, then bends toward the N. and finally curves toward the W. The eastern coast of the State is bordered in places by extensive salt marshes, and in the southeastern counties there are numerous swamps, where cranberry-culture is carried on. Like Cape Cod, the islands S. of the State are moderately level and sandy. The principal islands are Martha's Vineyard (about 100 sq. miles) and the sixteen Elizabeth islands (about 13 sq. miles), constituting the county of Dukes; Nantucket (about 17 miles long) which, with three or four small islands, constitutes Nantucket County; Monomoy, off the southeastern extremity of Cape Cod, and Plum island, a sand spit, off the northeastern coast of Essex County.

Bays, Harbors, Rivers, and Lakes.—The largest bay is Massachusetts, which contains Boston Bay, Lynn, Marblehead, Salem and Gloucester harbors; Cape Cod, next in size, contains Duxbury Bay, Plymouth harbor, Barnstable harbor, Wellfleet Bay, and Provincetown harbor, at Provincetown. Third in size is Buzzard's Bay, 30 miles in length and averaging 8 miles in width, sheltered from the Atlantic by the Elizabeth islands and containing New Bedford, Fairhaven, Wareham, and other harbors. Cotuit harbor and Lewis Bay on the south side of the Cape, and Pleasant Bay and Nauset harbor on the open Atlantic side, are among the numerous indentations of the coast-line. Martha's Vineyard has the harbors of Vineyard Haven and Edgartown; Nantucket has a deep and nearly landlocked harbor. North of Boston harbor are Lynn harbor, Nahant Bay, Marblehead, Salem, Beverly, and Gloucester harbors, Sandy Bay in Rockport, Annisquam harbor on the northern coast of Cape Ann, and the harbor formed by the mouth of Merrimac river. The harbor of New Bedford ranks next to that of Boston in its advantages. The stretch of water between the Elizabeth islands and Martha's Vineyard is called Vineyard Sound, and that between the mainland and Nantucket, Nantucket Sound. The principal river, the Connecticut, has a course of more than 50 miles in Massachusetts, cutting through the range containing Mt. Tom and Mt. Holyoke. Its width varies from 450 to 1,000 feet; at Montague and at South Hadley it is broken by falls; at Springfield its bed is only 40 feet above the ocean. Its watershed in the State has a breadth from E. to W. of about 60 miles. Its chief tributaries from the W. are the Agawam or Westfield and the Deerfield rivers. The principal tributaries from the east are Miller's and Chicopee rivers. The Housatonic rises in Berkshire County, and flows through Connecticut into Long Island Sound. The northwestern part of the State is drained by the Hoosac, which passes into New York State and joins the Hudson. The largest stream E. of the Connecticut, the Merrimac, has its sources in New Hampshire, but for 35 miles it flows through Massachusetts and empties into the Atlantic at Newburyport. It is navigable for vessels of 200 tons as far as Haverhill, 15 miles from its mouth, and on its banks are situated Lawrence, Lowell, and other large manufacturing cities. The Nashua unites with the Merrimac in New Hampshire, but has its sources in Worcester co., Mass. The Concord, another tributary, is formed by the junction of the Sudbury and Assabet rivers, and joins the Merrimac at Lowell. The Charles river, a winding stream about 75 miles in length, empties into the estuary between Boston and Cambridge. It is navigable to Watertown, 7 miles from Boston. The Blackstone river, 75 miles in length, rises in Worcester County, crosses the northeastern corner of Rhode Island, and below Providence expands into an estuary called Pawtucket or Seekonk river, an extension of Providence Bay. Taunton river rises in Plymouth County and empties in Mt. Hope Bay at Fall River. It is navigable as far as Taunton. Smaller rivers are the French, Mill, Ware, Swift, Shawsheen, Spicket, and Nemasket. Nearly all the streams are utilized for manufacturing purposes. Lake Quinsigamond, near Worcester, Watuppa Pond, near Fall River, and Long, Assowompsett, and Great Quittacus Ponds in Plymouth County are among the few landlocked bodies of water of large size.

Geology.—Most of the geological strata extend in broad bands across the State from N. to S. The rocks are largely metamorphic, both the Archæan and Palæozoic systems being represented. To the former Hitchcock assigns the feldspathic and calcarĕous gneiss of the Hoosac range, small areas of syenite on either side of the Connecticut valley sandstones, the wide stretch of gneissic rocks between the Connecticut river and Worcester, the mica schists found in connection with granite about Amherst and Leverett, the syenite and porphyry of Eastern Massachusetts, and possibly the feldspathic gneiss and the granite of Plymouth and Bristol Counties, and the gneiss and hornblende schist of Middlesex County. Syenite covers most of Essex and Norfolk Counties; Archæan and Palæozoic granite is found along the coast (on Cape Ann and at Quincy and other places there are extensive quarries), also in parts of Hampshire and Franklin Counties. Bolerites form the Holyoke range. The Palæozoic series W. of the Connecticut include Cambrian, Silurian, and even Devonian limestones, quartzites, schists, and slates. Olenellus and Paradoxides, limestones and slates occur in Essex and Middlesex Counties; grits and conglomerates, of probable Carboniferous age, in Suffolk County. A great part of Bristol and Plymouth Counties consists of Carboniferous rocks, but the anthracite they contain is of little value. The Connecticut valley basin is composed of Mesozoic sandstones and shales of great thickness, containing the fossil footprints of large reptiles, amphibia, and other forms of animal life. The strata of the west part of Martha's Vineyard are Cretaceous and Tertiary, the latter probably of Miocene age. Cape Cod, Nantucket, and the east part of Martha's Vineyard superficially are composed of drift material, a confused mass of bowlders, sand, and gravel. The same materials are found in the Connecticut, Housatonic, and other minor valleys; and the effects of the ice-sheet that at one time covered the State are everywhere seen. The Elizabeth islands and Nantucket are in part formed of terminal moraines. Bowlders of large size are numerous on Cape Ann, Cape Cod, and elsewhere. The famous Plymouth rock is a bowlder which was transported from the northern part of the State.

The principal mineral resource is granite, in the production of which the State has ranked first for many years. Several varieties are found, viz.: Hornblende, in Norfolk and Essex Counties; hornblende-biotite, in Essex County; epidote, in Norfolk County; biotite in Norfolk, Middlesex, Bristol, Worcester, and Plymouth Counties; biotite-muscovite, in Worcester and Berkshire Counties; and also biotite-gneiss, in Middlesex, Essex, Worcester, and Hampden Counties; diabase, in Middlesex and Hampden Counties; and melaphyre, in Suffolk County. In the census year 1890 there were 151 quarries in operation; the combined production was 9,587,996 cubic feet; and the total value was $2,503,503. Of the production 6,643,703 cubic feet were for building purposes; 1,475,093 cubic feet were for street work; 509,087 cubic feet were for cemetery, monumental, and decorative purposes; 252,288 cubic feet were for bridge, dam, and railway work; and 707,825 cubic feet were for miscellaneous purposes. Of sandstone, 21 quarries yielded 1,967,179 cubic feet, valued at $649,097; and of limestone, 12 quarries yielded a product valued at $119,978. Brick clay is found in the valleys of all the principal streams; cretaceous clay on the islands S. of the coast at Gay Head; rhodonite, a beautiful ornamental stone, said to be as rich as the Siberian variety, near Cummington; and rock kaolin at Andover. In 1899 the value of the principal mineral productions was: Granite, $1,798,294; sandstone, $131,877; slate, $800; marble, $59,416; and limestone, $168,147; total value, $2,158,534. Of iron ore, 29,611 long tons of brown hematite were mined in Massachusetts and Connecticut in 1899. There are a number of well-known mineral and other springs, whose waters have a large sale.

Soil and Productions.—Much of the soil is naturally sterile. Excepting Cape Cod, where there are long stretches of sandy, treeless flats, the surface was originally covered with heavy forests. After the forest growths were removed, the soil did not yield to the farmer so quickly and freely as had been anticipated, and the present productiveness is due to his skill and patience in cultivation in a larger measure than has been the case in almost any other agricultural State. There are found in the State, 3 species of pine, 12 of oak, 4 of hickory, 6 of birch, 5 of poplar, 11 of willow, 2 of elm, 2 of cedar, 3 of ash, 4 of cherry, 5 of maple, besides several species of laurel, cornel, viburnum, sumach, elder, and grape; the beech, butternut, black walnut, spruce, larch, hornbeam, tulip-tree, tupelo, buttonwood, mountain ash, sassafras, dogwood, holly, rhododendron, sweet bay or small magnolia, and many other trees and shrubs. The State board of agriculture and the State agricultural experiment station at Amherst have greatly aided the farmer in making fertile a soil naturally unpromising.

The following table shows the acreage, yield, and value of the principal crops for the calendar year 1900:

CROPS.	Acreage.	Yield.	Value.
Corn	40,667	1,545,346 bush.	$834,487
Oats	14,967	550,786 "	209,299
Rye	7,914	133,747 "	100,310
Barley	1,661	42,854 "	29,569
Buckwheat	2,187	37,179 "	26,769
Potatoes	28,626	2,261,454 "	1,492,560
Tobacco (1896)	1,975	3,199,500 lb.	383,940
Hay	567,079	550,067 tons	9,571,166
Totals	665,076	.....	$12,648,100

The number and value of farm animals on Jan. 1, 1900, were estimated as follows: Horses, 66,017, value $5,154,136; milch-cows, 181,589, value $6,755,111; oxen and other cattle, 73,378, value $1,990,270; sheep, 40,194, value $182,883; and swine (estimated), 60,000, value $725,000—total head 421,178, total value $14,807,400.

Zoölogy.—With the exception of deer, protected by law in Plymouth and Barnstable Counties, and the wild-cat the large wild animals have become extinct. The existing mammals include the gray and the red fox, the mink, land otter, raccoon, porcupine, muskrat, woodchuck, weasel, grampus, and porpoise. The authentic species of birds found in the State number 316. Of these, about 135 breed within the limits of the State and 70 are classed as rare or occasional visitors. There are over 100 species of marine fishes; about 20 species are found in the fresh-water streams and ponds. There are marked differences between many of the fishes and mollusks found on the north and south sides of Cape Cod. Among the reptiles are 3 species of venemous snakes.

Climate.—The climate in general is cool, with prevailing east and northeast winds from February to May, and with west and southwest winds during the summer and fall. A marked characteristic is its variety. A winter is seldom passed without a few days of extreme cold weather, and short spells of extreme heat are often experienced in summer. The winter season from December to March is usually cold and rigorous, the ground being sometimes covered with snow during most of the entire period. The proportion of snow and rain in the eastern or coast section is considerably less than in the interior or western part of the State. In the eastern section the spring is in advance of the interior and western parts, generally from a week to a fortnight, and the frosts, except in some particular localities, are not so early or severe. Droughts of longer or shorter duration are often experienced, but the climate on the whole is favorable for agriculture. The average annual rainfall is about 48 inches.

The following table shows the average rainfall at Springfield, in the Connecticut valley, and at Boston, on the coast:

MONTHS.	Boston, average for 23 years.	Springfield, average for 46 years.
May	3·57	4·17
June	3·22	3·80
July	3·59	4·51
August	4·47	4·53
September	3·00	3·49
October	4·06	4·15

The following table shows the average temperature of the two cities:

MONTHS.	Boston, average for 23 years.	Springfield, average for 26 years.
May	56·2°	59·2°
June	65·9°	68·8°
July	71·8°	73·2°
August	68·5°	70·6°
September	62·1°	62·8°
October	51·5°	50·9°

At Amherst, where the meteorological observatory of the Massachusetts Agricultural College is located, the average temperature from 1836–62 (twenty-five years) was December, January, and February, 24·53° F.; June, July, August, 68·26° F.; and from 1862–87 (twenty-five years) December, January, February, 25·21° F.; June, July, August, 68·53° F.

Divisions.—For administrative purposes, Massachusetts is divided into fourteen counties, as follows:

COUNTIES AND COUNTY-TOWNS, WITH POPULATION, FOR 1900.

COUNTIES.	*Ref.	Pop. 1890.	Pop. 1900.	COUNTY-TOWNS.	Pop. 1900.
Barnstable	5-K	29,172	27,826	Barnstable	4,364
Berkshire	2-C	81,108	95,667	Pittsfield	21,766
Bristol	5-I	186,465	252,029	New Bedford	62,442
				Taunton	31,036
Dukes	6-J	4,369	4,561	Edgartown	1,209
Essex	1-I	299,995	357,030	Lawrence	62,559
				Newburyport	14,478
				Salem	35,956
Franklin	2-E	38,610	41,209	Greenfield	7,927
Hampden	3-D	135,713	175,603	Springfield	62,059
Hampshire	3-E	51,859	58,820	Northampton	18,643
Middlesex	2-H	431,167	565,696	Cambridge	91,886
				Lowell	94,969
Nantucket	6-K	3,268	3,006	Nantucket	3,006
Norfolk	5-I	118,950	151,539	Dedham	7,457
Plymouth	4-J	92,700	113,985	Plymouth	9,592
Suffolk	2-I	484,780	611,417	Boston	560,892
Worcester	3-F	280,787	346,958	Fitchburg	31,531
				Worcester	118,421
Totals	.....	2,238,943	2,805,346		

* Reference for location of counties, see map of Massachusetts.

Cities and Towns, with Population in 1900.—Boston, 560,892; Worcester, 118,421; Fall River, 104,863; Lowell, 94,969; Cambridge, 91,886; Lynn, 68,513; Lawrence, 62,559; New Bedford, 62,442; Springfield, 62,059; Somerville, 61,643; Holyoke, 45,712; Brockton, 40,063; Haverhill, 37,175; Salem, 35,956; Chelsea, 34,072; Malden, 33,664; Newton, 33,587; Fitchburg, 31,531; Taunton, 31,036; Gloucester, 26,121; Everett, 24,336; North Adams, 24,200; Quincy, 23,899; Waltham, 23,481; and Pittsfield, 21,766, all other cities and towns being under 20,000.

Population.—Pop. (1890) 2,238,943, of whom 1,087,709 were male, 1,151,234 female, 1,581,806 native, 657,137 foreign, 2,215,373 white, 23,570 colored. The colored comprised the following elements: Of African descent, 22,144; Chinese, 984; civilized Indians, 424; Japanese, 18. The population in 1900 was 2,805,346.

Industries and Business Interests.—The State is extensively devoted to manufacturing. The leading industries are textiles, boots and shoes, machines and machinery, metals and metallic goods, and paper and paper goods. Bulletins of the eleventh U. S. census (1890) report the following statistics as to capital invested, persons employed, and output in the various branches of the textile industry: Cotton—persons employed, 75,544: capital invested, $128,838,837; value of output, $100,202,882. Woolen goods (including woolens, worsteds, wool hats, carpets, felt goods, and hosiery and knit goods)—persons employed, 43,038; capital invested, $75,665,637; value of output, $72,681,408. Shoddy—persons employed, 435; capital invested, $939,050; value of output, $1,170,080. Silks (including trimmings, braids, and other silk goods)—persons employed, 2,993; capital invested, $3,353,296; value of output, $5,557,569. Dyeing and finishing textiles—persons employed, 4,270; capital invested, $11,996,154; value of work done, $6,496,215. Returns annually made to the State bureau of statistics of labor indicate capital invested and annual output in the other leading industries as follows: Boots and shoes—capital invested, $41,906,981; annual output, $145,151,981. Machines and machinery—capital invested, $33,366,848; annual output, $31,101,816. Metals and metallic goods—capital invested, $39,580,082; annual output, $57,800,054. Paper and paper goods—capital invested, $22,931,364; annual output, $28,853,520. The entire capital invested in all industries in the Commonwealth is estimated at $568,963,681, and the aggregate output at $871,061,163. The official report for 1898 on manufactures showed 4,700 establishments with invested capital of more than $113,000,000. The wages paid amounted to $2,800,000 a week. In the State factories there were 7,799,872 spindles, and $110,655,603 invested in the manufacture of cotton goods.

Fisheries.—In the census year 1890 there were 101 vessels of the U. S. engaged in the pelagic whaling industry, and of the total 70, or 69·31 per cent., hailed from ports in Massachusetts, which also had 65·34 per cent. of the total tonnage. Of the home ports, Boston had 1 vessel; Edgartown, 3; New Bedford, 57; and Provincetown, 9. These vessels were valued at $578,800, and carried apparatus valued at $95,376, and an aggregate crew of 1,909 persons. The product of the year's fisheries was: Sperm oil, 718,065 gal., value $454,700; ambergris, 73 lb., value $23,200; ivory, 1,649 lb., value $1,424; whalebone, 125,931 lb., value $419,520; and whale oil, 232,238 gal., value $89,643: total value of products, $988,487. Both the whaling and inland fisheries have declined greatly in recent years. Of the latter the greatest falling off is in mackerel. From 1886 to 1894 the number of barrels inspected in Boston and Gloucester averaged fewer than 60,000. For the twenty-five years previous to 1886 the average was more than 200,000. The statistics of the State Bureau of Labor for 1895 give the following: Number of men engaged, 11,093; working capital, $4,488,564; value of apparatus, $599,267; chief catches, cod, 81,092,958 lb., oysters, 71,222 bush., lobsters, 2,119,587 lb. In the year ending Dec. 6, 1898, 49,952,000 lb. of fresh fish were landed at Gloucester, and 47,207,000 at Boston. These included, in addition to the above, haddock, herring, shad, menhaden, striped bass, scup, squeteague, Spanish mackerel, bluefish, tautog, flounders, flatfish, and other edible fishes.

Commerce.—Massachusetts has eleven ports of entry: Barnstable, Boston, Edgartown, Fall River, Gloucester, Marblehead, Nantucket, New Bedford, Newburyport, Plymouth, and Salem.

Finance.—On Jan. 1, 1901, the actual State debt, for the payment of which the State is directly liable, was $26,996,423.30; the contingent debt, for which certain cities and towns are liable, $39,043,412; sinking fund applicable to actual debt $15,292,256.85, to contingent debt $2,931,147.09. The receipts in 1893 were $33,188,466; expenditures, $30,374,333; and the cash in the treasury Jan. 1, 1894, $9,251,380.

In 1883 the assessed valuations were, real $1,226,111,297, personal $505,185,764, total $1,731,297,061; in 1893, real $1,839,663,813, personal $1,588,675,216, total $3,428,339,029. Of the 1893 total, $956,767,626 were assessed in Boston and other parts of Suffolk County. The State tax levied in 1893 was $2,500,000.

Banking and Insurance.—The national banks on Sept. 5, 1900, numbered 247, and had a combined capital of $78,502,500, surplus and profits, $42,823,202.40, and individual deposits, $213,178,519.47. June 30, 1900, there were 186 savings-banks, with 1,491,143 depositors, and $533,845,790 in deposits; surplus and profits, $34,629,320. On the same date there were 34 loan and trust companies, with $11,375,000 capital; surplus and profits, $11,026,552; and deposits, $105,674,935.

In 1893 there were 52 mutual fire-insurance companies, 2 mutual marine, and 11 joint-stock, all belonging to the State; 78 fire-insurance companies of other States licensed to transact business in Massachusetts, and 34 foreign fire-companies; total fire and marine companies, 177.

Means of Communication.—The building of railways in the State was begun in 1832. June 30, 1899, there were 2,122·86 miles of railway in the State. Massachusetts has more miles of railway in proportion to its area than any other State except New Jersey, and any country except Belgium. The railways are owned by fifty-one different corporations, but five companies, the Boston and Albany, the Boston and Maine, the Fitchburg, the New York and New England, and the New York, New Haven and Hartford, control and operate, under lease or otherwise, nearly the entire mileage.

Churches.—The U. S. census of 1890 gave the following statistics of the principal religious bodies:

DENOMINATIONS.	Organizations.	Churches and halls.	Members.	Value of church property.
Roman Catholic	381	383	614,627	$9,816,003
Congregational	559	686	101,890	11,030,890
Baptist	318	361	59,830	6,107,830
Methodist Episcopal	394	394	58,477	5,180,825
Unitarian	189	224	34,610	5,278,370
Protestant Episcopal	166	180	26,855	4,676,193
Spiritualist	61	62	7,345	269,710
Universalist	121	124	7,142	2,110,193
Presb. in the U. S. of America	18	21	3,570	365,500

Schools.—The public schools, including all the text-books and appliances used in them, are entirely free to all, and education is compulsory between the ages of seven and fourteen. The control of the schools is vested in the local authorities, and the State gives aid in providing expert supervision which extends over most of the schools. There is a State school fund, half of the income of which supports the normal schools and other general educational work, and the other half is distributed to the towns. The balance expended comes from local taxation. The total expenditure

for public schools in 1900 was $13,826,243, of which all but $275,849 was raised by local taxation. The local tax rate for school purposes was $4.71 for each $1,000 of valuation. In 1899 there were 3,395 schools; valuation of school property, $39,077,405; number of teachers, 13,402—male 1,197, female 12,205; average monthly salaries, male $136.23, female $51.41. It was estimated that there were 627,000 children between 5 and 18 years of age, of whom 471,977 were enrolled in public schools and 71,460 in private schools. The average daily attendance was 360,317, and the average expense per pupil, based on the average daily attendance, $38.55. School was held 9½ months of the year 1900. Free normal schools are maintained by the State in Bridgewater, Fitchburg, Framingham, Salem, Westfield, and Worcester for the training of teachers, and there is a State Normal Art School in Boston. For industrial training there are finely appointed schools in Boston, Cambridge, and Brookline. The Horace Mann School for the Deaf in Boston, the Clarke Institution at Northampton for the same class, the Perkins Institution and Massachusetts School for the Blind in South Boston, and Massachusetts School for the Feeble-minded at Waltham, are noble and widely known institutions. There were in 1899, 386 kindergartens and private schools with kindergarten departments, with 733 teachers and 18,161 pupils. There were 232 public high schools, with 1,402 teachers and 34,425 pupils; and 101 endowed academies, seminaries, and other institutions for secondary instruction. The universities and colleges of liberal arts were Amherst College (*q. v.*), Boston College, Boston University, Harvard University (*q. v.*), French Protestant College in Springfield, Tufts College (*q. v.*), Williams College (*q. v.*), Clark University, and the College of the Holy Cross in Worcester. The colleges for women comprised Smith College (*q. v.*), Mt. Holyoke College (*q. v.*), Wellesley College (*q. v.*), and Radcliffe College (Society for the Collegiate Education of Women), Cambridge. Other notable institutions for female education are Abbott Academy, Andover and Bradford Academy, Lassell Seminary in Auburndale, and Wheaton Female Seminary in Norton. There were 2 schools of science endowed with the national land grant—the Massachusetts Agricultural College in Amherst, and the Massachusetts Institute of Technology in Boston. The principal schools of law, medicine, theology, pharmacy, veterinary surgery, dentistry, etc., were departments of the large colleges and universities.

Public Libraries.—The number of public libraries in 1891 in the State containing 1,000 volumes and upward was 508. The aggregate number of volumes in these libraries was 4,650,088, and the number of pamphlets 1,102,401. There are 352 towns and cities in the State, and 308 of these contain free public libraries—that is, libraries that allow the free circulation of books for general reading to the homes of all the inhabitants, and that are managed as a public trust. State aid is conditionally granted to aid the formation of libraries in the smaller towns, and over $6,500,000 has been given or bequeathed by individual citizens to found or provide buildings for this class of libraries. There are only 44 towns without such free collections of books. In this statement the collections owned by institutions and associations like those at Harvard College and the Boston Athenæum are not included.

Charitable, Reformatory, and Penal Institutions.—The principal ones are the State Lunatic Hospitals at Danvers, Northampton, Westborough, Taunton; two at Worcester, Hospital for Dipsomaniacs and Inebriates, School for the Feeble-minded at Waltham, State Almshouse in Tewksbury, State farm at Bridgewater, State Prison in Boston, State Reformatory in Concord, Reformatory Prison for Women in Sherborn, State Primary and Reform Schools at Westborough, Lancaster, and Monson, and the usual county institutions. There are also large general hospitals in Boston and many other cities, and special institutions for the care of deaf-mutes, the blind, children, and other special classes.

Post-Offices and Periodicals.—On Jan. 1, 1901, there were 844 post-offices, of which 175 were presidential (16 first-class, 55 second-class, 104 third-class) and 669 fourth-class. There were 816 money-order offices and 182 money-order stations. Of newspapers and periodicals there were 84 of daily, 5 semi-weekly, 448 weekly, 8 bi-weekly, 11 semi-monthly, 132 monthly, 1 bi-monthly, 25 of quarterly publications, and 1 five times a year; total, 715.

History.—The aboriginal inhabitants of Massachusetts at the time of its permanent settlement by whites belonged to the Algonquian stock, and chiefly lived E. of the Connecticut river. The claim is made by some writers that Southeastern Massachusetts, including the large islands, was discovered about 1000–03 by Leif Erikson (*q. v.*) and his brother Thorwald, of Norwegian descent; that several Norse settlements were made during a period lasting 300 years, and that one of these, called Norumbega, was situated on the Charles river. There is no evidence to prove that the Cabots landed on the shores of New England, but England laid claim to the territory because at the time of John Cabot's discovery of Newfoundland and the mainland he was in her service. In 1602 Bartholomew Gosnold, an Englishman, with a small colony, landed in or near Salem harbor, subsequently coasted along Cape Cod, as he named it, on account of the abundance of fish caught there, and discovered the Elizabeth islands and the island of No Man's Land. His party made a settlement on the island of Cuttyhunk, but soon became disorganized and abandoned it. In 1603 another attempt at a settlement was made on or near the present site of Edgartown, Martha's Vineyard, by a colony under Martin Prynne; this also failed, as did that of George Waymouth in 1605. The first colony that proved successful was one from Leyden, Holland. It was composed of a portion of a church of English exiles, originally from Nottinghamshire and adjoining counties, who had separated from the Established Church, and in 1607–08 had fled to Holland to escape persecution. (See Robinson, John.) Hoping to better their condition and to preserve their identity as Englishmen, they obtained a patent from the Council for New England, binding themselves, in return for assistance given, to return a share of their profits in trade for seven years. The emigrants sailed in 1620 from Delftshaven, Holland, and finally, 101 in number, from Plymouth, England, in the Mayflower, a vessel of 180 tons. They had intended to settle somewhere S. of the mouth of Hudson river, but the ship was driven by storms out of its course and anchored in Provincetown Bay, Nov. 11. This was beyond the limits of the territory covered by their patent, and deeming it prudent to establish some kind of government before landing, the leaders of the expedition drew up a constitution or social compact, by the terms of which the colony was to be ruled, and soon after John Carver was chosen Governor for one year. After exploring the coast they landed at Plymouth, Dec. 11 o. s. (See Forefathers' Day.) During the winter they endured great privations, and lost nearly half their number by death. Meanwhile (1622–23) a rival colony had been planted at Wessagussett (now Weymouth) by Thomas Weston, a London merchant, and had failed disastrously, as did another under Robert Gorges (1623–24). Plymouth colony, having attempted in vain to obtain a charter, continued to govern itself with success. In 1624 a board of five assistants was chosen to aid the Governor, and the governing council was chosen yearly by all the inhabitants. In 1623 a small company of fishermen from Dorchester, England, settled on Cape Ann, but in 1626 abandoned the site, and part of them removed to Salem. Here they were joined in 1628 by a party of Puritans under John Endicott, one of the proprietors of a land company which had obtained a grant on Massachusetts Bay. In 1629 a charter was granted to the patentees and their associates in England, establishing a corporation and making the associates a body politic with power to establish a subordinate government in the new world. The officers were to consist of a Governor, deputy, and eighteen assistants, to be annually elected, and the legislative powers were intrusted to a general assembly of the freemen. In 1629 another body of settlers arrived, and in the same year it was decided to transfer the charter and government to Massachusetts. John Winthrop was appointed Governor, and in 1630 arrived with about 1,000 persons. Immigration continued; Boston, Dorchester, Lynn, and other towns were settled, and the wealth and social standing of the colonists, a few of whom belonged to the nobility, gave the Bay colony prominence. These Puritans soon adopted the "congregational way" of church government as practiced by the Plymouth Pilgrims. In 1651 Congregationalism was established by law.

By the terms of the charter the founders of Massachusetts were permitted to make laws and ordinances "not repugnant to the laws of England," and to "repulse and exclude" all persons whom they should believe to be undesirable as settlers. They proceeded to give the charter a liberal construction and to build up a form of government patterned after the Jewish commonwealth, but, in striving to realize their dream, often were led to adopt extreme and sometimes cruel measures. (See Hutchinson, Anne; Quakers, and

WILLIAMS, ROGER.) Nevertheless, many wise and beneficent measures were enforced, manufactures and mining were encouraged, and above everything else, learning. Plymouth colony was more tolerant than Massachusetts, and few instances of injustice are found in its annals.

In 1636 and 1637 troubles with the Pequot Indians led to the Pequot war, the principal losses of which, however, fell upon the Connecticut colony, an offshoot from that of Massachusetts Bay. In 1643 a confederacy was formed, consisting of the colonies of Massachusetts Bay, Plymouth, Connecticut, and New Haven. This confederacy lasted for twenty years, and then gave place to a more comprehensive one. Massachusetts Bay then included the settlements in New Hampshire and Maine. The Massachusetts Bay and Plymouth colonies had serious difficulties with the English Government, especially after the restoration of Charles II. The king appointed a commission to investigate and govern these colonies, but the colonial authorities refused to permit them to exercise their powers. The strained relations between Massachusetts and the mother-country were increased by the declaration of the general court in 1675, that for any power but itself to impose taxes was an infringement of the rights of the people as British subjects. The great struggle with the Indians in 1675 and 1676, known as King Philip's war, checked the prosperity of these colonies for a long time. Before this disastrous war had ended new troubles with the king had begun. Prompted by the vindictive spirit of Edmund Randolph, Charles II. had at last decided to annul the charter of Massachusetts Bay and to bring all the New England colonies under the sway of a royal Governor. In 1684 the English high court of chancery gave judgment against Massachusetts, and declared its charter forfeited. Joseph Dudley, son of the early emigrant Governor, was appointed president, but under the control of the revengeful Randolph, and the general court or legislature was abolished. On the accession of James II., Dudley was superseded by Sir Edmund Andros, already known to the colonists as an imperious and tyrannical commissioner. Upon the first report that the Prince of Orange had landed in England, Andros and all his coadjutors, including Joseph Dudley, whom he had made chief justice, were arrested, imprisoned, and held for trial; and immediately upon the receipt of the intelligence of the proclamation of William of Orange in England he was proclaimed in Massachusetts Bay, and simultaneously in the Plymouth Colony. In 1690 Massachusetts took part in the intercolonial war between the possessions of France and England, and to pay the colonial troops issued treasury notes for the first time in its history. In 1692, by a new charter granted by the king, Massachusetts Bay and Plymouth were consolidated into one government, Massachusetts having at that date a population of about 55,000 and Plymouth a population of 7,000. In 1692 the Salem witchcraft delusion occurred. There were frequent disturbances with the Indians for the next twenty-three years, the French colonists in Canada prompting the savages to make raids upon the colony of Massachusetts. From 1722 to 1725 these raids assumed the larger proportions of a war, and were finally ended by the almost complete extermination of the Indian tribes adjacent. From 1744 to 1748, in the war between England and France, Massachusetts contributed largely to the capture of Louisburg in 1745 and to the success of the Canadian expeditions. In the second war with France in the following decade, the colony again played a very conspicuous part. Her enterprise and her independent spirit excited the jealousy of Great Britain, and, as had been done by Charles II. and James II. eighty years before, occasion was sought to humiliate her. Oppressive measures of taxation were devised and her commerce was hampered by restrictions. The attempt to enforce the Stamp Act led to riots in Boston in 1765 and 1768, and as a result two regiments of British soldiers were quartered upon the citizens without their consent. In Mar., 1770, the "Boston massacre" occurred, in which three citizens were shot by British soldiers. On Dec. 16, 1773, occurred the famous destruction of the cargo of tea in Boston harbor. The port of Boston was closed in retaliation in 1774, and in the same year Gen. Gage, who had been placed in command of the troops in Boston, postponed indefinitely the meeting of the general court. The representatives, however, met at Salem. The seizure of the arsenal at Charlestown by the militia, the adjournment of the Assembly to Concord, and its reorganization there as a provincial congress, were among the many events which immediately preceded the revolution. The first blood of the Revolutionary war was shed at Lexington and Concord on Apr. 19, 1775; the battle of Bunker Hill occurred on June 17 of the same year. Massachusetts contributed 67,907 troops out of a total population of 231,779, and £164,000 toward the expenses of the war, but many of the people, especially among the educated class, were loyalists, and emigrated to Nova Scotia and New Brunswick rather than live under a republic. In 1780 Massachusetts adopted a State constitution; and it was decided not long after that, by a clause in the Bill of Rights prefixed to that constitution, slavery in the State was abolished. An insurrection, known as Shays's rebellion, occurred in the western part of the State in 1786, arising from the poverty and distress of the people and the severity of the taxes; some lives were lost in its suppression. The Constitution of the U. S. was ratified in Jan., 1788, by a State convention, by a vote of 187 to 168. In the division of parties which occurred at the beginning of the nineteenth century a large majority of the citizens of Massachusetts sided with the Federal party, and many of them were opposed to the war with Great Britain in 1812; nevertheless, the State furnished great numbers of seamen to the navy during that war, and in 1814 more than 20,000 militia were in service in the State and in the district of Maine. A number of delegates from the State appeared at the convention of the New England States which met at Hartford, Conn., in 1814, to confer upon their grievances. (See HARTFORD CONVENTION.) In 1815 "dissenters" were released from paying taxes for the support of Congregational churches, and in 1833 all religious denominations were placed on an equal footing. In 1820 the district of Maine was set off as a separate State. In the same year a convention met to revise the constitution. Another constitutional convention met in 1853. In 1831 the Anti-Slavery movement received an impetus by the establishment in Boston, by William Lloyd Garrison, of *The Liberator*, and by the formation of an Anti-Slavery society. Political agitations gave rise in the State to the Liberty party, which was succeeded by the Free-Soil party, and that by the Republican party. When the civil war broke out the people of the State supported the Union cause with enthusiasm, furnishing (1861–65) 159,165 men for all terms of service, including 26,329 who were in the navy, and paying in bounties (including interest on bounty loans to Dec. 31, 1885), $26,858,123.23. In addition to this sum there was paid in State and military aid to Dec. 31, 1885, $18,242,324.35. In Jan., 1865, the war debt of the State exceeded $14,500,000, the bonds for which were held chiefly by its citizens.

GOVERNORS OF MASSACHUSETTS.

Of Plymouth Colony, elected.

John Carver	1620–21
William Bradford	1621–33
Edward Winslow	1633–34
Thomas Prence	1634–35
William Bradford	1635–36
Edward Winslow	1636–37
William Bradford	1637–38
Thomas Prence	1638–39
William Bradford	1639–44
Edward Winslow	1644–45
William Bradford	1645–57
Thomas Prence	1657–73
Josiah Winslow	1673–81
Thomas Hinckley	1681–86
Sir Edmund Andros, gov.-gen.	1686–89
Thomas Hinckley	1689–92

Of Massachusetts, chosen annually under First Charter.

John Endicott (acting)	1629–30
Matthew Cradock (did not serve).	
John Winthrop	1630–34
Thomas Dudley	1634–35
John Hayues	1635–36
Henry Vane	1636–37
John Winthrop	1637–40
Thomas Dudley	1640–41
Richard Bellingham	1641–42
John Winthrop	1642–44
John Endicott	1644–45
Thomas Dudley	1645–46
John Winthrop	1646–49
John Endicott	1649–50
Thomas Dudley	1650–51
John Endicott	1651–54
Richard Bellingham	1654–55
John Endicott	1655–65
Richard Bellingham	1665–73
John Leverett	1673–79
Simon Bradstreet	1679–84
Jos. Dudley, pres.	1684–86
Sir Edmund Andros, gov.-gen.	1686–89
Thomas Danforth (acting)	1689–92

Appointed by the King under the Second Charter.

Sir William Phipps	1692–94
Wm. Stoughton (acting)	1694–99
Richard Coote, Earl of Bellomont	1699–1700
Wm. Stoughton (acting)	1700–01
The Council	1701–02
Joseph Dudley	1702–Feb., 1715
The Council	Feb.–Mar., 1715
Joseph Dudley	Mar.–Nov., 1715
Wm. Tailer (acting)	1715–16
Samuel Shute	1716–23
Wm. Dummer (acting)	1723–28
Wm. Burnett	Jau.–Sept., 1728
Wm. Dummer (acting),	Sept., 1728–June, 1730
Wm. Tailer (acting),	June–Aug., 1730
Jona. Belcher	Aug., 1730–41
William Shirley	1741–49
Spencer Phips (acting)	1749–53
William Shirley	1753–56
Spencer Phips (acting)	1756–57
The Council	Apr.–Aug., 1757
Thomas Pownal	1757–60
Thomas Hutchinson (acting)	June–Aug., 1760
Sir Francis Bernard, Bart.	1760–69
Thomas Hutchinson (acting)	1769–71
Thomas Hutchinson	1771–74
Thomas Gage	May–Oct., 1774
A Proviucial Congress,	Oct., 1774–July, 1775
The Council	July, 1775–80

Under the Constitution.

John Hancock	1780–85
James Bowdoin	1785–87
John Hancock	1787–Oct., 1793
Samuel Adams (acting),	Oct., 1793–94
Samuel Adams	1794–97
Increase Sumner	1797–June, 1799
Moses Gill (acting)	June, 1799–1800

Caleb Strong	1800-07
Jas. Sullivan	1807-Dec., 1808
Levi Lincoln (acting)	Dec., 1808-09
Christopher Gore	1809-10
Elbridge Gerry	1810-12
Caleb Strong	1812-16
John Brooks	1816-23
Wm. Eustis	1823-Feb., 1825
Marcus Morton (acting),	Feb.-July, 1825
Levi Lincoln	1825-34
John Davis	1834-Mar., 1835
Samuel T. Armstrong (acting)	Mar., 1835-36
Edward Everett	1836-40
Marcus Morton	1840-41
John Davis	1841-43
Marcus Morton	1843-44
George N. Briggs	1844-51
George S. Boutwell	1851-53
John H. Clifford	1853-54
Emory Washburn	1854-55
Henry J. Gardner	1855-58
Nathaniel P. Banks	1858-61
John A. Andrew	1861-66
Alexander H. Bullock	1866-69
William Claflin	1869-72
William B. Washburn,	1872-May, 1874
Thomas Talbot (acting),	May-Dec., 1874
William Gaston	1874-76
Alexander H. Rice	1876-79
Thomas Talbot	1879-80
John D. Long	1880-83
Benjamin F. Butler	1883-84
George D. Robinson	1884-87
Oliver Ames	1887-90
John Q. A. Brackett	1890-91
William E. Russell	1891-94
Frederick T. Greenhalge	1894-96
Roger Wolcott	1896-1900
William Murray Crane	1900-

AUTHORITIES.—E. Hitchcock, *Report on the Geology, Mineralogy, Botany, and Zoölogy of Massachusetts* (2 vols., Amherst, 1833), and *Final Report on the Geology of Massachusetts* (4 parts, 1841); also his *Ichnology of New England* (Boston, 1858), and *Supplement* to same (Boston, 1865); Reports printed by order of the Legislature: *Fishes, Reptiles, and Birds of Massachusetts* (Boston, 1839), *Herbaceous Flowering Plants of Massachusetts* (Cambridge, 1840), *Invertebrata of Massachusetts* (Cambridge, 1841); Harris, *Insects Injurious to Vegetation* (Boston, 1841; enlarged ed. 1852); Emerson, *Trees and Shrubs of Massachusetts* (2 vols., Boston, 1875); and Allen, *A List of the Birds of Massachusetts* (pamph., Salem, 1878). Historical Literature: See histories of the State by Gov. Hutchinson (Boston, 1764–67) and by Barry (Boston, 1855–57); Young, *Chronicles of the Pilgrim Fathers* (Boston, 1841) and *Chronicles of Massachusetts* (Boston, 1846); Holland, *History of Western Massachusetts* (Springfield, 1855); Palfrey, *The History of New England* (3 vols., Boston, 1858–64); Schouler, *History of Massachusetts in the Civil War* (Boston, 1868–71); *Memorial History of Boston* (4 vols., Boston, 1880–81); Goodwin, *The Pilgrim Republic* (Boston, 1888); Ellis, *The Puritan Age and Rule in the Colony of the Massachusetts Bay* (Boston, 1888); Weeden, *Economic and Social History of New England, 1620–1789* (2 vols., Boston and New York, 1890); Wright, *History of Wages and Prices in Massachusetts 1752–1883* (State bureau statistics of labor, Boston, 1885); *Reports* of the census of 1885: I. *Population and Social Statistics*; II. *Manufactures, Fisheries, and Commerce*; III. *Agricultural Products and Property* (Boston, 1887–88). Among works of a special character, see Dexter, *As to Roger Williams and his so-called "Banishment"* (Boston, 1876); Hallowell, *The Pioneer Quakers* (Boston, 1886) and *The Quaker Invasion of Massachusetts* (Boston, 1887); Brooks Adams, *The Emancipation of Massachusetts* (Boston and New York, 1887); C. F. Adams, *Three Episodes of Massachusetts History* (2 vols., Boston, 1892) and *Massachusetts, its Historians and its History* (Boston, 1893). WILLIAM E. RUSSELL.

Massachusetts Institute of Technology: a technical school founded at Boston in 1862 by Prof. William Barton Rogers and others. The original plan included not only the "school of industrial science," by which the Institute is now best known, but also a society of arts and a museum of arts. Thirteen distinct four-year courses are offered, viz.: civil, mechanical, mining, chemical, electrical, and sanitary engineering, architecture, biology, chemistry, physics, general studies, geology, and naval architecture. For the completion of any one of these the degree of B. Sc. is given. A conspicuous feature is the laboratory instruction of large classes. The students number about 1,200, and the instructing staff includes 165 professors, instructors, and assistants. Although the Institute holds property valued at $2,500,000, the high cost of its real estate and equipment makes it dependent chiefly on students' fees. The presidents of the Institute have been William B. Rogers, LL. D. (1862–70 and 1878–81), John D. Runkle, LL. D. (1870–78), and Francis A. Walker, LL. D., 1881–97.

N. W. TYLER, *Secretary*.

Massage [Fr., deriv. of Gr. μάσσειν, to knead]: a mechanical method of medical treatment of the body, consisting chiefly in manipulation administered by the hand of a person trained to do this in a particular way. This form of treatment is sometimes confounded with what is known as the Swedish movement-cure, which, however, is not the same, as the latter involves active co-operation on the part of the patient. The history of massage has been traced through various stages of development to very early times. There can be no doubt that long ago rude and unsystematic methods of manipulating the body were practiced. For example, the early medical writers of India describe a sort of medical gymnastics. The Chinese also practiced something of this sort; and the very word "shampooing" is derived from a Hindu word, *chāmpnā*, which signifies rubbing or percussing the body in connection with the use of a hot bath. The Greeks evidently used something of this kind, for it is not only described in certain of their medical books, but seems to have been a common practice among athletes and warriors. After the fall of the Roman empire this mode of treatment seems to have been abandoned until near the end of the seventeenth century, after which time it was used more or less imperfectly until it was revived about the beginning of the nineteenth century by Peter Heinrick Ling, a Swede, and placed on a good medical and scientific basis, in connection with what is now known as the Swedish movement-cure, of which Ling was the originator. It was only about 1860 that massage, as it is now understood, was fully developed by Estradère. As now practiced, massage consists in several different processes. The French call the chief of these *effleurage* (stroking), *friction* (rubbing), *tapotement* (tapping), and *petrissage* (kneading). These are used by a trained person, and each process is subject to a large variety of modifications, which, in some institutions, are made the subject of prolonged study. Massage has been applied to the treatment of a large number of bodily disorders, both medical and surgical, and the range of its applicability is from mild hysteria to serious disorders of internal organs and fractures of the bones. It is used very extensively by medical men who treat nervous diseases especially, and usually in connection with prolonged bodily rest on the part of the patient, and the administration of simple food in large quantities. The successful use of massage depends upon several conditions: One is manual dexterity on the part of the manipulator; another is the selection of an appropriate form of massage for any particular disorder; another is the proper proportion of rest on the part of the patient to the passive exercise effected by the manipulator; and, finally, the combination of judicious psychical and medicinal treatment with massage. Massage does good by mechanically pressing out from the tissues material which needs to be removed or to have its natural flow accelerated; the first, in the case of inflammatory effusions; the second, in the case of imperfect circulation. Besides this, massage acts by provoking muscle-cells, and probably all cells, to greater physiological activity. Persons who administer massage as a calling are called *masseurs* (masculine), *masseuses* (feminine), or *massagists* (irrespective of gender). Interesting details in regard to the history and practice of massage may be found in the following works: Josef Schreiber, *Praktische Anleitung zur Behandlung durch Massage* (Vienna, 1888); M. Roth, *The Prevention and Cure of many Chronic Diseases by Movements* (London, 1851); Emil Kleen, *Handbook of Massage*, translated by E. M. Hartwell (Philadelphia, 1892).

CHARLES W. DULLES.

Massag'etæ [= Lat. = Gr. Μασσαγέται. Of doubtful etymology, thought by some to be the Magog of the Bible]: a tribe of doubtful origin inhabiting the steppes to the N. of the Jaxartes. According to Herodotus, it was with them that Cyrus of Persia went to war, and fell in battle, 529 B. C., their queen, Tomyris, having refused an offer of marriage made by Cyrus for the purpose of picking a quarrel with her. According to Ctesias, the war was with another tribe, and Cyrus died of his wounds after the battle.

Mas'sasoit: the chieftain of the Pokanoket or Wampanoag Indians, found by the colonists of Plymouth, Mass., living in their vicinity in 1621 as ruler of the territory from Cape Cod to Narragansett Bay. He made a treaty with the settlers at Plymouth, Mar. 22, 1621, and maintained friendship with them until his death. His permanent residence was in the present township of Warren, R. I., where he was frequently visited by commissioners from the neighboring settlements. He entertained Roger Williams for several weeks when banished from Massachusetts. He was supposed to be eighty years of age when he died in 1661. He left two sons, Wamsutta and Pometacom, called by the colonists Alexander and Philip. They succeeded him in the chieftainship, the latter being the celebrated "King Philip."

Massé, maă′sā′, Félix Marie Victor: opera-composer; b. at Lorient, Franec, Mar. 7, 1822; received his musical education at the Paris Conservatory, where he took the Grand Prix de Rome for composition in 1844. His first opera was *La Chanteuse Voilée* (1850), and his last *La Mort de Cléopâtre*, which was performed after his death. Between these he wrote many operas, the best known being *Paul et Virginie* (1876); *La Fée Carabosse* (1859); *La Reine Topaze* (1856); and *Les Noces de Jeannette* (1853). He was Professor of Composition in the Conservatory from 1866 till illness compelled him to relinquish it in 1876. He succeeded Auber as a member of the Academy of Fine Arts, and Félicien David as an associate of the Royal Academy of Belgium. D. July 5, 1884. D. É. Hervey.

Masséna, maă′sā′naa′, André, Duke of Rivoli, Prince of Essling, marshal of France: b. at Nice, May 6, 1758; began his career as a cabin-boy and afterward joined an Italian regiment in French pay, but left it in 1789, as his humble descent prevented him from obtaining a commission. After the outbreak of the Revolution, however, and the annexation of Nice to France in 1792, he re-entered the army; became chief of a battalion Aug. 1, 1792, and brigadier-general Aug. 22, 1793. His most brilliant exploits were his victory over the allied Austrian-Russian army at Zurich, Sept. 25, 1799, which freed France from invasion; the siege of Genoa in 1800, which he held for three months, though invested by an Austrian army and blockaded by an English fleet; and his valorous defense of the villages of Aspern and Essling during the battle (May 21, 1809) which saved the French army from total destruction. In 1810 he received the highest command in Spain, and drove Wellington back to the lines of Torres Vedras, in Portugal, but receiving no re-enforcement he was compelled to retreat into Spain, and in the spring of 1811 he resigned his command on acount of ill-health. In the events with which Napoleon's career closed he played no conspicuous part. D. Apr. 4, 1817.

Massenet, maă′se-nā′, Jules Émile Frédéric: opera-composer; b. at Montaud, near St.-Étienne, France, May 12, 1842; when nine years of age he entered the Paris Conservatory. His early life was a struggle with poverty, and he had to give up his music lessons, but tramped to Lyons, where a relative resided, who heard the boy's story and sent him back to Paris. In 1859 he took first prize. In 1863 his cantata *David Rizzio* won the Prix de Rome. Since then he has been a prolific composer, producing operas, oratorios, cantatas, orchestral suites, etc. His most famous works are the operas *Don César de Bazan* (1872); *Le Roi de Lahore* (1877); *Hérodiade* (1881); and *Le Cid* (1885); his oratorios or cantatas *Eve* (1875); *Marie Madeleine* (1873); *La Vierge* (1879); and his orchestral suites *Scènes Pittoresques*. D. E. H.

Mas'sey, Gerald: poet; b. at Tring, Herts, England, May 29, 1828, of poor parents; worked in youth in a silk-mill and as a straw-braider, and received a scanty education; went to London; published *Poems and Chansons* (about 1846); started in 1849 and became editor of *The Spirit of Freedom*, and was secretary of the Christian Socialists, a co-operative society; was placed upon the civil list with a pension in 1863. He has published several volumes of poems and some prose works, among which are *Robert Burns, and other Lyrics* (1859); *Havelock's March, and other Poems* (1861); and *A Tale of Eternity, and other Poems* (1870); *Concerning Spiritualism* (1872); *My Lyrical Life* (1889); is a frequent contributor to periodical literature, a popular lecturer, and an earnest believer in Spiritualism.

Massicot: See Lead.

Mas'sillon: city; Stark co., O. (for location of county, see map of Ohio, ref. 3–H); on the Tuscarawas river, the Ohio Canal, and the Cleve., Lorain and Wheel., the Penn., and the Wheel. and Lake Erie railways; 65 miles S. of Cleveland. It is in an agricultural, coal-mining, and sandstone-quarrying region; has water, sewerage, gas, electric-light, and electric street-railway plants, three white sandstone quarries, glass-works, stationary-engine works, flour-mills, rolling-mill, iron-bridge works, paper-mill, agricultural-implement works, and machine-shops; and contains 3 national banks with combined capital of $450,000, a private bank, and 2 daily and 6 weekly newspapers. Pop. (1880) 6,836; (1890) 10,092; (1900) 11,944. Editor of "Independent."

Massillon, maă′sē′yōn′, Jean Baptiste: pulpit orator; b. at Hyères, Provence, France, June 24, 1663. He studied under the fathers of the Congregation of the Oratory at Marseilles, and himself entered the order (1681). He resisted the wish of his superiors that he should give himself to preaching, distrusting his talents in that direction. He preferred the career of a scholar and teacher. Even after his first successes he hesitated, withdrawing for a time to the Trappist monastery of Sept-Fonts. He left it to become director of the Seminary of St.-Magloire in Paris (1699). His lectures here had such signal success that he had to recognize his vocation. He preached a series of Lenten sermons at Montpellier in 1698 and in Paris in 1699. The latter made such an impression that he was appointed to preach at court during Advent of that year, and he was court preacher for Lent in 1701 and again in 1704. He pronounced funeral orations on Conti (1709), the Dauphin (1711), and Louis XIV. (1715). In 1718 he preached before the Dauphin, then preparing for his first communion, the ten sermons of his famous *Petit Carême*, formerly counted the best of his works. In 1717 he was made Bishop of Clermont; the rest of his life was spent in the duties of his bishopric; its literary fruits were the *Discours synodaux*. His last oration was that on the Duchess of Orleans, mother of the regent (1723). He entered the Academy in 1719. D. in Clermont, Sept. 18, 1742. Massillon's sermons are distinguished from those of his great predecessors both by their matter and their form. They give less place to dogma, whence the criticism that they lack religious fervor; but they are more constantly concerned with morals, and are more searching and accurate in their analysis of conduct and motive. In form they are wrought and polished with more studied art. His *Œuvres complètes* have been published by Jos. Massillon (13 vols., Paris, 1745); by Renouard (13 vols., Paris, 1810); by Abbé Guillon (16 vols., Paris, 1828); and by Abbé E. A. Blampignon (Paris, 1865–68; 4 vols., 2d ed. 1886). Cf. Abbé E. A. Blampignon, *Massillon d'après des documents inédits* (Paris, 1879). Many of his sermons have been translated into English, e. g. the funeral oration of Louis the Great (London, 1872) and selected sermons (2 vols., 1889–90; with a biographical preface).

A. G. Canfield.

Mas'singer, Philip: dramatist: b. at Salisbury, England, in 1584; studied at St. Alban's Hall, Oxford; went in 1606 to London, where it has been supposed that he became a Roman Catholic. His first play is the *Virgin Martyr* (1622). Only eighteen of his works are extant, the MSS. of several others having been carelessly destroyed. He excelled in the drawing of tragic character, in the dignity, refinement, and moral superiority of his sentiments, and in melody of expression. Among his best works are the *Duke of Milan* (1623); *Fatal Dowry* (1632); *A New Way to Pay Old Debts* (1633), which still keeps the stage; *A City Madam* (1659); *A Very Woman* (1655); and *The Picture*. D. Sept. 18, 1640. He was the associate of Fletcher and Decker. The best editions of his works are those by William Gifford (London, 1850), and by Hartley Coleridge (London, 1859).

Mass'mann, Hans Ferdinand: philologist; b. in Berlin, Germany, Aug. 15, 1797; studied theology at Jena and Berlin; became greatly interested in the athletic movement started by Jahn, taught athletics (*Turnen*) in various institutions, and finally studied German philology in Berlin. While professor at Munich and subsequently in Berlin, his attention was devoted to pedagogical reforms as well as to German philology. In the latter field he became known chiefly as the editor of old German texts and manuscripts, as, e. g., *Ulfilas* (1857); *Die Kleineren Sprachdenkmäler vom 8–12 Jahrhundert* (1839); *Denkmäler deutscher Sprache und Litt. aus Handschriften des 8–16 Jahrh.* (Munich, 1828); *Deutsche Gedichte des 12 Jahrh.* (1837), etc. Though a great enthusiast his philological work is lacking in accuracy and critical acumen. D. Aug. 3, 1874. Julius Goebel.

Masson, David: author; b. in Aberdeen, Scotland, in 1823. He was educated at Marischal College, Aberdeen, and at the University of Edinburgh. At twenty-one he went to London and became a contributor to the reviews and magazines. In 1852 he was chosen Professor of English in University College, London, a position which he resigned in 1865 to accept the chair of Rhetoric and English Literature in the University of Edinburgh. In 1859 he became editor of *Macmillan's Magazine*; and since 1879 has been editor of the Registry of the Privy Council of Scotland. His great work is his exhaustive *Life of John Milton* (6 vols., 1858–79). Among his other publications are *Essays, Biographical and Critical* (1856); *British Novelists* (1859); *Drummond of Hawthornden* (1873); *Wordsworth, Shelley,*

Keats, etc. (1874); *The Three Devils* (1874); *Chatterton* (1874); and an elaborate edition of Milton (3 vols., 1874).
H. A. Beers.

Masson, Louis François Roderick: statesman; b. at Terrebonne, Province of Quebec, Canada, Nov. 7, 1833; was educated at the Jesuit College, Georgetown, Md., and College of St. Hyacinthe, Province of Quebec; and was admitted to the bar in 1859. He sat for Terrebonne in the Dominion Parliament 1867–82; was Minister of Militia and Defense 1878–80; President of the Council 1880; lieutenant-governor Province of Quebec 1884–87; and was appointed to the Senate in 1890. He has been mayor of Terrebonne; was promoted lieutenant-colonel of militia 1867; and created a commander of the papal order of Gregory the Great 1888; is author of *Les Bourgeois de la Compagnie du Nord-Ouest* (2 vols., Quebec, 1890). Neil Macdonald.

Massō'rāh, **Māsōrāh**, or **Massōreth** [from Mod. Heb. *māsōrāh*, tradition]: the technical name given to a collection of grammatico-critical notes on the Hebrew text of the Old Testament, with the object of determining its divisions, grammatical forms, letters, vowel-marks, and accents. Tradition carries the origin of the *Masorah* back to the times of Ezra and the Sōferīm. The use of the Bible, especially of the Pentateuch, in the synagogue service, tended to draw the attention of teachers to its wording; and R. Akiba's method (which prevailed) of attaching importance to every single word and letter of Scripture enhanced the care with which the text was treated. It was necessary also to teach the text in the schools, and for this purpose divisions were made into paragraphs, sentences, and clauses. Two names, Nakkai and Hamnuna, are mentioned who went as far as to count the number of verses contained in the twenty-four books of the Bible. This was about the time of the persecutions of Hadrian. Later Masorites went further, counted the number of verses in each book, the number of times certain forms occurred, and determined the way in which words were to be pronounced which, for one reason or another, were not to be read in the synagogue as written. A late Talmudical treatise, *Massecheth Sōferīm*, busies itself partly with these matters. It was the Masorites who invented the signs for the vowels, the older Hebrew having been written only with consonants. In this they probably followed the example of the early Syrian grammarians. Their first attempts commenced early in the seventh century, and only undertook to distinguish words which were spelled with similar consonants. The whole system was developed, however, before the split with the Karaites in the ninth century. Its origin is probably to be found in Babylon, where a certain Pinchas is mentioned (eighth century) as being foremost in these studies. At the end of the century, Asher founded the school in Tiberias. There are two different systems of vocalization—the Tiberian, the one ordinarily found in our Hebrew texts, and the so-called Babylonian or Superlinear, which can be seen in the celebrated St. Petersburg *Codex of the Prophets* (917 A. D.) and in MSS. coming from Southern Arabia. The Masorites also invented a most elaborate system of interpunctuation, which served the double purpose of marking the connection between the different parts of a sentence as well as the musical value of each word in the cantilation used in the synagogue. The *Masorah* led the way to a grammatical treatment of the text, and furnished the material. There are three kinds of *Masorah*: *Masorah parva*, containing short glosses which were placed between the columns of the text of the Bible; *Masorah magna*, made up of longer notes placed upon the upper and lower margins. When this did not suffice the Masoretic notes were placed at the end of the different books (*Masorah finalis*). The *Independent Masorah* contains collected notes on words and passages which were put together in the form of books. The most important of these collections is the *Ochlah Wëochlah*. Our present Masoretic system goes back almost entirely to Aaron ben Asher (ninth century), the most prominent of the Masoretic scholars. He was the author of the *Dikdukē Hattëāmīm* (ed. by Bäer and Strack, Leipzig, 1879). His opponent, Moses ben Naftali, does not enjoy the same consideration. A *Masorah* was also provided for *Targum Onkelos*. See Targum.

Literature.—Geiger, *Jüdische Zeitschr.* (iii., pp. 78–119); Grätz, *Monatschrift* (1881–82); L. Blau, *Masoretische Untersuchungen* (Strassburg, 1891); A. Büchler, *Untersuch. zur Entstehung und Entwick. der Heb. Accente* (Wien, 1891); I. Harris, *The Rise and Development of the Massorah*, *Jew. Quart. Rev.* (i., pp. 128, *sq.*); W. Bacher in Winter and Wünsche, *Die Jüd. Lit.* (ii., pp. 119, *sq.*); A. Merx, *Eine Studie zur Gesch. der Masora*, *Verhand. des 5ten Orient. Congresses* (Berlin, 1882, p. 188); Lagarde, *Mittheilungen* (i., 91); G. D. Ginsburg, *The Massorah* (3 vols., London, 1880–85); König, *Einleitung in des Alte Testament* (Bonn, 1893, pp. 38, *sq.*). Richard Gottheil.

Massowa: an important port on a little island of the Red Sea within hailing distance of the African mainland, hence its name from the Ethiopic, through the Arabic Medsaúa = to call; the Saba of Ptolemy (see map of Africa, ref. 4–G). It was obtained by the Turks in the seventeenth century, and Abyssinia's attempts to acquire it as a port always ended in failure. In 1885 Italy, taking advantage of Egypt's difficulties with the Mahdists, and with the connivance of England, seized Massowa, which is now her chief settlement and port in her African possession of Eritrea. The climate is excessively hot and unhealthful, but as the leading gateway from the sea to Abyssinia Massowa is capable of considerable development. Pop. about 12,000. C. C. Adams.

Mast [O. Eng. *mæst*; cf. Dutch, Germ., Swed., and Dan. *mast*, mast, perhaps cognate with Lat. *mā'lus*, mast, earlier **mādus* < Indo.-Europ. *mazdos*]: a nearly upright spar of wood, iron, or steel rising upward through the decks of a vessel for the purpose of affording attachment to the sails and rigging of a ship. The fir and pine of Puget Sound and Norway are of great repute as material for masts. Iron and steel masts are constructed upon several different systems. In all vessels of any considerable size each mast consists of several parts, of which the lowest is the mast proper, next the topmast, the topgallant mast, and the royal mast, and sometimes a sky-scraper, the highest of all. The foremost mast of a ship is the foremast; the central one, the mainmast; the one farthest aft, the mizzenmast; and the separate parts of each are distinguished as the fore-topmast, the main-topgallant mast, etc., by combining the name of each mast with the appropriate name of each part of a mast. Ships, barks, barkentines and some schooners have three masts. Brigs, brigantines, and schooners ordinarily have two masts. Many sloops, smacks, luggers, and other small craft have but one mast. Large seagoing steamers have often four, and sometimes five, masts.

Mastaba: the name applied by the Egyptian Arabs to the tombs of the nobles of the fourth, fifth, and sixth dynasties, which are found at Saqqarah, near Memphis. The name is derived from the ordinary bench found in front of Egyptian houses. Though presenting the appearance of truncated pyramids they were different in their origin, being probably an outgrowth of the cairns erected to mark the burial-places of prominent persons. In the earliest specimens, however, the sides were already formed of sloping masonry walls, and the tops were paved. In latter times their place was taken by rock-hewn tombs. The largest specimens date from the fourth dynasty; the best executed from the fifth; those of the sixth show signs of decadence. One hundred and thirty-three mastabas have been found at Saqqarah; the largest and best preserved is that of Ti, and is situated near the "Step Pyramid." They vary in size (170 × 86 feet to 26 × 20 feet) and height (13 to 30 feet), are rectangular, and have their longest direction N. and S. Like all Egyptian tombs, they were intended to insure the preservation of the mummy, upon which the hope of "living again" depended. The ordinary mastaba contained three essential features: the mummy-chamber and pit, the *serdab* (hollow space, or cellar), and the chamber of offering. The first was subterranean, cut in the rock directly beneath the chamber of offering, and was reached by a pit which was usually vertical (40 to 80 feet deep) located on the longitudinal axis of the mastaba a little N. of the center. After the mummy had been placed within, the entrance was walled up and the pit filled with large stones. The chamber of offering was in most cases on the east side near the southeast corner, and contained a sculptured table of offering. To the mural decorations, sometimes very beautiful, we owe much of our knowledge of the customs of the period. A fine example of such a chamber is in the Berlin Museum. Some of the expressions used show that the mastaba may have been constructed during the life of the occupant. The *serdab* was a hidden chamber inside the mastaba in which a statue of the dead was usually placed, to serve as the home of the Ka (*q. v.*). It was frequently connected with the chamber of offering by a small passageway, only a few square inches in size, by which the incense might reach the representative of

the dead, the hidden statue, and also as a means of egress and entrance for the Ka. A false door, intended for the exclusive use of the departed, is sometimes found near the northeast corner, corresponding to the entrance to the chamber of offering. Other mastabas which may date back to the sixth dynasty have been found in Nubia. CHARLES R. GILLETT.

Mastacembel'idæ [Mod. Lat., named from *Mastacembelus*, the typical genus; Gr. μάσταξ, mouth, jaw + ἐν, in + βέλος, dart]: a family of eel-shaped fishes of the order *Opisthomi*. The vertebræ are in large number (in *Rhynchobdella* 32 + 40); confined to Asia and West Africa, and best represented in the fresh waters of the East Indies. Under the name of "eels" they are esteemed by the British residents of India.

Master [from O. Fr. *maistre* > Fr. *maître* < Lat. *magis'ter*, of same root as *mag'nus*, great]: a name applied to various persons in positions of authority, and specifically used to designate an officer of the navy, the chief officer of a merchant vessel, and certain chief officers or functionaries of law courts, and of some other officials. Their titles, powers, and duties are here noted in brief. For MASTER AND SERVANT, see that title; for the use of master as a term of scholastic distinction, see DEGREES.

In the U. S. and the British navies the term *master* was used to designate the navigator or sailing-master. In the U. S. navy his grade was between that of an ensign and that of a lieutenant, and he ranked with first lieutenant in the army. The title was changed by act of Congress Mar. 3, 1883, to lieutenant (junior grade). In the British navy he was a line officer of the lowest rank, and his title is now navigating lieutenant, or staff commander.

MASTER OF A SHIP.—This is the technical legal term for the chief officer of a merchant vessel, having supreme command of the crew and the sole management of the ship, in common speech called the "captain." This office, with its peculiar legal functions, is very ancient: it is described in the *Laws of Oléron*, and in other maritime codes of the Middle Ages. The master is appointed by the owners of the vessel, and as an agent represents both them and the owners of the cargo. He is clothed with very great powers in respect to the ship, the cargo, and the crew, and when in foreign countries his authority to act for and to bind his principals exceeds that of any other regular commercial agent, and is almost unbounded, having, in general, authority to do anything that under the circumstances may be or seem necessary to complete the voyage, or save the property in his charge from destruction. For a full description of his powers, duties, and functions, see SHIPPING, LAW OF.

MASTERS AT COMMON LAW.—Formerly in Great Britain these were five masters or clerks on the plea side of the court of queen's (or king's) bench, the court of exchequer, and the court of common pleas, appointed by statute (7 Wm. IV. and 1 Vict. c. 30), whose duties were to tax costs, compute damages, attend the judges in court, etc. Under the judicature acts and subsequent statutes these officers with the same duties were attached to the branch of the high court of justice, representing the court to which they belonged, and they also transact much of the business at judge's chambers.

MASTERS IN CHANCERY.—These were originally appointed as assistants to the chancellor, who had the power of appointing them himself from the time of Edward IV. They were first called clerks, but afterward received the name master, in the reign of Edward III., and are a survival of a council of twelve chief clerks of the time of Richard II. The chief of the masters in chancery was called the Master of the Rolls. (See below). They were generally required to be learned both in the civil and the common law. Their principal functions, which they still exercise where the office is retained, were the hearing of references of causes, the taking of affidavits and acknowledgments, the examination of witnesses in certain cases (e. g. for the perpetuation of testimony), the taking of recognizances, etc. When a suit involved a matter of account, particularly if this were long and complicated, it became the usual practice to refer its settlement to a master. The masters also examined upon reference the propriety of bills in equity, and if report was made that a bill contained scandalous and impertinent matter, it was struck out. In order to enable him to perform his duties he was given certain powers of the court, such as to compel the attendance of parties and witnesses, etc. The report of the master in chancery is not final as a determination of the rights of the parties until it has been confirmed by a judicial order, and before this is done the parties are given an opportunity to make such objections as they may desire as to his findings, either of law or of fact. In England masters in chancery were abolished by statute (15 and 16 Vict., c. 80), and their duties are now largely performed by the chief clerks, commissioners to administer oaths, and taxing-masters (who tax the costs)—offices created by statute.

In the U. S. there are still masters in chancery so called in some of the States, and in those States, as New York, where they do not exist as such, the matters which were formerly referred to them in equity cases, accounts, questions of fact, etc., are referred to attorneys at law or solicitors, who are technically styled referees. In performing such functions they have much the same powers as were formerly given to masters in chancery. The form of procedure varies with the customs and statutory rules of the jurisdiction in which he is appointed.

MASTER OF THE ROLLS.—This officer was originally the chief of the masters in chancery (see above), having the keeping of the rolls and grants under the great seal, and the records of the court of chancery in England. He subsequently acquired judicial powers, which were fully established in the reign of George II. (3 Geo. II., c. 30), and was one of the judges before whom equitable causes could be heard in the first instance; but an appeal lay from an order or decision by him to the court of appeal in chancery, or to the lord chancellor. By the Judicature Act of 1873, s. 31 (previous to which he alone of all the judges was allowed to sit in the House of Commons), he was made the second judge of the chancery division of the high court of justice, and by that of 1875, s. 4, an *ex-officio* member of the court of appeal. Under the act of 1881 (Jud. Act., 1881, s. 2) he sits in the court of appeal only, but he still has the keeping of the records.

MASTERS IN LUNACY.—In Great Britain these are certain officers created by statute (16 and 17 Vict., c. 70), to whom are referred inquiries and matters connected with the persons and estates of lunatics. Their powers correspond in many respects to those of the commissioners in lunacy in some of the U. S., but are more extensive.

MASTER OF THE CROWN OFFICE.—This officer was the queen's (or king's) coroner and attorney in the criminal department of the court of queen's (or king's) bench, who prosecuted at the relation of private informers, and now, with the same functions, is made by statute one of certain officers called masters of the Supreme Court.

MASTER OF THE FACULTIES.—A term in Great Britain for an ecclesiastical officer under the archbishop who grants licenses, dispensations, etc.

MASTER OF THE HORSE.—The name in Great Britain for an officer of the royal household, subordinate in rank only to the lord steward and the lord chamberlain.

F. STURGES ALLEN.

Master and Servant: in law, persons who sustain such a relation to each other that one has the legal right to direct and control all acts done on his behalf by the other. Servant is a word of wide scope and variable signification. As a generic term it includes every one who performs authorized acts for another. This is the only sense in which it was used in early English law. An apprentice, a bondman, a wife, a child, a master of a ship, a bailiff, a factor, an attorney, an under sheriff—all were servants. Agent, as the designation of a distinct species of this class, did not come into use until late in the sixteenth century. At present, however, servant is often employed as a specific term. It frequently occurs in wills in the sense of domestic servants. In a great variety of statutes its meaning is confined to laborers, or servants of an inferior grade. And legal writers and judges often use it in contradistinction to agent to designate those who are expected to receive and bound to obey special directions of their employers, as distinguished from the other class, whose chief function is to institute contract relations between their principals and third parties, and who are allowed to exercise their discretion and to enjoy a considerable degree of personal independence in conducting the business of their principals.

In this article servant will be used in its generic sense, but no reference will be made to particular kinds of servants, such as agents, apprentices, and slaves, since they are treated of separately. Moreover, many of the rules given under the head of agent are applicable to all servants, and will not be repeated here. The present discussion therefore will be confined to the mutual liabilities of master and servant, and to their liabilities for wrongs to third persons.

Mutual Liabilities. (*a*) *Breach of Contract of Service.*—As the contract relation of master and servant is a personal one, it is terminated by the death of either, or by the continued sickness of the servant. Such termination is not a breach, however, as it is not attributed to the acts of the parties, but to the act of God. In case the servant breaks his contract the master may recover damages for the breach, and in exceptional circumstances may obtain an injunction against him. (*Toledo, etc., Ry.* vs. *Penn. Co.*, 54 Federal Reporter 746, where railway employees were restrained from engaging in a strike which was ordered to enforce a boycott against a connecting line.) When the master breaks the contract the servant may proceed, in most jurisdictions, in either of three ways: He may sue for the unpaid value of the services he has rendered, treating the contract as rescinded by the master's breach. Or he may sue at once upon the contract for such damages as he can show he will probably sustain by the master's breach of it. Or he may wait until the expiration of the term for which the contract was made, and sue for the actual damages which the breach has caused him. If he sues for damages, the master may show in reduction of his claim that he earned wages, or that he might have earned them by other like employment in the same locality.

(*b*) *Breach of Duty.*—The servant is bound to obey all reasonable instructions of his master, and to exert himself faithfully in promoting the master's interests. For a breach of such duties, causing harm to the master, the servant is liable to him in damages. Hence if the master is obliged to pay third persons for injuries done to them by the servant without his authority or ratification, the servant is liable over to him therefor.

On the other hand, the master is bound (1) to use reasonable care in providing a safe place in which the servant can work; (2) to take suitable precautions that all tools and machinery are free from discoverable defects, and are kept in proper repair; (3) to warn the servant of any danger that is not apparent or that is not fairly incident to the business; (4) to make, promulgate, and enforce such rules as are necessary for the reasonable protection of those engaged in his business; and (5) to use reasonable care in selecting and continuing superintendents and fellow servants. For the breach of any of these duties, causing injury to a servant, an action in tort will lie to recover the damages sustained. If these duties have been fairly performed, and the injury results from the negligence of a fellow servant, the master is not liable.

(*c*) *Fellow Servants.*—This exception to the general rule—that a master is liable for the torts of his servants within the scope of their authority—is quite modern. It was first announced in England in the case of *Priestly* vs. *Fowler* (3 *Meeson* vs. *Welsby*, 1, A. D. 1837), and in the U. S. in *Murray* vs. *South Carolina Ry.* (1 McMullan (S. C.) 385, A. D. 1841). The courts of Scotland rejected it until the House of Lords forced its acceptance upon them by the decision in *Wilson* vs. *Merry* (Law Reports, 1 Scotch and Divorce 326, A. D. 1868), and it has no recognition upon the continent of Europe. In a number of the U. S. it has been greatly modified by statute. The reason assigned for the exception is that "a servant, when he engages to serve a master, undertakes, as between himself and his master, to run all the ordinary risks of the service, including the risk of negligence upon the part of a fellow servant, when he is acting in the discharge of his duty as servant of him, who is the common master of both." In applying this doctrine great difficulty has been experienced in determining who are fellow servants and what is a common employment.

In order for two persons to sustain the relation of fellow servants they must have a common master. Hence one employed by an independent contractor on a building is not the fellow servant of another working by his side on the same building, but employed directly by the owner. If persons having a common master are engaged in a common employment they are fellow servants, although they do not work in company, nor have an opportunity to control or influence each other's conduct, and are engaged in different departments of duty; for example, the carpenter, the porter, and the stewardess of a steamship; but their departments of duty may be so distinct that their employment can not be considered a common one, although they are engaged in promoting the business interests of the same master. Accordingly, it has been held that the captains of two ships which are owned by the same person, while carrying on his business, are not necessarily within the fellow servant exception to the master's liability. The safety of one captain was not, in the natural and ordinary course of things, dependent on the care and skill of the other. The injury of either by the negligence of the other was not an ordinary risk of the service. (The Petrel (British, 1893), 1 Reports 651.) Their relations are quite different from those of engineers or conductors of different trains on the same railway, where the risk of injury to one is the natural and necessary consequence of misconduct in the other. *Van Avery* vs. *Railway Co.*, 35 Federal Reporter 40.

According to the view which prevails in Great Britain and generally in the U. S., the relative rank of servants is immaterial. Employees do not cease to be fellow servants because the master has given to one the control over another while engaged in the common service, and he does not become liable for injuries sustained by an inferior servant through the negligence of his superior; but, as we have seen, the master owes certain duties to all his servants. If one of them is injured by reason of the master's failure to perform any of the five classes of duties mentioned above, he is liable for the damages resulting therefrom. He can not escape responsibility by delegating any of them to a servant. One to whom such a duty has been delegated is often called a vice-principal, and his negligence in its performance is the master's negligence. It is the nature of the negligent act, and not the rank of the actor, that determines the master's liability. (*Baltimore, etc., Ry.* vs. *Baugh*, 149 U. S. 368.) In a number of the U. S. the courts take a different view, and hold that where one servant is placed by his employer in a position of subordination to the orders and control of another, the master is liable for injuries sustained by the negligence of the superior. See the dissenting opinion of Justice Field in the last-cited case.

Liabilities to Third Persons.—The servant is liable to third persons for any wrong he does them, although he acts in obedience to his master's commands. His contract of service can not be invoked against an injured party as an authority to commit a tort, and, if he knew the act was wrongful, he can not obtain any indemnity from his master. The master is also liable if the servant's tort was committed "in furtherance of and within the scope of the business with which he was trusted." Even if the relation of master and servant did not subsist at the time of the wrongful act the master may make himself liable therefor by ratifying it. See RATIFICATION.

This extraordinary liability of the master is thought by some writers to be the "remnant of the obsolete institution" of slavery, and to require "men daily to pay large sums for other people's acts, in which they had no part and for which they are in no sense to blame." (Holmes, *The Common Law*, pp. 16, 17, 230.) Undoubtedly the primitive law of our Germanic ancestors held the master absolutely liable for the wrongs of his slaves or of his free servants; but this doctrine suffered a radical modification during the early common-law period, so that by the sixteenth century the established rule seems to have been that the master was liable only for the servants' torts which he was proved to have commanded or assented to. Apparently the rule was found to relieve the master unduly, and a reaction set in during Lord Holt's time, which has continued to our day, resulting in his present stringent responsibility. (See *Responsibility for Tortious Acts*, by Prof. John H. Wigmore, 7 Harvard *Law Rev.*, pp. 315, 383, 441.) Probably no better reason for the existing rule can be given than that offered by Chief Justice Shaw when he declared it "is obviously founded on the great principle of social duty that every man in the management of his own affairs, whether by himself or by his agents or servants, shall so conduct them as not to injure another; and if he does not, and another thereby sustains damage, he shall answer for it."

Independent Contractor.—This responsibility, however, does not ordinarily extend beyond the acts of servants. If a person employs another to do work for him in the capacity of an independent contractor he will not be liable for the other's torts save in exceptional cases. Nor should he be liable, for he does not retain the power of controlling the work. Whether such power is retained in a given case is often a difficult question; but where it is not retained, where the one employed undertakes to produce a given result and is free to use his own discretion in the manner of accomplishing it, he is an independent contractor; the business is his business, and a person injured by his conduct of it can not look beyond him for redress. (*Casement* vs. *Brown*, 148 U. S. 615.) If, however, the work to be done by the contractor is

unlawful, such as tearing up a street pavement and obstructing travel without authority; or, though it be lawful, if its performance necessarily will bring wrongful consequences to pass, unless guarded against, the employer is bound to respond for the contractor's torts precisely as he is for similar torts by his servants.

Who is the Master?—In some cases this question is a troublesome one, for the servant doing the harm, although selected and paid by one person, is engaged upon the work of another. The owner of a crane and employer of the man in charge of it hired them to another, who used them in loading his vessel. By the negligence of the servant injury was done to a third party, and the question was who must respond as master for this servant's wrong. On the one hand it was argued that he was liable who chose and had the right to discharge him. On the other, it was claimed that he was the master, who had the right, at the moment, to control the doing of the wrongful act. The court took the latter view, and this appears to be the correct one. It follows that a person may be the servant of one in a particular matter, though he is at the same time the general servant of another. He may have two masters at the same time, but not as to the same act; and the test of responsibility for a servant's act is the right to control it. (*Donovan* vs. *Laing* (1893), 1 Queen's Bench 629; *Wood* vs. *Fiber Co.*, 154 Mass. 419.) If a stranger interferes and directs a servant to do an act which causes injury, he will be liable, not as a master, but as the procurer and cause of the wrong.

Scope of Employment.—When the servant's wrongful act is specifically ordered by the master, or is the natural and probable consequence of his orders, he is clearly liable. He is also responsible if the act was done in furtherance of and within the scope of the business intrusted to the servant, and it will not matter that the employer has forbidden the particular act, and that it can not benefit him in fact. Accordingly, an omnibus-owner who had instructed his driver not to obstruct other vehicles was held liable for the damage done to another omnibus by his driver's pulling across the road in front of it and causing it to upset. If the master has given to the servant discretion to act in an emergency, the latter's decision will bind the former; as where trainmen eject a passenger without cause. He is also liable for the willful misconduct of the servant, provided it is within the scope of his employment, but not for wrongful acts done exclusively for his private ends. It was therefore held that a railway company must pay damages to one who was kicked by a brakeman while attempting to board a car, but not to one who was pursued by a conductor, caught, and carried off on its train. The difficulty in these cases is not in ascertaining the rule of law to be applied, but in determining, as a matter of fact, whether the servant's wrongful conduct is a part of his master's affairs. Although the master is liable to third persons for his servants' torts within the limits above described, he is entitled to reimbursement by the servant for any damages he is compelled to pay because of such torts, unless they were authorized or have been ratified by him.

Statutory Changes.—The common-law rules relating to master and servant have been modified to some extent by statute, but no attempt will be made to give the details of this legislation. One of its objects is to secure to workmen the payment of the entire amount of wages in money, unfettered by any promise, obtained by powerful employers, to spend any part at any particular shop or in any particular manner. (See the Truck Act, 1 and 2 Wm. IV., ch. 37.) Another is to reduce the hours of labor which a master can require of his servant. Still another object is the modification or abolition of the fellow-servant exception to the master's liability. See the English Employer's Liability Act of 1880, 43 and 44 Vict., c. 42; Georgia Code, §§ 2083 and 3036; Iowa Revised Code of 1880, § 1307; Rhode Island Public Statutes, 1882, c. 204, § 15; Alabama Civil Code of 1886, §§ 2590–92; Mass., chap. 270 L. of 1887, and chap. 359 L. of 1893; Texas, chap. 91 L. of 1893; Wood's *Master and Servant*; McKinney on *Fellow Servants.*

FRANCIS M. BURDICK.

Mastersingers [trans. of Germ. *meistersinger*]: the poets and rhymers who, after the decline of the minnesong in the thirteenth century, were the chief representatives of the poetic art in Germany for more than two centuries. Believing that poetry was an accomplishment that could be acquired by precept and diligent practice, they organized during the fifteenth century into regular guilds or schools, with statutes resembling those of the contemporary trade-unions. We may thus distinguish two periods in the history of the mastersong, a period previous to the organization into guilds, and a period following this organization. Concerning the former period and the origin of the mastersong we are poorly informed. The legend invented by later mastersingers, according to which twelve old masters were the founders of their art, is without the least historical foundation. Instruction in the technical requirements of poetry, i. e. in metrics and music, certainly existed in the times of classical minnesong. It was reserved, however, for the last representatives of the minnesong, who took special pride in the artificiality of their verse-structures, to systemize this instruction. Many of the last minnesingers were not of noble birth, and it is highly probable that with the appearance of democracy in the ranks of the poets the element of pedantry was ushered in also.

Numerous signs and facts point to Mentz as the oldest seat of the mastersong. Here we find at the close of the thirteenth and at the beginning of the fourteenth centuries Frauenlob (d. Nov. 29, 1318), a talented but extremely vain and artificial poet, who seems to have gathered around himself apprentices in the poetic art. Not only may we infer this from a picture which accompanies his poems in the famous Heidelberg (former Parisian) manuscript, but also from the influence which his poetry doubtlessly exerted on the later mastersingers. The religious and theological contents of most of the mastersongs, their fruitless versified speculations concerning the Trinity, the Immaculate Conception, and other problems of mediæval scholasticism may more or less be traced back to Frauenlob's example.

Mastersinger schools similar to that of Mentz were gradually established in the cities along the Rhine, like Worms, Strassburg (1493), and Freiburg, where the thrift of commerce and the awakening of the spirit of independence among the citizens had also given rise to the demand for higher education. All of these schools seem to have been highly conservative in spirit, for they did not allow their members the invention of new metrical measures, but restricted them to the use of the metrical models of the "old masters." During the fifteenth century a mastersinger, by name Nestler von Speier, introduced, however, a new measure (*Ton*), thereby causing a break with the traditions of the Mentz school, and the establishing of more schools in the interior of Germany. Simultaneously with this event, which meant the development of a greater freedom of spirit among the mastersingers, a more strict organization into guilds or associations must have taken place. As the leader of the younger and more progressive generation of mastersingers, we may consider Hans Folz, a poet from Worms. He took the part of Nestler in the latter's conflict with the Mentz school, ridiculed the conservatism of the old masters, and founded a new school in Nuremberg, which soon developed into the most prominent in Germany. For in this school Hans Sachs, the greatest of all the mastersingers, received his earliest instruction in the art of poetry. In him the mastersong could finally claim a real poet of national reputation, though we of modern times do not find the true greatness of Hans Sachs in his mastersongs. With the rise of humanism in Germany and the subsequent development of new poetical ideas the mastersingers are gradually lost to sight. Still, their guilds continued to exist in the seclusion of some of the small German cities up to the nineteenth century, the last of the guilds being formally dissolved by the twelve masters of Ulm in 1830.

In his masterly essay *Ueber den altdeutschen Meistergesang*, Jacob Grimm has demonstrated beyond doubt that the mastersong, from a metrical point of view, was the continuation of the minnesong. Concerning the metrical rules of the later mastersong, the customs and regulations which were observed by the guilds, we are excellently informed by the so-called *Tabulaturen* as they were published by Puschmann, *Gründlicher Bericht des deutschen Meistergesangs* (1573), and by Wagenseil, *Buch von der Meistersinger holdseliger Kunst* (1697). The general character of the contents of the mastersong has already been partly described. Its theological abstruseness and didactic dryness repel a reader of the present day. In spite of its fossilized appearance we must not forget that in times of general mental decay and poetical decline these guilds preserved at least the faint memory that poetry should be an art.

See Jacob Grimm, *Ueber den altd. Meistergesang* (1811); Bartsch, *Meisterlieder der Kolmarer Handschrift* (1862);

Goedeke, *Introduction to Dichtungen von Hans Sachs* (1883); Martin, *Die Meistersänger von Strassburg* (1882); Plate, *Die Kunstansdrücke der Meistersinger*. JULIUS GOEBEL.

Mas'tic [viâ Fr. from Lat. *mas'tiche, mas'tice*, from Gr. *μαστίχη*, mastic, apparently deriv. of *μαστάζειν, μασᾶσθαι*, chew]: a valuable gum-resin used as an ingredient of many varnishes. By itself it is transparent, tough, brilliant, and delicate, and is often employed in finishing maps and paintings. It is obtained from cuts in the bark of *Pistacia lentiscus, P. atlantica*, etc., shrubs of the order *Anacardiaceæ*. It comes from Barbary, the Levant, and especially from China. It has a limited use in medicine and in dentistry and in mounting objects for the microscope.

Mastication: the act or process of chewing, as of food. It is a complex co-ordinated muscular act which depends upon the activity of nerve centers in the brain, whose performances are guided by sensations generated in the sensory nerves distributed to the membrane lining the mouth, to the teeth, and to the muscles of the jaws and cheeks. The food is moved in various directions and mixed with saliva by means of the tongue chiefly, and is kept between the teeth by the opposing actions of the tongue on the one side and the lips and cheeks on the other.

Mastication is accomplished by the teeth of the lower jaw being brought with a cutting or grinding motion against those of the upper jaw. The movements of the lower jaw are of three kinds: vertical, lateral, and fore-and-aft, the first having for its object the cutting and laceration of the food, and the last two its grinding and comminution; consequently we find that the types of movement in different species of animals depend upon the nature of the food upon which the animal lives. In man mastication is performed by vertical and lateral movements, for although he possesses the power of fore-and-aft motions, they are not used in chewing. The upward movement is effected by the temporal, masseter and internal pterygoid muscles, and the downward movement by the weight of the jaw, which may be reenforced by the digastric, mylohyoid, geniohyoid, and certain other small muscles connected with the hyoid bone, and the platysma. The lateral movements are due to the alternate contractions of the external pterygoids. In herbivora the movements are lateral, having for their purpose the grinding of the pieces. In carnivora they are vertical, accomplishing nothing more than tearing and lacerating. In rodents they are fore-and-aft, combined with the vertical. The type of movement in mastication in any animal can be told with considerable accuracy by the nature of the teeth —in animals in which the movement is of the vertical character the teeth are chiefly pointed and wedge-like, as in the cat, and are especially adapted for cutting and tearing; in those in which the lateral type is marked the teeth are chiefly of the molar variety, having large, irregular surfaces which render them particularly useful for grinding, as in the cow; while in those in which we find both up-and-down and lateral movements both varieties of teeth are observed. Rodents and other species exhibit other peculiarities, which depend upon the nature of the food upon which they subsist.

During mastication the food is mixed with saliva which is poured into the mouth as a result of a reflex excitation of the salivary glands, and is moved to and fro by means of the intricate movements of the tongue so as to bring the particles between the teeth. After the jaws have been brought together the tongue, cheeks, and lips conjointly collect the mass and again get it in position to be chewed, and so the operations are repeated until a sufficient degree of comminution is accomplished. The tongue then gathers the mass and molds it in the form of a bolus. The tip of the tongue is now brought against the roof of the mouth, and the bolus lying in the hollow of the tongue is gradually forced back to the pharynx, as more and more of the tongue is brought against the roof of the mouth until it reaches the isthmus of the fauces, when various muscles are successively brought into operation and the bolus is swallowed. As a rule, but one side of the mouth is engaged in chewing at any given time; after a while the labor is shifted to the other side, and so on alternately. Most people habitually chew upon one side more than upon the other.

The degree of pressure which is exerted by the lower jaw is regulated by the sensations imparted by the extremely sensitive nerves of the teeth and muscles of the lower jaw; the degree of comminution of the food is afforded us by sensations coming through the same nerves distributed to the mucous membrane of the tongue.

While mastication is a voluntary act it is carried on almost automatically after it is started, the process being guided by the sensory impulses as above noted.

The object of mastication is to prepare the food for the actions of the digestive juices. In carnivora mastication is relatively of little value, owing chiefly to the comparatively small amount of non-digestible matter taken in the food, but in herbivora and omnivora it is essential that mastication be carried to a high degree in order that digestion can take place with proper speed. Food that is not properly chewed is far more difficult of digestion than that which is. The evil effects of bolting the food are only too frequently illustrated in the prevalence of dyspepsia. Graminivorous birds, which swallow seed, beans, etc., whole, ingest pebbles, small pieces of glass, etc., with their food, which by the aid of the powerful muscles of the gizzard gradually grind the food, and thus mastication is practically accomplished in the stomach. EDWARD T. REICHERT.

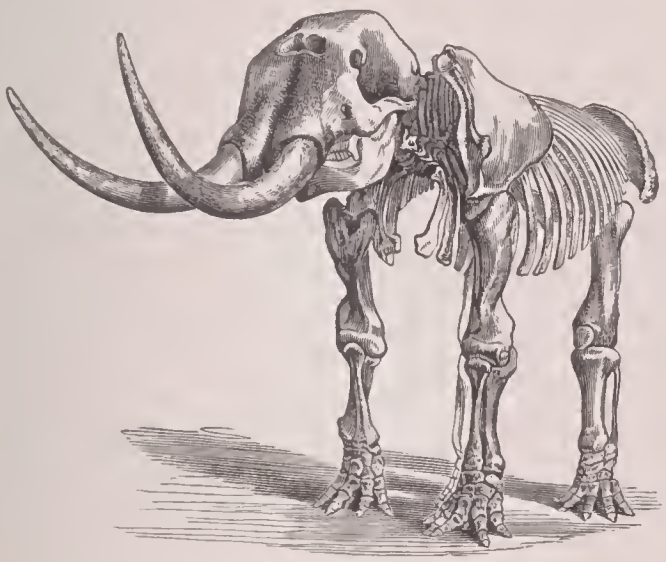
Mastiff [M. Eng. *mestif* = O. Fr. *mestif*, mongrel, apparently from a deriv. of Lat. *mixtus*, but cf. also O. Fr. *mastin* > Fr. *mâtin* < Lat. **mansueti'nus*, tamed dog; the word may have also been influenced by prov. Eng. *masty*, big, big dog, connected with *mast* fruit, food]: a name applied to several distinct breeds of large watch-dogs. The old English and Irish mastiffs (breeds which are unfortunately now nearly extinct) resemble the bulldog in courage and strength, but excel him in magnanimity, faithfulness, and affection for man. The mastiff should have a massive head, broad forehead, short muzzle, and small pendant ears. The neck should be muscular, chest full, legs straight. The hair should be short, the color fawn with black muzzle and ears. The tendency nowadays seems to be to breed this dog with a smaller head and muzzle than formerly. (See DOGS.) The Tibet mastiff, from Central Asia, is one of the largest of the dog tribe. He is bred both as a sheep dog and as a defender of the house. The so-called Cuban bloodhound is really a mastiff of Spanish origin, but in ferocity and bloodthirstiness appears to excel all other breeds.

Revised by F. A. LUCAS.

Mas'todon [from Gr. *μαστός*, breast, nipple + *ὀδούς, ὀδόντος*, tooth. Named from the conical projections on its molar teeth]: name of a genus of Tertiary and Quaternary quadrupeds of large size, belonging to the order *Proboscidea*, and closely related to the elephant and the mammoth. They are distinguished from those animals principally by the more simple structure of the crowns of the molar or grinding teeth. These teeth, according to Owen, are seven on each side, above and below. The first two, at least in the upper jaw, are followed by vertical successors, but the remaining teeth displace one another from behind forward, usually not more than two of each series being in use at one time, or eight in all. The molar teeth have wedge-shaped, transverse ridges, and the summits of the ridges are divided by a depression lengthwise with the tooth, and further subdivided into smaller cones, more or less resembling the teats of a cow, whence the name, meaning "nipple-tooth." The form of these teeth is of peculiar interest, as being intermediate between those of ordinary herbivorous animals and the complex teeth of the elephant. In the common American species, *M. americanus*, the posterior molars are crossed by three to five such ridges, the last molar above and below being subject to some variation; but in the three teeth preceding the last there are three such ridges, and this form was taken by Dr. Falconer as the type of his sub-genus *Trilopodon* (three-crested). *M. longirostris* of Europe has four such ridges on the corresponding teeth, representing his sub-genus *Tetralophodon* (four-crested). *M. sivalensis* has five ridges, while another group, considered by that author as intermediate between *Elephas* and *Mastodon*, and named *Stegodon*, has six or more such crests. These ridges are built up of dentine or the bony substance of the tooth, and covered by a layer of enamel. The fangs and base of the tooth are further covered by a coating of cement, which in the typical *Mastodon* extends only in a very thin layer over the enamel of the crown, while in *Stegodon* it is present in considerable quantity in the valleys between the crowded ridges. In the elephant the same process has been carried still further. The ridges of dentine coated with enamel have become numerous, thin, and proportionally high, and the intervals are filled with cement, which also invests the whole crown of the tooth. As such a tooth becomes worn by use the grinding surface will present a series of ridges of enamel crossing the tooth,

and uniting with each other in pairs at the sides of the tooth, so as to inclose an elongated area of dentine. Each of these areas represents a section of a dentinal ridge, while between the areas, and continuous with the exterior of the tooth, is a layer of cement. Both the cement and dentine being softer than the enamel, will be worn into hollows alternating with ridges of that material.

The coarser teeth of the *Mastodon* indicated a coarser food than that of the elephant, and the remains of twigs and branches of trees, especially spruce and hemlock, found in the position of the stomach of some mastodon skeletons, have given very positive evidence as to the nature of their food. There were no canine teeth, but two of the upper incisors were developed in the form of tusks, like those of the elephant. These were also preceded by a pair of deciduous tusks, and in some species were provided with a band of enamel upon their surface. Shorter tusks were also present in the lower jaw of many and perhaps all of the species. These were early deciduous in the females, and in the males one, usually the right, was frequently retained. The skull was massive, but considerably lightened by air-cavities. The form and position of the nasal opening, as well as the shape of the nasal bones, indicate the presence of an elongated and flexible proboscis, and the necessity of such an organ is shown by the shortness of the neck, the vertebræ of which are much compressed longitudinally and



Skeleton of American mastodon.

flattened. All the vertebræ are short, with the neural spines of the thoracic region elongated. The *M. americanus*, the earliest and best-known species, has been very fully described under the name *M. giganteus* by Dr. J. C. Warren, the description being mostly drawn from a very perfect skeleton discovered in a swamp at Newburg, N. Y. This skeleton measured 11 feet in height, and 17 feet in length to the base of the tail. The entire length of the tusk is 10 ft. 11 in., about 2½ feet being included in the socket. The fore foot measures nearly 2 feet across. The bones were massive compared with those of the elephant. When alive this animal must have been 12 or 13 feet high, and, including the tusks, about 25 feet long. Other skeletons more or less complete have been discovered in Orange co., N. Y., in New Jersey, Indiana, and on the banks of the Missouri, while isolated bones and teeth have been found in nearly all parts of the U. S. and in Canada. This species seems to have been confined to the Quaternary. At the same time there were living at least two species in South America, the *M. andium* and *M. humboldtii*, the former species extending into the southern parts of North America. From the Pliocene of Nebraska, Dr. Leidy has described a species, *M. mirificus*, smaller than *M. americanus*, and with a greater number of transverse ridges upon its molars. *M. obscurus* was first described from the Pliocene of Maryland, and remains of the same or a closely allied species have since been found in North Carolina, Georgia, California, and New Mexico. This species closely resembled the *M. angustidens* of Europe, and like that species was provided with a band of enamel upon the tusk. No American species are known earlier than the Pliocene, but in Europe *M. longirostris* and *M. tapiroides* are from the Miocene, and the explorations of Capt. Cautley and Dr. Falconer have made known several species from the Sewalik Hills of India, which are referred to the Miocene. Below that formation no species have yet been discovered. O. C. Marsh.

Masû'di, or **Al-Masûdi**, Ali-Abul-Hassan: b. at Bagdad about the close of the ninth century; received a brilliant education and spent many years in travel. The Mohammedan power and the Arabic language were then at their highest development, and Masûdi visited and described many regions which no writer of his race and creed had seen, including the shores of the Caspian, Persia, India (perhaps even China), Madagascar, Arabia, all the countries of North Africa, and Spain. His later years were passed in Palestine, Bassora, Antioch, and Damascus, and he died in Egypt in 956. His work, embracing the geographical and historical results of his travels, is the most celebrated of its kind in the Arabic language, and abounds in curious information illustrating the manners, morals, and beliefs of the time. It is styled *Meadows of Gold and Mines of Gems*, and is but an epitome of a larger work, now lost, called the *History of the Times*. The *Meadows of Gold* has been frequently printed, and one volume of an English translation was published by Dr. A. Sprenger in 1841 under the title *El-Masûdi's Historical Encyclopædia*. Other works of Masûdi are extant in MS., and several others have been lost. Revised by J. R. Jewett.

Masulipatam': maritime city of Kistna district, Madras, British India; at the mouth of a northern branch of the Kistna delta; 220 miles N. of the city of Madras; in lat. 16° 9′ N. (see map of S. India, ref. 4–F). It is the center of a manufacture of textile fabrics, which are, however, being crowded out by English ones. It is also the center of the Christian missions in the Telugu country. The port is being gradually silted up, and is now accessible only for native craft. The city is in marked decadence. The French possessed the city from 1660 to 1669, and there still remains a small patch of French territory (22 acres) in the city, where a market is held, besides two or three small patches outside. In 1864 a terrible storm passed over the city, causing enormous destruction and the loss of 30,000 lives.
Mark W. Harrington.

Mat, **Maa**, or **Mait**: an Egyptian goddess, "daughter of Ra" the sun-god, "eye of Ra," "mistress of heaven, queen of earth, mistress of the nether world," "queen of gods and goddesses." She was sometimes represented as the wife of Thoth (*q. v.*), and was regarded as the impersonation and goddess of truth and justice. In this capacity she had the higher grades of judges as her priests, and the chief judges wore her image suspended about their necks as the insignia of their office. In the judgment scene in Amenti (see Ritual of the Dead) she is represented as weighing the heart of the departed against the symbol of truth. Her sign was the ostrich feather, which she wore upon her head when standing, and sometimes upon her knees when in a sitting posture. Charles R. Gillett.

Mat, or **Matting** [O. Eng. *meatte*, O. H. Germ. *matta*, from Lat. *mat'ta*, rush-mat]: a coarse textile fabric made by weaving grasses, rushes, palm-fiber, bark, and the like, and used for summer floor-covering, for packing furniture and other goods, as material for bags, as covering for hotbeds and cold-frames in gardens, etc. In rude nations matting is used instead of sailcloth. Vast quantities of "bass matting," made from the inner bark of the European linden-tree (*Tilia*), are made in Northern Russia. Nearly all kinds of Russian exports are packed in this material, which has an extensive sale. Chinese or Canton matting is made from rushes, as are the excellent mats of the Japanese. The Mauritius exports sugar and grain packed in mats, which are made of the leaves of a tree. The beautiful India matting is woven from a sedge, the *Papyrus pangorei*. In Portugal and Spain very handsome mats are made from Esparto grass and reeds. Mats are also made from coir or cocoanut and other palm-fibers. These are used for covering the floors of public halls, and are very durable. The Japanese make mats so soft and elastic that they are used as bedding.

Matabeles, The: See Kaffraria.

Matagal'pa: city of Nicaragua; capital of the department of Nicaragua; situated nearly in the center of the republic, on a platcau surrounded by mountains, about 3,500 feet above the sea (see map of Central America, ref. 5–H). It is in a rich agricultural district, and is growing rapidly. Pop. about 10,000. The department has an area of 7,100 sq. miles and a population of 40,000. H. H. S.

Matamata': the native name, adopted as the common and specific name of a curious fresh-water turtle (*Chelys matamata*) from Northern South America, which has the

carapace raised into three rows of conical prominences, the neck broad and flattened, and the head wide and so depressed as to look as if actually crushed. The neck, which can not be withdrawn beneath the shell, bears along its sides little fleshy projections or fimbriations. The animal is about 2 to 3 feet long, of a dirty-brown color, and is sluggish in its movements. F. A. Lucas.

Matamo'ros (so named in honor of the patriot Mariano Matamoros; incorrectly written Matamoras): town; in the state of Tamaulipas, Northern Mexico; on the Rio Grande del Norte; 30 miles above its mouth and opposite Brownsville, Tex. (see map of Mexico, ref. 4–H). It is well built, and is the center of a rich grazing district. Near it there are gold mines of some importance. Matamoros, through its port Bagdad, near the mouth of the river, has had a considerable commerce, exporting horses, hides, etc., but this has been much hindered by the shifting bar of the Rio Grande. In 1892 it was reported that this bar was impracticable for vessels drawing 5 feet of water, though ordinarily it admits those drawing 10 feet or more. The city lies in the "free zone" (see Tamaulipas), and it is claimed that there is much contraband trade with Texas. The place dates from 1823. It was occupied by the U. S. forces under Gen. Taylor after the battles of Palo Alto and Resaca de la Palma, May 18, 1846, and was an important point during the struggles between the French and the Republicans in 1866. Pop. (1889) 13,000. Herbert H. Smith.

Matamoros Izúcar, or simply **Izúcar**: a town of the state of Puebla, Mexico, near the eastern base of the volcano of Popocatepetl, and 90 miles S. E. of Mexico city (see map of Mexico, ref. 7–H). It is in the center of a rich sugar region, and is connected with Puebla, and thence with Vera Cruz and Mexico, by railway. Rich deposits of iron and lead are reported from the vicinity. On Feb. 23–26, 1812, patriot forces in Izúcar repulsed an attack of the Spaniards. Pop. about 14,000. H. H. S.

Matamoros, Mariano: Mexican patriot; b. about 1770. He was a priest at Jantelolco, near Cuernavaca, and joined the revolutionary forces of Morelos in Dec., 1811. In the heroic defense of Cuautla (Jan.–Feb., 1812), he greatly distinguished himself. Sent to the relief of Bravo (Oct., 1813), he defeated Candano at San Agustin del Palmar (Oct. 14), this being one of the most signal victories gained by the patriots. Subsequently he shared in the repulse at Valladolid and the defeat at Puruaran (Jan. 5, 1814), where he was captured. Morelos's offer of 200 prisoners in exchange for him was refused, and he was shot at Valladolid Feb. 3, 1814; Morelos executed the 200 prisoners in reprisal. Mexican writers, especially Alaman, hold that Matamoros was the greatest military genius in the patriot forces, and claim that if his advice had been followed the war would have ended in the defeat of the Spaniards. Herbert H. Smith.

Matan'zas: a town and port of the northern coast of Cuba; on a bay of the same name; 52 miles E. of Havana, with which it is connected by railway (see map of West Indies, ref. 3–C). It is the second port in Cuba in importance, and has a large export trade, principally of sugar and molasses. The bay, though partly obstructed by shallows, is a good and safe port; it is defended by the fort of San Severino. The city is well built, mainly on heights overlooking the bay; it has a fine theater, government palace, an excellent educational institute called the Empreza Academy, etc. Three miles to the E. is the celebrated cavern of Bellamar, noted for its stalactites, and said to be 3 miles in depth. Matanzas was founded in 1695, and was destroyed by fire in 1845. It is the capital of a province of the same name. Pop. (1899) 36,374. Herbert H. Smith.

Matches [M. Eng. *macche*, from O. Fr. *mesche* (> Fr. *mèche*, wick) < Lat. *my'xa*, lamp-nozzle = Gr. *μύξα*, mucus, nostril, lamp-nozzle]: small sticks of inflammable material tipped with a substance yet more inflammable which can be ignited by friction.

The first matches of which we have any account were thin splinters of wood about 4 inches long tipped with sulphur. These were ignited, when live coals or other fire were not available, by means of a tinder-box and its copartners flint and steel. Fire was first communicated to the tinder by sparks of burning metal struck from the steel by the flint. Fire having been communicated to the tinder, the sulphur match could then be ignited. This method of obtaining fire was very inconvenient; sometimes the tinder, owing to dampness, would fail to ignite, or the steel would not respond to the stroke of the flint; at such times the usual recourse was to borrow fire from a neighbor, and in thinly settled regions miles were sometimes traveled for this purpose.

The discovery of phosphorus by Brandt in 1668 was first applied commercially as a means of obtaining fire by Godfrey Haukwitz, of London, who in 1680, under the direction of Robert Boyle, prepared and sold large quantities. It was used for procuring fire by rubbing small particles between the folds of brown paper, and a sulphur match was ignited from the resulting flame; but as phosphorus was both costly and dangerous this invention was not long employed. One of the best of the earlier inventions by which phosphorus was used for obtaining fire was the "phosphorus bottle." This was a small bottle in which a piece of phosphorus had been stirred with a hot wire, so as to coat the interior of the bottle with oxide of phosphorus; the bottle was kept tightly corked when not in use, but when a light was required the cork was withdrawn and a sulphur match was dipped in and thus ignited. This phosphorus bottle gave place to the so-called "oxymuriate matches," which were invented in 1805 by Chancel, of Paris. These consisted of splints of wood tipped first with sulphur and then with a mixture of chlorate of potash, gum, and sugar, colored with vermilion. These matches, when brought into contact with asbestos soaked in sulphuric acid contained in a small vial sold with them, immediately ignited. Such matches were very inconvenient to use in the dark, and an apparatus was devised for lighting them which could be put in action by pulling a cord; but this was expensive, not portable, and was more curious than useful. In the same year phosphorus matches were used in Paris, and in 1809 Derepas suggested the mixing of the phosphorus with magnesia in order to diminish the danger from such matches. Derosne is said to have made a friction match tipped with phosphorus in 1816; but the first really practical friction matches were made in England in 1827 by John Walker, a chemist of Stockton-on-Tees. These were called Congreves after Sir William Congreve, the inventor of the Congreve rocket. They consisted of wooden splints, or strips of cardboard, one end of each being first coated with sulphur, and then tipped with a mixture of sulphide of antimony, chlorate of potash, and gum. Each box was retailed at a shilling, and contained eighty-four matches and a piece of sandpaper, between the folds of which the match was drawn for ignition.

In 1830 a Mr. Jones, of London, patented the matches called Prometheans. These were made of a small roll of waxed paper having a minute glass globule of strong sulphuric acid coated with a mixture of chlorate of potash and sugar at one end. Ignition was effected by breaking the globule of acid, and its contents, acting upon the mixed chlorate of potash and sugar, produced fire.

Both the Congreves and Prometheans were endowed with many objectionable features; the former did not readily ignite, often the burning tip separated from the splint, and the fumes from the burning sulphur and antimony were offensive. The Prometheans were not popular on account of the danger from the acid and the explosive reaction at the moment of ignition; moreover, both were too expensive for extended common use.

These matches were supplemented by the original lucifer (Lat. *luciferus*, that which brings light) friction matches. These were made, for greater safety in transportation and use, in the form of wooden cards or combs having about a dozen teeth, each tooth being a match, which was broken off from the others when required for use. These matches were at first tipped with the same chemical composition as the Congreves, and were open to many of the same objections, but it was not long before phosphorus—of which the cost had been greatly reduced by improved methods of manufacture—was introduced as a component of the tipping composition.

Phosphorus friction matches were first manufactured on a commercial scale by Treschel, of Vienna, in 1833, but at about the same time such matches were also made at Moldenhauer, in Darmstadt, and for many years Austria and Southern Germany were the principal localities of the manufacture.

The work-people who prepare and apply the igniting composition are liable to necrosis of the lower jaw, called the "jaw" or "match" disease, or "the flute." The teeth decay and fall out, and then the decay extends to the jaw-bone, causing intense pain, which never ceases until an operation or death relieves the sufferer. It is said that cleanliness, ventilation, and careful attention to the teeth are almost

infallible preventives of the jaw disease. The discovery of amorphorus or red phosphorus, by Prof. Anton von Schrötter, of Vienna, in 1845, gave great hopes of immunity from the dangers arising from the use of common phosphorus, as the red variety is a perfectly innocuous substance; but notwithstanding this fact its use has not become general among manufacturers of matches. Red phosphorus is used in the manufacture of the well-known "safety matches" invented by Lundström, of Sweden, in 1855. These matches ignite only on the prepared surface which accompanies the box; this surface, and not the matches, contains the phosphorus required for ignition, making them less liable to cause accidental fires than the more common kinds.

Wax tapers, or vesta matches, are made by coating cotton wick with wax, and tipping them with igniting composition at one end.

Machinery is largely employed in the manufacture of matches, and the number produced annually is beyond computation; two European manufacturers are said to make (together) nearly 45,000,000,000 matches each year, and it has been roughly estimated that there are 200,000,000 matches consumed daily in Great Britain, or about eight per head of the whole population. Applying this estimate to the U. S., the daily consumption would be the enormous total of 520,000,000.

According to the census of 1880 there were 37 manufacturers of matches in the U. S., having an aggregate capital of $2,114,850, who disbursed in wages $535,911 per year, used $3,298,562 worth of raw materials, and produced goods valued at $4,668,446. W. F. Durfee.

Mate, maa'tā, or **Maté**, mă̆a-tā' [Span. *yerba*, or *yerba de mate*; the *mate* is properly the gourd in which it is prepared]: a name commonly given to the dried leaves and small shoots of *Ilex paraguariensis*, otherwise known as Paraguay tea. The plant is a small tree (10 to 20 feet), which grows in the highland forests of Paraguay and the neighboring parts of Brazil (Santa Catharina, Paraná, and Rio Grande do Sul); all modern attempts to cultivate it from the seed have failed. The Paraguayan mate is that best known in Europe, but a much greater quantity and better quality is obtained in Paraná. The product is gathered by special workmen who visit the forests, principally in June and July, that obtained in later months being inferior. The branches are cut off, passed through the flame of a hot fire, and the twigs stripped from the larger boughs are exposed for a day to the heat of a slow fire of aromatic wood; subsequently they are fully dried, broken into fragments, and packed in bundles bound in hides for the market. Often the product is adulterated with the leaves of inferior species of ilex, or even with plants of other orders. Mate is the common and popular beverage throughout the Platine states of South America, and, to a lesser extent, in Southern Brazil. In use it is placed in a gourd cup; boiling water is added, and the liquor is sucked through a silver or tin tube having an expanded and perforated end (*bombilla*). It is customary to pass the same gourd and bombilla to the different persons in a company, more water being added as needed. The gourds are often richly ornamented. The flavor of mate is quite unlike that of tea, but it is greatly enjoyed by those who have become accustomed to it. The physiological effects resemble those of coffee. See Couty, *Le Maté et les Conserves de Viande* (Rio de Janeiro, 1880). H. H. Smith.

Matehuala, mă̆a-tā-wàa'lă̆a: a city in the northern part of the state of San Luis Potosí, Mexico; near the frontier of Nuevo Leon; on the Matehuala Railroad (see map of Mexico, ref. 5–G). It contains many silver-reducing establishments, most of the ore being brought from the Catorce Mountains, though there are some mines in the immediate vicinity. Population about 15,000. H. H. S.

Matejko, mă̆a-tā'e-kō, Jan Aloysius: historical painter; b. at Cracow, Austrian Poland, July 30, 1838; studied at Cracow Art School and at the Vienna and Munich Academies; was awarded a first-class medal at the Paris Exposition of 1867 and a medal of honor at the Exposition of 1878; received the decoration of the Legion of Honor in 1870; became director of Cracow Art School in 1873. His pictures, many of large size, depict scenes from the history of Austrian Poland. D. Nov. 1, 1893. W. A. C.

Matera, mă̆a-tā'ră̆a: town; in the province of Potenza, Southern Italy; situated in a plain flanked by two deep valleys and surrounded by hills (see map of Italy, ref. 7–G). It contains several well-built churches and a remarkable chapel, San Pietro Barisano, consisting of three naves, the whole excavated in a single huge block of stone. This town suffered cruelly from wars and earthquakes during the Middle Ages. The present inhabitants are mostly agriculturists or shepherds. Pop. (1881) 15,700.

Material Cause: in ontology, the first of the four kinds of causes distinguished by Aristotle and accepted by later metaphysicians. As defined by him, the material cause of a thing is the physical basis of its existence—namely, the matter from which it was formed or developed; e. g. the block of marble from which a statue is carved. The material cause of a thing is thus partly, but not absolutely, identical with the thing itself (*das Ding an sich*). In the instance cited a portion of the material cause, or block of marble, must be eliminated in order to arrive at the semblance of the pre-existing type—i. e. the finished statue. See Matter.

Materialism [from Lat. *materia'lis*, deriv. of *mate'ria*, stuff, matter, matter as opposed to spirit.—originally, building material, timber, for **dmāteria*, connected with Gr. δέμειν, build: Goth. *timrjan*]: in general, the doctrine that nothing exists but matter with its sensible properties. It is opposed to idealism, the doctrine that nothing exists but mind. Spiritualism, which maintains the existence of mind or spirit as well as matter may be dualistic or monistic, in which latter case it becomes some form of idealism.

History.—Greek materialism led the way. The Greek philosophers, Leucippus, Democritus, and Epicurus, speculating upon the origin of the universe, posited an infinite number of atoms or refined particles of matter combining and recombining in mathematical proportions throughout space and time, until, after endless trials, all existing things have been produced. In these systems not only were solid objects, plants, and animals, regarded as mere masses of compounded atoms, but also the souls of men, which were supposed to consist of ethereal and luminous particles diffused like air or light through the body, and dispersed with it at death; and even the gods themselves were fancied as atomic beings or dream-like images in human form, dwelling in the interspaces between the worlds in happy indifference to the course of nature and the affairs of mortals. Roman materialism followed as little more than a reproduction of the Greek, and had its chief representative in Lucretius, who expounded the doctrines of Epicurus in a majestic philosophical poem, *On the Nature of Things*. Traces of Epicureanism are also to be found in the writings of Horace, Vergil, and other men of letters, but it did not maintain at Rome the high ethical character which it had claimed among the Greeks, having been so bitterly assailed by the Stoic philosophers that the very name has since remained a synonym for sensuous pleasure.

Italian materialism rose with the classical revival as a compromise between the dogmas of the Church and the speculations of the Alexandrian school of Aristotle. The leader of the movement, Pomponatius, until silenced by a decree of the Lateran Council, held the mortality of the soul, the necessity of the will, and the embodiment of God in nature, and subsequently the systems of Democritus and Epicurus were partially revived by Telesius, Campanella, and Magnenus, and at length fully sanctioned by Peter Gassendi, a French ecclesiastic, whose learned defense of Epicureanism as consistent with Christianity has caused him to be styled the father of modern materialism.

English materialism at the same time was opening new paths with greater boldness and freedom. Thomas Hobbes, in his work *Leviathan*, described the soul as a corporeal substance receiving ideas as material images, the state as an incarnation of absolute power, and God himself as but a name for the incomprehensible omnipotence of nature. In Hartley and Priestley the materialistic hypothesis began to receive the support from physiology which is in current discussion its main support.

French materialism grew out of the previous systems through the modification of the philosophy of Locke worked out by Gassendi. The Abbé Condillac, a disciple of the latter, illustrated the process of transforming sensations into ideas by an imaginary human being incased in marble and allowed to acquire successively the different senses and combine their impressions by acts of attention, memory, and judgment. It would seem to have been but a step further for La Mettrie, in his treatises *On Man a Machine* and *Man a Plant*, to reduce the mind to a perishable mechanism or organism. And at length the Baron d'Holbach, in his *System of Nature*, brought materialism to an ethical as well as theoretical climax, by not only denying the existence of

mind, freedom, and immortality, and maintaining the eternity of matter, the indestructibility of force, the immutability of physical law, but by assailing virtue, religion, and God as superstitious fictions. In Germany the newest phase of materialistic thought—the physiological—reached full statement by Büchner, Feuerbach, and others; and by those advocates of evolution, such as Haeckel, who find in it support for a positivistic or agnostic philosophy.

C. W. Shields. Revised by J. Mark Baldwin.

Contemporary Forms of Materialism.—The modern doctrines of materialism differ greatly from the older Greek and continental views, in being a new statement of the physiological doctrine begun by Hartley. Materialism has tended from the crude postulate of bulk matter as a metaphysical principle to a form of psychological doctrine which aims, by analyzing the mental functions into simple sensational elements, at showing their final dependence upon changes in the brain. The successive positions which modern materialism has taken show progress both in exactness of statement and adequacy of analysis. The problem which it now claims to answer is this: Given organized matter with the laws of conservation and uniformity, how may we account for thought? Thought, mind, is a function of nervous action.

Schiff's Experiments.—Much has been made of the experiments of Schiff, whereby he has shown that mental operations are accompanied by a discharge of heat. (*Archives de Physiologie*, 1870, p. 451.) Luys says (*Brain and its Functions*, pp. 78–79): "These experiments show us, on the one hand, that sustained intellectual work is accompanied by a loss of phosphorized substance on the part of the cellular cell in vibration; that it uses it up like an ignited pile which is burning away its own essential constituents; and that, on the other hand, all moral emotion perceived through the sensations becomes at the same time the occasion of a local development of heat." This may be perfectly true and yet valueless for the debate. Every one admits that there is a loss of phosphorized substance during thought; but this phosphorus is found passing off in the ordinary channels of the body (Byasson and Beaunis), and this latter fact is used by Luys to prove the passage of thought back into a material form. He says: "It (thought) uses it (phosphorus) up"; but phosphorus is also found passing from the body in the form of sulphates and phosphates and in increased quantities after periods of wakefulness and thought (Hammond), therefore (p. 70) these "serve as a chemical measure of the intensity of cerebral work done in a given time."

On either the materialistic or the spiritualistic hypothesis equally, a development of heat is possible during the play of intellectual processes. If mind and brain are distinct, and brain a necessary organ of mind, heat may be the equivalent in whole or in part of cerebral activity. In short, the evolution of heat means only that molecular change is going on in the brain. That there is no break in the continuity of brain processes is also strongly urged by Tyndall and Dubois Reymond, and stated by Fiske in these words, i. e. "The dynamic circuit is absolutely complete without taking psychical manifestations into account at all. No conceivable advance in physical science can get us outside of this closed circuit, and into this circuit psychical phenomena do not enter." (*Cosmic Philosophy*, vol. ii., p. 442.) If this be true, it is asked, how can the mind have any efficacy in directing or controlling the body?

Older View of "Mental Direction."—The common answer to this claim of the materialist is this: While the mind can not change the energies of the brain in quantity by adding to or subtracting from them, yet it can *direct* these energies in one channel in preference to another, just as an electrician directs his current on one wire or another without altering its strength. This answer is not adequate since it involves just as truly an exhibition of physical force to remove an obstruction or direct a current as to generate one. The modern materialist, who is also usually a physiologist, claims that the decision of the mind to direct the energies of the brain one way or the other is itself due to still earlier conditions of the brain. The mental determination is said to be due to an earlier physical change instead of the later physical change being due to the mental determination.

Late Physiological Views.—This last position is stated strongly by the French physiologist Marique, who attempts with others to show (*Recherches Expérimentales*, Brussels, 1885) that the brain is entirely a reflex organ; that the higher cerebral centers are in dynamic connection with one another, and that voluntary action and thought differ from reflex action and sensation only in their greater complexity and liability to delay. Maudsley works this view out, in its implications for psychology, in great detail. (*Physiology of Mind.*) This general position is now so well proved, as far as the brain processes themselves are concerned, that idealists no longer dispute it. The defense of Spiritualism against materialism is accordingly thrown further back, and the question asked: Granted uniformity of brain processes, are consciousness in general and the higher processes of thought by this sufficiently accounted for?

Late Idealistic Views.—The answer takes currently two forms in opposition to materialism: Some hold that the higher mental processes—thought, ethical emotion, volition, etc.—are not correlated to brain processes at all, i. e. go on without involving any brain action. This is held with reason to be directly disproved by cases of mental disease in which the loss of these higher mental functions is directly caused by lesions in the brain. The other answer to the materialists' claim at this point contends that consciousness with all that it is capable of doing is itself a fact no matter how the brain may work under it, and since all knowledge of science and everything else is dependent upon the use of the processes of consciousness, the problem as to which is the ultimate form of activity, mental or cerebral, must be decided on broader grounds than those purely psychological. The question at issue then becomes this: Granted a conscious process of thought and a brain process going on together, each for itself, how can we best explain man's personality as a whole comprising both these factors?

Thus thrown into metaphysics the materialist finds himself at the mercy of the idealist. (See Metaphysics.) The solutions, however, now most generally considered adequate, of the problem of mind and body and their relation fall under some form of *monism*, i. e. which holds that these two seemingly opposed things must after all be forms or manifestations of a deeper-lying First Cause or Ground which is one, and which in its nature must itself afford an adequate explanation of "man with all his mind." The two outstanding facts that seem to give adequate support to the view that this first principle of all things is mind are these: First, the nature of thinking as a reflective act involving a subject who sets himself over against his thoughts—what is usually called the fact of self-consciousness—and, second, the fact that all our knowledges get judged by us in a way which we call *ethical*, as worth more or less, some than others, and that we can not help judging those knowledges which involve self-consciousness and ideal things as worth more than the mechanical facts of objective science.

Materialism of Life.—As a metaphysical doctrine materialism has accordingly been practically abandoned in contemporary philosophy. It is now active as a theory only in psychology. In practice, however, what is called "materialism of life" was never more aggressively real. It is in fact rather to the absence of philosophy or of clear thinking and the desertion of high ideals of thought and conduct that this phrase has so common and so pertinent application in modern commercial, literary, and social life. When a man is filled up with material things, low aims, physical comforts, and indulgences, and "finds his meat and drink" in realistic situations, he is starving his thinking nature and blotting out his ideals. Better a man should think, even though he think wrong, than that materialism in this sense should paralyze his abilities and his endeavor. For references, see Metaphysics. The best single history and criticism is Lange, *History of Materialism.*

J. Mark Baldwin.

Materials, Strength of: See Strength of Materials.

Mate'ria Med'ica [Mod. Lat.; Lat. *mate'ria*, matter, subject-matter + *me'dica*, fem. of *me'dicus*, medical, of medicine]: a phrase used to designate the substances used in the practice of medicine; but as the art of the physician embraces the scientific use of articles in common vogue, as food and drink, and of moral and hygienic influences, fully as much as of drugs, it is plain that the term *materia medica* can not be used to designate a definite group of substances, but is simply a convenient phrase by which to refer to the weapons of the physician in general. So far as drugs are concerned, they are derived principally from mineral and vegetable sources, though some few are of animal origin. They are commonly classified according to their effects on the animal system in health or disease; but inasmuch as the majority produce an effect more or less complex, as these combinations of effects are almost endless, and as even

with the same drug the effect varies with varying circumstances of dose or state of the patient, it follows that an accurate division of medicines into groups on the basis of their effects on the living organism is impossible. Such terms as irritants, anodyne, astringent, etc., must be taken merely as defining a kind of effect. The meaning of these various terms and the uses of each drug will be found described under the individual headings. EDWARD CURTIS.

Materna, AMALIA: See the Appendix.

Mathematical Machines: See CALCULATING-MACHINE.

Mathematics [from Lat. *mathema'tica* = Gr. *ἡ μαθηματική* (sc. *τέχνη*, art), fem., and *τὰ μαθηματικά*, neut. plur. of *μαθηματικός*, pertaining to science or learning, especially to mathematics, deriv. of *μάθημα*, learning, deriv. of *μαθεῖν*, learn]: the science which reasons about the relations of magnitudes and numbers, considered simply as quantities admitting of increase, decrease, and comparison. It is divided into three great branches, arithmetic, algebra or analysis, and geometry; but in the extension given to the subject in modern times, these three branches merge into each other so gradually that no exact line can be drawn. Arithmetic is the branch which is concerned with the properties and relations of numbers, especially whole numbers; but when these relations are reasoned about, it is necessary to use algebraic symbols to express numbers, and thus the notation of algebra comes in. Algebra, or analysis, in itself reasons about quantity in general, expressed by means of symbols, without any relation to the particular kind of quantity. The distinction between algebra and analysis is not sharply drawn, at least in the English language. In French the term algebra is generally restrieted to the study of quantities supposed to be unehanged in value, while analysis comprises the study of quantities considered in the act of constantly varying, and therefore having no definite value. In the English language we commonly apply the term "calculus" to this subject. In modern mathematics algebra and geometry run together, because geometrical conceptions are found to be necessary in the development of algebra, while the theorems of the most advanced geometry can be expressed only in algebraic language. Thus arise extensive mathematical inquiries, in which the language and conceptions of the two are combined. S. NEWCOMB.

Mather, COTTON, D. D., F. R. S.: clergyman and author; son of Increase Mather and grandson of Rev. John Cotton; b. in Boston, Mass., Feb. 12, 1663; was trained by Ezekiel Cheever, and graduated at Harvard College in 1678; became a teacher, and in 1685 was ordained his father's colleague over the North church, Boston, having by persistent effort overcome an impediment in his speech; labored with great zeal as a pastor, endeavoring also to establish the ascendency of the churches and ministry in civil affairs. He was conspicuously connected with the witchcraft proceedings in Massachusetts. He was author of *Memorable Providences relating to Witchcraft* (1689); *Wonders of the Invisible World* (1693); *Essays to Do Good* (1710; Glasgow, 1838); *Magnalia Christi Americana* (London, 1702; Hartford, Conn., 1820; Boston, 1855), a very quaint and curious book, full of learning, piety, and prejudiee; and other works, large and small, numbering 382, not reckoning his *Illustrations of the Sacred Scriptures* and other unpublished writings. He was made D. D. in 1710 by the University of Glasgow, and F. R. S. in 1717. Mather, whatever were his faults, was a man of great excellence of character. He labored zealously for the benefit of the poor, for mariners, slaves, criminals, and Indians, opposed intemperance, and aided in introducing inoculation for smallpox. His eredulity was partly the fault of his age. D. in Boston, Feb. 13, 1728. His *Life* was written by Samuel Mather, his son (1729), by W. B. O. Peabody in Sparks's *American Biography*, also by B. Wendell (1882), and by A. P. Marvin (1889); also see W. F. Poole in *The North American Review*, Apr., 1869.
Revised by G. P. FISHER.

Mather, INCREASE, D. D.: b. at Dorchester, Mass., June 21, 1639; sixth son of Rev. Richard Mather (1596–1669); graduated at Harvard 1656, and at Trinity College, Dublin, 1658; preached in England and America; was ordained over the North church, Boston, in 1664; was president of Harvard College 1685–1701; received (1692) the first doctorate in divinity conferred in English-speaking America; was a leader in opposing the abrogation by Charles II. of the Massachusetts charter; was in England during the Revolution of 1688, and procured in England (1692) a new charter for Massachusetts, under which he was given the power of naming the governor, lieutenant-governor, and council; opposed the severe punishment of witches; was the author of ninety-two publications, large and small, of which one of the most noteworthy is *An Essay for the Recording of Illustrious Providences* (1684; republished London, 1856). He was a preacher for sixty-six years, sixty-two of which were spent in Boston. For many years he exerted a commanding influence in civil and ecclesiastical affairs. D. in Boston, Aug. 23, 1723. Revised by G. P. FISHER.

Mather, WILLIAM WILLIAMS, LL. D.: geologist; b. at Brooklyn, Conn., May 24, 1804; graduated at West Point 1828; Assistant Professor of Chemistry there 1829–35; first lieutenant in U. S. army 1834–36; Professor of Chemistry, University of Lousiana, 1836; engaged in the New York geological survey 1836–44; Ohio State geologist 1837–40; State geologist of Kentucky 1838–39; Professor of Natural Science in the University of Ohio 1842–45; its vice-president and acting president 1847–50; editor of *Western Agriculturist* 1851–52; author of *Geology of the First Geological District* (*Natural History of New York*, 1843); and of other geological reports and scientific papers. D. at Columbus, O., Feb. 27, 1859.

Matheson, GEORGE, D. D., F. R. S. E.: a minister of the Church of Seotland and author; b. in Glasgow, Mar. 27, 1842; lost his sight before entering the University of Edinburgh, but graduated with a remarkable record, having repeatedly taken the highest prizes in both academic and theological subjects; was assistant to Dr. Macduff in Sandyford church, Glasgow, 1867–68; minister at Innellan 1868–86; and since 1886 has been minister of St. Bernard's, Edinburgh. He was on the staff of *The Expositor* 1879–81, from which he was removed for holding the "larger hope." Besides contributing to the leading periodicals, he has published *Aids to the Study of German Theology* (Edinburgh, 1874); *Growth of the Spirit of Christianity* (2 vols., Edinburgh, 1877); *Originality of the Character of Christ* (in *Contemporary Review*, 1878; reprinted separately in the U. S.); *Natural Elements in Revealed Religion* (Baird lectures 1881; Edinburgh, 1882); *My Aspirations* (London, 1883; translated into German, 1892); *Moments on the Mount* (London, 1884); *Religious Bearings of the Doctrine of Evolution* (*Transactions* of the Pan-Presbyterian Council, 1884); hymn *O Love that will not let me go!* (Church of Scotland Hymnal, No. 176, 1885); *Can the Old Faith Live with the New?* (1885); *Evolution and Revelation* (1886); *The Psalmist and the Scientist* (1887); *Voices of the Spirit* (London, 1887); *Sacred Songs* (1889); *Landmarks of New Testament Morality* (1889); *Spiritual Development of St. Paul* (1890); and *The Distinctive Messages of the Old Religions* (1893). C. K. HOYT.

Math'ew, Sir JAMES CHARLES: See the Appendix.

Mathew, THEOBALD, known as Father Mathew: temperance reformer; b. at Thomastown, Tipperary co., Ireland, Oct. 10, 1790; studied for a time at Maynooth College; joined the Capuchins, in Dublin, and was ordained a Roman Catholic priest in 1814. He was distinguished for his laborious eharities and his heroism at Cork, especially in the cholera outbreak of 1832. In 1838 he organized the first total abstinence society in Cork. He afterward traveled over all parts of Great Britain and Ireland, and induced hundreds of thousands to sign the temperance pledge. The expenses of this tour involved him in heavy liabilities, and on one occasion led to his imprisonment for debt; from this embarrassment he was only partially relieved by a pension of £300 from the Queen in 1847. The duties on Irish spirits fell from £1,434,573 in 1839 to £852,418 in 1844, and crime as strikingly diminished. He was named by the clergy of the diocese for the vacant bishopric of Cork, but the pope would not ratify the choice (1847). He labored 1849–51 in the U. S., and met with remarkable success. D. at Queenstown, Dec. 8, 1856. See his *Life* by J. F. Maguire (London, 1863; 2d ed. London and New York, 1864).
Revised by S. M. JACKSON.

Mathews, CHARLES: actor; b. in London, June 28, 1776; after a brief apprenticeship to his father, a bookseller, went on the stage as an amateur, and then (1794) as comedian of the regular company at the Theater Royal, Dublin; made his first appearance in London in 1803 as Jubal in *The Jew*; in 1818 introduced his *At Home*, and on his return from a successful trip to the U. S. appeared in his specialty, a *Trip to America*, which was well received. D. at Plymouth, June 28, 1835. See the *Memoirs* by his wife (4 vols., 1838–39).

Mathews, Charles J., son of Charles: actor; b. in Liverpool, England, Dec. 26, 1803; though intended for an architect, he adopted the stage as a profession, achieving remarkable success on his first appearance in public in *The Hunchbacked Lover*; in 1838 married Madame Vestris, at the time lessee of the Olympic theater; they visited the U. S., and on their return to England managed the Covent Garden and Lyceum theaters, but not successfully. His wife dying in 1857, Mathews again visited the U. S. in 1858 and married Mrs. Davenport, better known as Lizzie Weston; in 1860 introduced a similar entertainment to his father's *At Home*, in which his wife assisted; in 1863 made a successful professional trip to Paris, and in 1869–72 visited the U. S. and Australia, returning to England in 1873. D. June 24, 1878. See his *Life*, edited by Charles Dickens (1879).

Mathews, William: See the Appendix.

Mathews, William Smith Babcock, Mus. Doc.: musician and musical critic; b. at Loudon, N. H., May 8, 1837; was educated in New Hampshire Conference Seminary, Boston, and under private teachers; has been an organist, teacher, and writer in Chicago since 1867; was editor of *The Musical Independent* (1869–71); was musical critic and editorial writer on the staff of *The Chicago Herald* (1880–83), and on that of *The Daily News* (1883–90); has been a publisher of music since 1891; is associate editor of *The Etude*; and is the author of numerous musical text-books. C. H. T.

Mathi'as, Thomas James: author; b. in England about 1754; graduated at Trinity College, Cambridge, 1774; wrote a volume of *Runic Odes* (1781), imitated from the Norse; an *Essay on the Evidence relating to the Poems attributed to Thomas Rowley* (1783), sustaining the authenticity of the Chatterton poems; and a poem, *The Pursuits of Literature* (4 parts, 1794–97), issued in sumptuous style, with copious notes, chiefly devoted to a savage criticism of the literary favorites of the time. Mathias was for many years previous to 1818 treasurer of the household to Queen Charlotte. He published in 1805 an edition of Tiraboschi's *History of Italian Literature* (4 vols.), and in 1814 an edition of Gray's works. His last years were passed at Naples, where he died in 1835. Mathias was proficient in the Italian language, in which he wrote several works. Revised by H. A. Beers.

Mathieu, măă'ti-ö', Anselme: modern Provençal poet; b. at Châteauneuf-du-Pape in 1829. He was one of the seven founders of the Society of Felibrige, and an intimate friend of Mistral. He has published verses and articles in the *Aiòle* and other organs of the new Provençal school; has translated into Provençal poems of Horace and Catullus; and has published a collection of original poems in the same dialect, of a rare poetical sentiment—*La Farandoulo, poésie provençale avec traduction française et avant-propos de F. Mistral* (2d ed. Avignon, 1868). A. R. Marsh.

Mathura: sacred city of India. See Mattra.

Mati, maa'tĕe, Tomaso, Commendatore: civil engineer; b. at Leghorn, 1825; studied in Florence and afterward in France under Poirel. He constructed the harbors of Leghorn, Civita Vecchia, Naples, Brindisi, and Venice. At the last-mentioned place, by using the large lagoon as a tidal basin, he has made a direct entrance 25 feet deep in place of a crooked channel of 10 or 12 feet. He has also constructed lighthouse works on all parts of the Italian coast. He is the inspector of the Government corps of civil engineers, and has published many books on the construction of harbors and on modern lighthouse works; is senior member of the council of public works. W. R. Hutton.

Matilda: Countess of Tuscany; b. in 1046; a daughter of Count Boniface of Tuscany and Beatrice of Lorraine; inherited very extensive possessions in Northern and Central Italy, including Tuscany, parts of Lombardy, Ferrara, Modena, Reggio, Mantua, and other dependencies, and played a most prominent part in papal history. The traditional policy of the family was firm adherence to the empire, but it was entirely reversed by Count Bonifaee on account of the treacherous manner in which he was treated by Henry III.; and during the pontificates of Nicholas II., Alexander II., Gregory VII., Victor III., Urban II., and Paschalis II., Countess Matilda was the principal support of the papacy. Especially intimate were her relations with Gregory VII., and Canossa, where the famous penance of Henry IV. took place, was a fief of hers. She was twice married—first to Godfrey of Lorraine, then to Guelph of Bavaria—but her marriages counted for little in her life; and after her death, which occurred in 1115, she bequeathed her enormous wealth to the papal see. It formed part of the so-called *patrimonium Petri*, and, though the will was hotly contested by the emperor, the pope succeeded in retaining the larger portion of the property. See her *Life*, by Luigi Torti (1859), and Amédée Renée, *La Grande Italienne* (1859).

Matile, măă'teel', George Auguste: jurist; b. at La Chaux-de-Fonds, canton of Neuchâtel, Switzerland, May 30, 1807; was educated in the colleges of Neuchâtel and Berne; studied law in Berlin, Heidelberg, and Paris, and was admitted to the bar in Neuchâtel in 1830. He served several terms in the legislature of his canton, and was appointed Professor of Law at the University of Neuchâtel in 1838, and one of the judges of the Supreme Court; emigrated in 1849 to the U. S.; was naturalized as a citizen in 1856, and was appointed Professor of History at Princeton, N. J., in the same year, and Professor of French Literature at the University of Pennsylvania in 1858. From 1863 he held various positions in the State Department in Washington. The principal of his works are *Points de Coutume* (1838); *Autorité du Droit romain de la Coutume de Bourgogne et de la Caroline dans la Principauté de Neuchâtel* (1838); *Musée historique de Neuchâtel* (3 vols., 1841–59); *Monuments de l'Histoire de Neuchâtel* (2 vols. fol., 1844–48); *Histoire de la Seigneurie de Valangin* (1852); *Political Economy* (translated from List), etc. D. in Washington, Feb. 6, 1881.

Mat'ins [from Lat. *matuti'nus*, of the morning, deriv. of *Matu'ta*, goddess of morning; cf. *mane*, in the morning, early]; specifically, the early morning service of the Roman Catholic Church, as distinguished from vespers or evensong.

Matsumaye, măăts'mī', or **Fukuyama**, foō-koō-yaa'măă: a town in the extreme southwest corner of the island of Yezo, Northern Japan (see map of Japan, ref. 3–D). Until 1868 Matsumaye was the center of Japanese civilization and trade in Yezo, but the departure of its lords and the growth of Hakodate have reduced it to a decayed condition. Its harbor never afforded advantages as a port, being a mere open roadstead, and its situation is isolated. The castle, situated on an eminence commanding the town, is now devoted to the purposes of an elementary school, and its grounds form a small public garden. The last struggles of the adherents of the Tokugawa party in 1868 were made in and around Matsumaye, and the town suffered considerably. Pop. 12,000. J. M. Dixon.

Matsys, Quintyn: See Messis.

Matta, maa'tăă, Guillermo: politician and poet; b. at Copiapó, Chili, in 1829. In 1859 as one of the leaders of the radicals, he was banished, returning in 1861; he was elected deputy 1870 and 1873; was *intendente* of Atacama 1875 to 1881, and subsequently held various diplomatic positions. His first literary attempts, short stories, published in 1853, were severely criticised for their freedom of style, but his verses are widely known and very popular. They are mainly in the lyric style. An edition of his poems, in two volumes, was published at Leipzig about 1880. H. H. S.

Mattaponies: See Algonquian Indians.

Mattap'ony River: a stream in Virginia, which unites with the Pamunkey to form the York river. It is itself formed from the union of four streams—the Mat, the Ta, the Po, and the Ny rivers.

Mattawa, măt-a-waa', or **Mattawan**: a town of Nipissing co., Ontario; on the left bank of the Ottawa river, at the junction of the Mattawa; on the Canadian Pacific Railway; 198 miles W. N. W. of the city of Ottawa. It is the fitting-out place for the large lumber interests in the vicinity, and has a considerable trade. It is a favorite starting-place for lovers of fishing. Pop. 1,200. M. W. H.

Mattawa River: a tributary of the Ottawa river; rising near Lake Nipissing, in Trout Lake, it passes through a series of picturesque small lakes and rapids, all of them, with their tributaries, well stocked with fish. After a course eastward of 50 miles through Nipissing County, it falls into the Ottawa river at Mattawa town. Before the construction of the Canadian Pacific Railway the stream was of capital importance as a favorable outlet to the Great Lakes of the productions of the upper Ottawa. M. W. H.

Matteawan: village; Dutchess co., N. Y. (for location of county, see map of New York, ref. 6–J); on the Fishkill creek, and the Newburg, Dutchess, and Conn. Railroad; 1½ miles from Fishkill Landing-on-the-Hudson. It has abun-

dant water-power, and contains manufactories of felt goods, lawn-mowers, wood-working machinery, hats, files, and other articles, the Howland Circulating Library (founded in 1872) containing over 6,000 volumes, a daily paper, a national bank, and a savings-bank. Pop. (1890) 4,278; (1900) 5,807.

Mattei, Tito: See the Appendix.

Matter [M. Eng. *matere*, from O. Fr. *matiere* < Lat. *mate'ria*, stuff, matter, originally building material, timber, for **dmāteria*, connected with Gr. δέμειν, build]: a term which has two main significations, which have changed gradually with the changes in philosophical thinking. They may be called the idealistic and the materialistic, the former dating from Parmenides, and receiving its full expression in Plato and Aristotle; the latter from Thales and the atomists Leucippus and Democritus. In the former signification *matter* is little more than a logical postulate; in the latter, it is an abstraction of the imagination. In Parmenides it is simply not-being (μὴ ὄν) as opposed to being, and is the ground of the phenomenal, illusory multiplicity of the world. This is virtually the view of Plato, who, however, is compelled to attribute to matter something more than a mere negative existence. With him it is the correlate of idea. (See Plato, Parmenides, Philebus, Timæus; Siebeck, *Platos Lehre von der Materie*, in *Untersuchungen zur Philosophie der Griechen*.) According to Aristotle, ὕλη is one of the four αἰτίαι or grounds of existence, the correlate of *form*, the ground of change, being pure potentiality, utterly devoid of determination, and therefore, as such, unknowable. (See Form.) Aristotle sees process where Plato sees but multiplicity. When united with *form*, *matter* gives οὐσίαι, or substantial things, which owe to it their imperfection. The Aristotelian doctrine was adopted by the Stoics, and the Platonic by the Neoplatonists. Proclus held that matter was neither good nor bad, but constituted the ground of necessity. The Fathers of the Church, mingling philosophic speculation with dogmatism, were divided on the question of the eternity of matter, as well as of the mode of its production. The same is true of the Arabic philosophers, who based their doctrines mainly upon Aristotle. Bishop Berkeley denied the existence of matter altogether, as did Lotze in our own day. The materialistic view of matter was held in a rude form by the Ionian philosophers, whose whole efforts apparently were a search for a single material principle to explain the world. The *atomic* theory was apparently first propounded by Leucippus or Democritus of Abdera, and has been held by the majority of materialists ever since. According to it, matter consists, in the last analysis, of an indefinite number of indivisible particles. Some naturalists, such as Democritus, imagined that these differed in form, position, and aggregation; which differences constituted the differences of material objects. Lucretius was the great atomist among the Romans. In modern times an atomic doctrine has been maintained by Diderot, Kant, Herbart, and by all or nearly all the natural scientists of the present day. (See Atom and Molecule.) By most of them matter is no longer looked upon as dead or separable from force, but as endowed with all the potencies of which existing things are the realizations. Whichever theory we adopt, matter remains an abstraction, the correlate of force, without which it would be unthinkable. Cf. Suarez, *De Corporum Natura Tractatus* (Bologna, 1877); Baümker, *Das Problem der Materie in der griechischen Philosophie*; Schneid, *Naturphilosophie im Geiste des hl. Thomas von Aquino*; Pesch, *Institutiones Philosophiæ Naturalis Secundum Principia S. Thomæ Aquinatis*; Ramière, *L'Accord de la Philosophie de Saint-Thomas et de la Science Moderne au Sujet de la Composition des Corps*; Stallo, *The Concepts and Theories of Modern Physics*; Lange, *Geschichte des Materialismus*; Fechner, *Ueber die physikalische und philosophische Atomlehre*; Hartmann, *Philosophie des Unbewussten*, § c. cap. v.; Büchner, *Force and Matter*; and various articles in *The Popular Science Monthly* and *Philosophie Positiviste*. Thomas Davidson.

Matter, maa'ter, Jacques: theologian and historian; b. at Alt-Eckendorf, Alsace, of German parents, May 31, 1791; studied at Strassburg, Göttingen, and Paris; became in 1819 Professor of History at Strassburg, in 1832 inspector-general of the University of Paris, in 1845 of the public libraries of France; retired to Strassburg in 1846 to become professor in the Protestant theological seminary. D. there June 23, 1864. His *De l'Influence des Mœurs sur les Lois, et des Lois sur les Mœurs* (1832), was crowned by the Academy. The most prominent of his numerous other writings are *L'Histoire de l'école d'Alexandrie* (Paris, 1820; 2d ed. 3 vols., 1840); *Histoire Critique du Gnosticisme* (1828; 2d ed. 3 vols., 1843–44); *Histoire Universelle de l'Église Chrétienne* (1829–32); *Schelling, ou la Philosophie de la Nature* (1842; 2d ed. 1845); *De l'État Moral, Politique, et Littéraire de l'Allemagne* (2 vols., 1847); *Saint-Martin* (1862); *Emmanuel de Swedenborg* (1863); and *Le mysticisme en France aux temps de Fénelon* (Paris, 1864), a work of both historical and theological interest. Revised by S. M. Jackson.

Matterhorn, Mount: See Cervin, Mont.

Matteuc'ci, maa-too'chĕe, Carlo: b. at Forlì, Italy, June 21, 1811; graduated at the University of Bologna in 1828, and began his scientific experiments at Forlì, but soon after went to Paris to prosecute them. After the publication of his articles upon electricity and upon torpedoes in 1840 he was appointed, on the recommendation of de la Rive and of Humboldt, to the chair of Physics in the University of Pisa. In 1848 he was sent by the Tuscan Government as civil commissioner into Lombardy with the Tuscan troops, and later on a diplomatic mission to the Diet of Frankfort. After the political events of 1849 he resumed his professorship at Pisa, and in 1859 the Tuscan Government gave him a mission to the court of Berlin, afterward to the Government of Turin before the annexation of Tuscany to Piedmont. After this annexation he took an active part in the moderate constitutional politics of Italy. In 1862 he became for a short time Minister of Public Instruction for the kingdom of Italy. On the transfer of the capital to Florence he was made director of the Museo di Fisica Fiorentina, and devoted himself almost exclusively to the prosperity of that institution. D. at Leghorn, June 25, 1868. Among his very numerous scientific publications the following are best known: *Cenni sull' Influenza dell' Elettricità nella Formazione delle Principali Meteore Acquee* (Bologna, 1827); *Sull' Influenza del Calore sul Magnetismo* (Forlì, 1831); *Sulle Correnti elettro-Magnetiche di Faraday* (Forlì, 1833); *Sur l'Electricité animale* (Florence, 1834); *Discorso sul Metodo Razionale Scientifico* (Forlì, 1835); *Essai sur les Phénomènes Electriques des Animaux* (Paris, 1870); *Lezioni di Fisica* (Pisa, 1852); *Cours d'Electro-Physiologie* (Paris, 1856). Revised by E. L. Nichols.

Matthew, măth'yoo, Saint: one of the twelve apostles and the author of the first Gospel. I. *Character.*—Among the twelve apostles there was only one whose previous occupation had made him familiar with the use of the pen; and this one, St. Matthew, seems also to have been the first among them to prepare an evangelical record. We know very little of his character and life. His apostolical calling is narrated in Matt. ix. 9; Mark ii. 14; Luke v. 27. He was sitting at the receipt of customs on the border of the sea, near Capernaum, filling the office of a publican. These officers were generally abhorred by the Jews, being considered as renegades because they served the pagan lords of the country. Jesus passing by, followed by a great multitude, noticed him, and discovered at first glance that there was in him a future apostle and preacher of the new faith. The publican, who perhaps previously had received salutary impressions from the teachings of Jesus, obeyed without hesitation the call of the Lord, and in order to celebrate the career which opened before him, he invited his former colleagues to a feast in his house together with Jesus and his disciples, desirous that they too should partake in some manner in the grace which had been conferred on him. It was his first missionary act. Mark and Luke call this publican Levi; and it is probable that this was the original name of the apostle, and that Jesus, as he had given to Simon the surname of Peter on their very first meeting (John i. 43), gave to Levi the surname of Matthew—that is, "a gift from God"—in order to designate the striking manner in which God had given him this disciple in the very moment when their eyes first met. The only surprising circumstance according to this explanation is that Mark and Luke do not indicate the identity of Matthew with this publican Levi in their lists of the twelve apostles (Mark iii. 18; Luke vi. 15; Acts i. 13). Thus, from the second century, and up to our days, some have been of the opinion that there were two different publicans whose callings occurred in a similar manner; but this is not probable; the story of the calling of Levi and Matthew is so similar that it is difficult to consider it as the record of two different facts. There is a more natural solution. From a regard to the apostle, tradition would not like to attach to his name the humiliating title of publican; and this seems to be the simple reason why it is omitted in the lists of the Gospels of Luke and

Mark, which were prepared from the general tradition, while Matthew himself when he narrated the fact had no fear of recalling the memory of his former profession; hence these words in the first Gospel: "Matthew the publican" (Matt. x. 3). The father of Matthew is called Alphæus, but must not be confounded with Alphæus called Clopas, who was the brother of Joseph and the uncle of Jesus. Matthew remained, no doubt, in Jerusalem, together with the twelve, as long as the preaching of the apostles in this city continued—that is, nearly up to the year 60. When Paul went to Jerusalem for the last time, in 59, he seems to have found none of the apostles there (Acts xxi.). Clement of Alexandria tells us of Matthew that he ate no meat, but only vegetables and fish. The historian Hegesippus, in the second century, attributes a similar ascetic practice to James, the brother of the Lord, the first chief of the congregation of Jerusalem and a contemporary of the apostles. It is also known that the Essenes, a Jewish sect which aspired to a particular sanctity, confined themselves to the same diet. In this privation the aim was merely a more complete consecration of the body to the service of God, and not the attainment of any legal merit; the law never gave any such precept. The Jewish Christians of Rome, mentioned in Rom. xiv., ought also to be remembered here. By this austere discipline, Matthew no doubt desired to recommend his ministration to the Jews and procure access among them for the gospel. Various later traditions, originating between the fourth and sixth centuries, tell us that Matthew went to Ethiopia, or Macedonia, or Parthia, or Arabia, or India; we are even told by some that he suffered martyrdom in Arabia or Persia; but so late and discordant traditions have little value.

II. *The Gospel.*—All the Fathers agree that the apostle Matthew wrote a Gospel, but in the Hebrew language, and not in the Greek, in which is written the book contained in the canon under the name of Matthew. Papias, at the beginning of the second century, says: "Matthew composed the speeches (the teachings of Jesus) in the Hebrew language (Aramæan), and each one translated them (into Greek) as well as he could." These last words signify, probably, that each preacher translated orally from Matthew into Greek while teaching in the church. Eusebius tells, furthermore, that Pantænus, the founder of the catechetical school of Alexandria, when in the second century he went to India to preach Christianity, found the Gospel of Matthew in Hebrew among some Christians to whom it had been brought by the apostle Bartholomew, the first missionary to that country. All the other Fathers have the same traditions concerning the original language of the first Gospel. Nevertheless, our Greek Matthew does not make the impression of being a translation, at least not in the narrative parts. The language is vigorous, fresh, pure, like that of an original writing. Thence it has been inferred, in accordance with the literal sense of the expressions of Papias, that the Gospel mentioned by him contained only the *speeches* of Jesus, and not a complete history of his ministration, and that the narrative part was added later as a historical framework, in which the primitive work of Matthew was inserted, translated into Greek. Two circumstances confirm this inference: First, in the record of the first Gospel five principal groups of speeches of Jesus can be distinguished—namely, chs. v.–vii.; x.; xiii.; xviii.; xxiv.–xxv.; all of which are connected with the narrative by very similar formulas, and which might very well have originally formed a separate work having for its subject the teachings of Jesus. Secondly, in these great speeches in our Matthew the Old Testament is most frequently quoted according to the translation of the Septuagint, while in the narratives it is most frequently quoted from the Hebrew text—a circumstance which seems to indicate a different origin. Accordingly, we must suppose that Matthew composed an Aramæan work which comprised only the teachings of the Saviour, arranged according to some leading principles. Thus (1) *the justice of the kingdom of heaven*, which division appears in our first Gospel as the sermon on the mount (v.–vii.): (2) *the apostolate*, which second division is found in our first Gospel in c. x.; (3) *the picture of the kingdom of heaven*, the grand collection of parables in c. xiii., which depicts the foundation of the kingdom (the sower), its anomalous development (the tares), its power, both externally and internally (the mustard-seed and the leaven), its worth both to him who finds it without seeking and to him who seeks (the hidden treasure and the pearl), and its terms (the net); (4) *the discipline of the Church*, which division is contained in ch. xviii. 1–20 of our first Gospel; and, lastly, (5) *the consummation of the present era*, or the judgment of Israel, the Church, and all the nations, which division (xxiv.–xxv.) formed the imposing conclusion of the work of Matthew, corresponding with the opening, the sermon on the mount. Christ thus appeared as the divine *legislator* (chs. v.–vii.), *king* (ch. xiii.), and *judge* (chs. xxiv.–xxv.). This original work by Matthew, in Aramæan, probably was the foundation of that *Gospel of the Hebrews* which was adopted by the Jewish Christian communities of the first centuries. This Gospel needed a complement, and this need was supplied, no doubt, by the narrative part of our first Greek Gospel, translated into Aramæan, and adorned with many legendary additions borrowed from an already falsified tradition. It also suffered mutilation in order to conform to the peculiar ideas of the different Jewish Christian sects. As for the narrative frame of the first Gospel, it was possibly composed by one of the companions of St. Matthew, who had partaken of his evangelical labors and written down the apostolical tradition, such as it had become fixed at Jerusalem and in Palestine. In the arrangement of the historical matter the same method of systematical grouping may be observed here as in the composition of the speeches: chs. viii. and ix., following after the sermon on the mount, give a collection of *acts of power*; chs. xi. and xii., following after the apostolical instruction, give a collection of *words of wisdom*; chs. xiv.–xvii., following after the collection of parables, contain a record of *various excursions* which preceded the teaching of the discipline (ch. xviii.) and the departure from Galilee (ch. xix.). Two small details show that Matthew had taken part in this labor, directly or indirectly: (1) the surname of "publican" added to his name, as we have seen, in the list of the twelve apostles in the first Gospel (x. 3); (2) the fact that in this same list, in the fourth couple of apostles—which couple in all the lists comprises Matthew and Thomas—the name of Thomas is placed before that of Matthew, while in the other lists Matthew is placed before his colleague. It is evident that he could not change the place of the couple to which he belonged, but he could change the place of his name in this couple; and this he did. Eusebius says, referring to his predecessors, that "Matthew, after preaching to the Jews, and about to depart in order to preach to other nations, composed in the language of the Fathers (in Hebrew) the Gospel he had preached, in order to fill the void which his absence would leave among his audience." This date is in accordance with the preceding, relating to the language in which Matthew wrote; and it accounts for the absence in this Gospel of all explanations of Hebrew customs, such as we find in Mark and Luke, writing for pagan readers. The time of the composition is indicated by Irenæus: "Matthew published among the Hebrews and in their native tongue his evangelical record at the time when Peter and Paul preached at Rome and founded the Church there." Some have taken umbrage at this tradition, because neither Peter nor Paul founded the Church of Rome, which follows clearly from the Acts of the Apostles and the Epistles of St. Paul, but they have forgotten that in the epoch in which Irenæus wrote (the last third of the second century) the apostolical times appeared in a general way as the epoch of the foundation of the Church. The work of Matthew bears, so to speak, its date marked on its face. This Gospel is a divine act, an official proclamation issued by the government of God. It is God himself who summons his people by a solemn ultimatum to recognize Jesus as Messiah, and threatens them with destruction if they will not obey. This is the reason why the Gospel opens with the genealogy of Jesus, and why he is called "Christ, the son of David, the son of Abraham" (i. 1), the Messiah who shall raise the "throne of David, his father," and redeem the promise of the salvation of the world attached to the posterity of Abraham. This is furthermore the reason why the whole Gospel is a demonstration of the Messianic dignity of Jesus; why the five traits of the history of his infancy, recorded in the first two chapters, are accompanied each by a prophecy; why his residence in Galilee at the beginning of his ministration is justified (iv. 14–16) by a prophecy of Isaiah; why the collection of the acts of power (viii.–ix.) is grouped around a prophecy by Isaiah, quoted viii. 17, which serves as text; why the collection of the words of wisdom (xi. and xii.) center in a prophecy by Isaiah, quoted xii. 17. Moreover, there is scarcely one trait in the history of the Passion which is not accompanied by a prophecy, because this ignominious death was the great offense for the Jewish feeling

(1 Cor. i. 23), and the last words, "Go ye, therefore, and teach all nations, baptizing them," etc., give the programme of the whole work of the Messiah. By such a book God said to his people, "The forty years of repentance which were accorded to thee (Matt. xxiv. 34) will soon expire; acknowledge Jesus as thy Messiah or thou shalt perish." This situation is indeed in harmony with the date indicated by Irenæus—namely, about 64, or five to six years before the destruction of Jerusalem. There is especially one passage which determines exactly the period of the composition. It is the parenthetical clause xxiv. 15, by which the author interrupts, in the same manner as Mark, the speech of Jesus on the destruction of Jerusalem, and invites the Church to take notice of the signal of flight which Jesus gave in advance. Such a *nota bene* shows evidently that the sign has not yet been realized, but is imminent. The sign was the invasion of Judæa by the Roman armies, which took place about 66, and the time of the composition is consequently about 64 or 65. Thus we arrive at nearly the same time of composition for all the three earlier Gospels composed as they were in different countries and for different nations (Romans, Greeks, Hebrews); and this chronological result coincides with the fact, evident to our eyes, that none of the three evangelists has employed the writings of any of the others in the composition of his work. This reciprocal independence, which seems to us to have been demonstrated by a minute exegesis, would have been impossible if one of the three had written a long time before the others; the last writer must necessarily have known the writings of the others. Moreover, the date indicated corresponds very well to the situation of the Church at this epoch. Was it not the time in which those who had witnessed the appearances of the Saviour began to die out? Hence resulted in the feeling of the Church a void and uneasiness, which demanded a rich compensation; and this was given to the Church in the different countries in which it existed by the publication of the first three Gospels. A fragment of an antique work, found in the eighteenth century by Muratori in the library of Milan, speaks thus of the four Gospels: "Although the beginning of each of our Gospels differs (each choosing its own point of departure), this is nevertheless of no importance to the faith of the believers, since all things are represented by them all *in the same ruling spirit*" (*uno ac principali spiritu*). Thus the relation between the four Gospels was understood in the second century, while modern criticism has attempted to place these works in opposition to each other, and to discover among their authors motives of mutual rivalry and hostility unworthy of the characters of such men and of the sanctity of such an object, but this false criticism will break down before the indestructible feeling of the moral purity of these books. The Church feels that in calling these authors the *holy evangelists* she has not followed an illusion. That spirit of holiness which is her own life-blood recognizes itself in the spirit which, one and the same, pervades all the four books. The picture of the divine work, its *history* proper, was written by Luke; the simple, apostolical *memoirs*, with all their dramatic freshness, were given by Mark; the official and theocratic proclamation of Jesus as King Messiah, was issued by Matthew; and to John we owe the revelation of Jesus as the Son of God, as the everlasting Word. Matthew forms evidently the transition from the Old to the New Testament. His Gospel is the Old Testament reflected in the New. Hence it was always placed at the head of the evangelical collection and of the whole New Testament. It is the *Genesis* of the New Testament. On the other hand, the Gospel of Matthew corresponds to the book of Revelation. As the former reproduces under the form of history in the New Testament that part of the Old which is already accomplished, the latter reproduces under the form of prophecy at the end of the New Testament that whole part of the Old which is not yet realized. The Revelation says, "All is accomplished." Thus in the divine word the beginning, middle, and end correspond with each other in a marvelous manner. See BIBLE and GOSPEL.

FRÉDÉRIC GODET.

Matthew of Paris: historian; b. in England about 1200; entered in 1217 the convent of St. Albans; wrote a continuation of the *Flores Historiarum* of Roger of Wendover, comprising the period from 1235 to 1259, the whole work, known as the *Historia Major*, having formerly been incorrectly ascribed to him; and superintended the preparation of an abridgment of that work, which under the same title of *Flores Historiarum* was ascribed to Matthew of Westminster, who probably never existed. The questions of authorship and authenticity were solved by Sir Frederick Madden, who published in 1866 the original manuscript of the abridgment, partly in the handwriting of Matthew of Paris. The larger work was translated by Rev. J. A. Giles (1849–54), the smaller by C. D. Yonge in Bohn's Antiquarian Library (1853). Nothing is known of the personal history of Matthew of Paris beyond a few references to his own writings, except the fact that he was sent to Norway in 1248 by Pope Innocent IV. as visitor of the Benedictine order. His stay there was brief. D. at St. Albans soon after May, 1259.

Matthews, EDMUND ORVILLE: See the Appendix.

Matthews, HENRY, LL. B., Q. C., M. P.: politician; b. in 1826 in Ceylon, where his father, Hon. Henry Matthews, was a judge; was educated in Paris and London; obtained the university law scholarship at the University of London; admitted at Lincoln's Inn at eighteen; was called to the bar in 1850; was examiner in common law to the council of legal education 1872–76; has been engaged in many notable lawsuits, including the Tichborne case; entered Parliament in 1868; and was Home Secretary in Lord Salisbury's second ministry 1886–92.

Matthews, JAMES BRANDER: author; b. in New Orleans, La., Feb. 21, 1852. He graduated at Columbia College and took up his residence in New York city, devoting himself mainly to dramatic literature, fiction, and literary criticism. In 1892 he was appointed lecturer on Literature at Columbia College. Among his plays are *Margery's Lovers*, a comedy (1884), and *This Picture and That*, a comedy (1887). His other publications include *The Theaters of Paris* (1880); *French Dramatists of the Nineteenth Century* (1881); *A Secret of the Sea, and Other Stories* (1886); *Pen and Ink* (1888); *A Family Tree, and Other Stories* (1889); an edition of *Sheridan's Comedies* (1885); *Americanisms and Britticisms* (1892); *In the Vestibule Limited* (1892); and *The Story of a Story* (1893). H. A. BEERS.

Matthews, STANLEY, LL. D.: jurist; b. July 21, 1824, in Cincinnati, O.; graduated from Kenyon College 1840; studied law, and, removing to Maury co., Tenn., was admitted to the bar and began the practice of his profession. He then married, and shortly after returned to Cincinnati. From 1846–49 he assisted in the editorial management of *The Cincinnati Herald*, an anti-slavery journal. In 1851 he was elected judge of the court of common pleas for Hamilton County, and in 1855 to the State Senate. In 1858 he was appointed U. S. district attorney for the southern district of Ohio. At the outbreak of the civil war he was commissioned lieutenant-colonel of the Twenty-third Regiment Ohio Volunteers; in Oct., 1861, was commissioned colonel of the Fifty-seventh Regiment, and in that capacity commanded a brigade in the Army of the Cumberland; in 1863 resigned his commission to enter upon the duties of judge of the inferior court of Cincinnati. In 1877 he took part as counsel before the electoral commission, opened the argument in behalf of the Republican electors in the Florida case, and made the principal argument in the Oregon case; was soon after elected to the U. S. Senate, and in 1881 was appointed associate judge of the Supreme Court of the U. S. D. at Washington, D. C., Mar. 22, 1889.

Matthews, WASHINGTON, LL. D.: ethnologist; b. in Ireland, July 17, 1843; was taken by his father to the U. S.; graduated M. D. at the University of Iowa 1864; entered the army immediately as acting assistant surgeon; served in the Indian wars in Dakota and Montana until 1868; also became an officer and rose to the rank of major; served in the regular army, largely in the Dakotas, New Mexico, and the States and Territories of the Pacific slope. From his earliest childhood his life has been mainly passed in contact with Indian tribes which retained their original customs and beliefs. Among his publications are *Grammar and Dictionary of the Language of the Hidatsa*; *Ethnography and Philology of the Hidatsa Indians*; *The Gentile Organization of the Navajo Indians*; *The Catlin Collection of Indian Paintings*; *Consumption among the Indians*; *The Inca Bone and Kindred Formations among the Ancient Arizonians*; *Apparatus for Tracing Orthogonal Projections of the Skull*.

Matthias, ma-thī'as, SAINT: the twelfth apostle, in place of Judas Iscariot; chosen during the ten days between Ascension and Pentecost. Of the 120 disciples in Jerusalem, apparently only two (Barsabas and Matthias) could be found

who had been companions of Christ during the whole course of his ministry; and of these two the latter was chosen somehow by *lot*. In spite of specious arguments against it, the validity of this election can be sustained. The New Testament makes no further mention of Matthias, and ancient traditions clash. See the *Acta Sanctorum*, Feb. 24.

Matthias: the assumed name of ROBERT MATTHEWS, a religious impostor; b. in Washington co., N. Y., about 1790; resided in Albany when, excited by the preaching of the celebrated revivalists Rev. Charles G. Finney and Rev. Edward N. Kirk (about 1830), he determined to become a religions leader. He began by ardent advocacy of temperance, and having had some success in street-preaching, claimed to have received a revelation, and undertook to convert the city of Albany. His violence defeated itself, while his absurd pretensions were promptly refuted. Enraged at the failure of his projects, he prophesied the destruction of Albany, and proceeded secretly to New York, where he succeeded in imposing upon several respectable families, and in creating a sensation. Having been accused of poisoning one of his wealthy disciples, he was tried and acquitted, but, having then lost all influence, quietly disappeared, and died some years later in Arkansas. See *Matthias and his Impostures*, by William L. Stone (New York, 1835).

Matthias: German emperor from 1612 to 1619; b. Feb. 24, 1557; a son of Maximilian II., and educated in Germany. In 1577 he repaired secretly to the Netherlands, and made an attempt at managing affairs there, but failed, and withdrew in 1580. On June 14, 1612, he succeeded his brother, Rudolph II., as Emperor of Germany, but his reign was very unsuccessful. The differences between the Protestant Union, formed in 1608, and the Catholic League, formed in 1609, grew now into open controversies. The emperor first tried to put himself at the head of the Catholic League, but, failing in this, he undertook to suppress both associations by an imperial decree, to which, however, neither of them paid any attention. In 1617 the bigoted Archduke Ferdinand was appointed King of Bohemia, and on May 23, 1618, the Protestant inhabitants of Prague took arms and broke out in open rebellion. Thus began the Thirty Years' war. Hardly a year after (Mar. 20, 1619) the emperor died, and was succeeded by Ferdinand.

Matthias I., Corvinus: See CORVINUS (MATTHIAS) I.

Matto Grosso, maa'tō-grō'sō (literally, thick copse): a western state of Brazil; the largest of the republic except Amazonas, but the most thinly settled of all; bounded N. by Amazonas and Pará, E. by Goyaz, São Paulo and Paraná, S. by Paraguay, and W. by Bolivia. Estimated area, 532,400 sq. miles. All the eastern and northern part is comprehended in the Brazilian plateau, having an average elevation of about 2,500 feet; it is much cut up by deep and wide river valleys, and the escarpments thus formed are frequently represented as mountains on maps. The immense depression of the Paraguay occupies the southwestern portion; it is perfectly flat, and is subject to periodical inundations. The plateau is nearly everywhere cut down abruptly, and even precipitously, to this depression, the edges forming the so-called serras of São Jeronymo, of Piquiry, etc. The depression of the Madeira (Guaporé branch), almost confluent with that of the Paraguay, fringes the western boundary, and the table-land is cut down to it in a similar manner (Serra dos Parecís). Bordering the western side of the Paraguay, on the frontiers of Bolivia, there are several isolated groups of high and rugged hills (Serra dos Dourados, etc.). The numerous streams of the plateau drain northward to the great Amazonian branches, eastward to the Araguaya, southeastward to the Paraná, and southwestward to the Paraguay. The Paraguay and several of its numerous affluents are navigable nearly to their sources. The other large rivers are much obstructed by rapids; they include the Tapajós and its branch the Pernatinga or São Manuel, and the Xingú, flowing to the Amazon; the Rio das Mortes, a branch of the Araguaya; and the rivers Verde, Ivinheima, etc., affluents of the upper Paraná. The climate of Matto Grosso is generally hot in the river depressions, temperate and delightful on the plateau; from June to September there are occasional cold spells, caused by south winds, apparently the same as the "pamperos" of the Rio de la Plata; during these the temperature sometimes sinks to freezing. The rainy season begins in September, is well marked from December to April, and ends in May; the remaining months are dry. The soil of the open plateau is generally sandy and unfit for cultivation, but it affords excellent pasturage in the rainy months. The forest lands and river valleys are very fertile. The gold and diamond washings of Matto Grosso were formerly among the richest in the world; they are now nearly abandoned, but are far from being exhausted. Many small Indian tribes occupy the wilder portions, but large areas are completely deserted. The civilized population does not exceed 60,000, of which one-third is gathered in the capital, Cuyabá. Corumbá, on the Paraguay, is the port of entry, and Villa Maria, Matto Grosso, Miranda, and Diamantina are small towns. Hides and small quantities of gold and drugs are almost the only exports; agricultural products are insufficient for the local demand. The upper Paraguay was early visited by Spaniards. Until the opening of the Paraguay to steam navigation (1859), the only means of communicating with the coast was by a long overland journey or by the rivers in canoes which were dragged around the rapids. The Paraguayans occupied part of the province 1865–68. See Fonseca, *Viagem ao Redor do Brazil* (1880); Castelnau, *Expédition dans les parties centrales de l'Amérique du Sud* (1850–51); Pimenta Bueno, *A Provincia de Matto Grosso* (1880); the works of von den Steinen. HERBERT H. SMITH.

Mattoon: city; Coles co., Ill. (for location of county, see map of Illinois, ref. 7–F); on the Ill. Cent., the Cleve., Cin., Chi. and St. L., and the Peoria, Dec. and Evans. railways; 56 miles W. of Terre Haute, Ind., 172 miles S. by W. of Chicago. It is in a corn and broom-corn growing region; is an important shipping-point; and has a high school, 2 national banks with combined capital of $110,000, a State bank with capital of $50,000, and a daily and 5 weekly newspapers. Pop. (1880) 5,737; (1890) 6,833; (1900) 9,622.

Mattra, Mathura, or **Muttra**: a town in the Northwestern Provinces, British India, on the Jumna; is a very ancient and celebrated city, mentioned by Ptolemy as the "Modoura of the gods," a railway station, and capital of a district of the same name (see map of North India, ref. 6–E). As the birthplace of Krishna it is venerated by the Brahmans, and visited by a great number of pilgrims. The shores of the river are provided with gorgeous flights of steps, and the city contains an immense temple, which once possessed idols of gold and silver, with eyes of diamonds. These were carried away by foreign conquerors. Sacred apes and swarms of holy parrots and peacocks are kept here. Pop. (1891) 60,020. Revised by M. W. HARRINGTON.

Maturin, mäă-too-reen': a town in the northeastern part of the state of Bermudez, Venezuela; on the open plains bordering the Guarapiche river, 22 miles above the port of Caño Colorado (see map of South America, ref. 1–D). It is the commercial center of the region on the southern slope of the Cumaná Mountains and of the plain bordering the Orinoco delta, and has a large trade, especially in cattle and hides. Its port on the Orinoco is San Rafael at the head of the delta. Maturin was formerly the capital of a province or state of the same name, now merged into Bermudez. Population (1889, with the district) 14,473. H. H. S.

Mat'urin, CHARLES ROBERT: novelist; b. in Dublin, Ireland, in 1782; educated at Trinity College; took orders in the Church of England, and became curate of St. Peter's, Dublin. Pecuniary losses induced him to write several novels of an extravagant character, which had little success—*The Fatal Revenge* (1807); *The Wild Irish Boy* (1808); *The Milesian Chief* (1812); *Women* (1818); *Melnoth* (1820); and *The Albigenses* (1824)—but his tragedy of *Bertram*, represented by Edmund Kean at Drury Lane theater, brought him £1,000 and a considerable reputation as a poet, which was scarcely justified by his later productions: *Manuel* (1817) and *Fredolpho* (1817). He was an eloquent pulpit orator and a bold opponent of Roman Catholicism. D. in Dublin, Oct. 30, 1824. Revised by H. A. BEERS.

Maubeuge, mō'bözh': town; department of Nord, France; on the Sambre, which here becomes navigable; about 10 miles N. of Avesnes (see map of France, ref. 2–G). It is fortified, and has iron-foundries and manufactures of firearms, iron and steel goods, saltpeter, oil, and sugar, and an active trade in coal, slate, and marble. It originated from a great double monastery for monks and nuns founded in the seventh century by St. Aldegonde, and was incorporated with France by the peace of Nimeguen. Its fortifications were planned by Vauban. Pop. (1896) 19,799.

Mauch Chunk, mawk'chŭnk': borough; capital of Carbon co., Pa. (for location of county, see map of Pennsylva-

nia, ref. 4–I); on the Lehigh river, the Lehigh Canal, and the Lehigh Val. and the Cent. of N. J. railways; 46 miles W. by N. of Easton, 83 miles N. W. of Philadelphia. It is the most important anthracite coal-trade center in the U. S.; lies between the Mahoning and Sharp Mountains, and is almost entirely surrounded by mountains and high hills. The mines on Sharp Mountain are among the oldest and most productive in the State. Formerly coal was conveyed from the top of the mountain to the chutes in the borough by means of the switchback railway, on which the cars descended by gravity. The cars were hauled back first by mule-power, and afterward by cables operated by stationary engines at the different inclines. Subsequently a tunnel at Nesquehoning took the place of this method of transportation, and the old gravity road is now used exclusively for pleasure excursions. The panorama from Mt. Pisgah, the highest point of Sharp Mountain, and the scenery through which the cars descend with great velocity, add much to the romantic interest which characterizes the trip. The borough consists of a single street; contains foundries, machine-shops, and flour-mills: and has 2 libraries (Dimmick Memorial and Public, both opened in 1884) with over 12,000 volumes, 3 national banks with combined capital of $600,000, and a daily and 2 weekly newspapers. Both the borough and Glen Onoko, near by, are visited by many thousands of people each summer. Pop. (1890) 4,101; (1900) 4,029.

Maudsley, Henry, M. D., LL. D., F. R. C. P.: alienist; b. at Giggleswick, Yorkshire, England, Feb. 5, 1835; studied at the University of London, where he graduated in medicine in 1857; was physician to the Manchester lunatic asylum 1859–62; settled in London as a consulting physician upon lunacy 1862; published *The Physiology and Pathology of the Mind* (1867); was made fellow of the Royal College of Physicians 1869; appointed Gulstonian lecturer to that body in 1870; published his course of *Lectures on Body and Mind* 1870; and wrote a treatise on *Responsibility in Mental Disease* (1874) for the International Scientific Series. He was Professor of Medical Jurisprudence in University College 1869–79, and editor of *The Journal of Mental Science* 1863–78. He received LL. D., Edinburgh University, in 1884. Published *Body and Will* (1883); *Natural Causes and Supernatural Seemings* (1886).

Revised by S. T. Armstrong.

Maui: See Hawaii Nei.

Maule, mow'lā: a river of Chili, rising in the Andes, flowing westward and entering the Pacific in lat. 35° 18′ S.; length about 140 miles, navigable for about 50 miles. The Maule formed the southern limit of the Inca conquests, and during the colonial period it separated Spanish Chili from the territory of the Araucanian Indians, which contained only a few Spanish forts. The Maule gives its name to a province on the southern side, having an area of 2,930 sq. miles and a population (1891) of 127,650. Capital, Constitucion.

H. H. Smith.

Maulmain', or **Moulmein**: city of Tenasserim, Burma; at the mouth of the Salwen, in the Bay of Bengal, in lat. 16° 30′ N. It is a flourishing place, important for its exports of teak. Ivory, grain, wax, and gum are also exported, and silks and cottons, wine and beer, tobacco, arms, and sugar are imported. Pop. (1891) 57,920.

Maumee, maw'mĕē: village; Lucas co., O. (for location of county, see map of Ohio, ref. 1–E); on the Maumee river, the Wabash Canal, and the Wabash and the Toledo, St. L. and Kan. City railways; 8 miles S. of Toledo, the county-seat. It is in an agricultural region, and has flour-mills, agricultural-implement factories, a private bank, and a weekly newspaper. Pop. (1880) 1,780; (1890) 1,645; (1900) 1,856.

Maumee River: a river formed by the union of St. Mary's and St. Joseph's rivers at Fort Wayne, Ind. Its mouth is at Toledo, O. It is navigable 8 miles to South Toledo, and in high water to Defiance, 50 miles.

Mauna Loa, maa'oo-nää lō'ää [from native name, Great Mountain]: the largest active volcano in the world, situated nearly in the center of the island of Hawaii. Its snow-crowned dome rises 13,600 feet above the level of the sea. It contains several craters, both on its summit and on the sides. The group of craters on the summit form an immense abyss a mile and a half in diameter, and 1,000 feet deep. No other volcano equals this in the volume of lava discharged in the principal eruptions. The lava flood of 1855, which reached the outskirts of Hilo, covered 200 sq. miles with an average depth of 100 feet, and its volume would nearly have built Vesuvius. In 1858 the lava stream flowed to the sea and half filled the Bay of Kiholo. Another great eruption (1880) threatened the destruction of Hilo, and the volcano was very active in 1888 and 1892. When quiescent Mauna Loa is a favorite resort for tourists. The eruption of 1880–81 poured forth for nine months a river of lava which ran 50 miles, varying from a few hundred yards to 3 miles in width.

C. C. Adams.

Maundy (mawn'di) **Thursday** [M. Eng. *maunde*, command, from O. Fr. *mandé* < Lat. *mandatum*, command, whence Eng. *mandate*; so called from the "new commandment" of John xiii. 5, 34]: the same as the Holy Thursday in Passion week. On this day, in Roman Catholic countries, the feet of pilgrims are washed in the church, while the *Mandatum novum* is sung, and doles are given to the poor.

Maupassant, mō'pää'sääṅ', Henri René Albert Guy, de: novelist; b. at Miromesnil, Seine-Inférieure, France, Aug. 5, 1850. After an indifferent education he went to Paris, and was employed as clerk in the Navy Department. Attracted to letters, he enjoyed the counsel of his uncle Flaubert, who was his master in the art of writing. This art he practiced and cultivated long before publishing. His first work, a volume of verse, *Des Vers*, dates from 1880. His great power in the short story in prose was revealed by *Boule-de-Suif* (1880), which showed also the influence of Zola. His reputation was made very rapidly, and he put forth volumes in quick succession till 1892, when mental disease showed itself. He became an inmate of a private asylum and died July 6, 1893. Among his more than twenty volumes are the collections of short stories, *La Maison Tellier* (1881); *Les Sœurs Rondoli* (1884); *Contes du jour et de la nuit* (1885); *La Horla* (1887); *Mont-Oriol* (1887); *La Petite Roque* (1888); *La Main Gauche* (1889); *L'Inutile Beauté* (1890): the novels *Pierre et Jean* (1888); *Fort comme la mort* (1889); *Notre cœur* (1890); descriptions of travel *Au Soleil* (1884); *Sur l'eau* (1888); *La vie errante* (1890). His pictures are mainly of the human animal of robust appetite and rudimentary intelligence and conscience, observed with much penetration, and set forth in a clear, firm, and direct style.

Maurel, Victor: See the Appendix.

Maurepas, mōr'pää', Jean Frédéric Phélypeaux, Count de: statesman; b. at Versailles, July 9, 1701; inherited in his fourteenth year an office as Minister of State, including the departments of the royal household, of the city of Paris, and of the marine. This office had belonged to his family since 1610, and when he was twenty-four years old he took charge of it himself. In 1749 he was banished from the court on account of a sarcastic epigram on Madame de Pompadour, but on the accession of Louis XVI. he returned as Prime Minister and held the position till his death, Nov. 21, 1781. His knowledge was superficial, his character frivolous, his administration a hotbed for all kinds of abuses. He rendered some service to the French marine, but his two most famous measures were the convocation of the parliaments and the alliance with the North American colonies in the Revolutionary war, both of which had a decisive influence in bringing about the French Revolution. A work in four volumes, purporting to be the memoirs of Maurepas, was published by his secretary 1790–92.

Maurer, mow'rer, Georg Ludwig, von: jurist and statesman; b. at Erpolsheim, in Rhenish Bavaria, Nov. 2, 1790; studied at Heidelberg; was appointed Professor of Jurisprudence at Munich in 1826; became a member of the Greek regency 1832–34; was for a short time Bavarian Minister of Foreign Affairs, and Minister of Justice in 1847, and died at Munich, May 9, 1872. His *Geschichte des Altgermanischen Gerichtsverfahrens* (1824) was crowned by the Academy of Munich. Besides a number of valuable works on jurisprudence and the history of legislation and government in Germany, he wrote in 1836 *Das Griechische Volk vor und nach dem Freiheitskampfe* (3 vols.)—His son, Konrad Maurer (b. in 1823 at Frankenthal in the Palatinate), studied at Munich, Leipzig, and Berlin, and was appointed Professor of Jurisprudence at Munich in 1847. He has made comprehensive studies of Icelandic language, literature, and history, and written several works on this subject, such as *Die Entstehung des Isländischen Staats und seiner Verfassung* (1852); *Gullthórissaga* (1858); *Isländische Volkssagen* (1860), etc.

Revised by W. B. Shaw.

Maurice, mō'rees', Count of Nassau, Prince of Orange: stadtholder; b. Nov. 14, 1567, at Dillenburg, in Nassau, a son of William the Silent, of Orange; studied at Leyden,

and was proclaimed stadtholder of Holland, Zealand, and Utrecht shortly after the assassination of his father in 1584, and appointed commander-in-chief by all the provinces after the recall of Leicester by Queen Elizabeth in 1587. His military career was very brilliant. He took Breda in 1590, Zutphen, Deventer, and Nymwegen in 1591, Geertruidenberg in 1593, Groningen in 1594. In 1597 he defeated the Spaniards at Turnhout in Brabant, and in 1600 at Nieuwport, near Ostend, in the latter battle destroying all chance of escape for his army, if defeated, by dismissing the ships. From ambitious designs he opposed the armistice of twelve years which Barneveldt succeeded in concluding with Spain in 1609, and by which the United Provinces were acknowledged as an independent republic. He aspired to sovereignty, and in the hot controversy between the Arminians and the Gomarists favored the latter as a means of overcoming the resistance of Barneveldt and the republican party. His success was but temporary. Barneveldt was executed in 1619, but the popularity of Maurice was lost, and it was hardly regained by some new exploits in the renewed war with Spain in 1622. D. at The Hague, Apr. 23, 1625. Next to Alexander Farnese, he was generally considered the greatest general of his age, and numbers of young men of royal or noble birth who wished to learn the art of war gathered in his camp. See Motley, *History of the United Netherlands* (1860–67) and *Life and Death of John of Barneveld* (1874); also Grorn van Prinsterer, *Maurice et Barneveldt* (Utrecht, 1875). Revised by F. M. Colby.

Maurice: Duke of Saxony, of the Albertine line; b. Mar. 21, 1521, at Freiberg, a son of Henry the Pious; joined the Protestant Church in 1539; married in 1541 a daughter of the Landgrave Philip of Hesse, and succeeded his father on the ducal throne in the same year. His relations with the Emperor Charles V. were most amicable at this time. He fought in his army against the Turks and against the French, and although he was an ardent Protestant, and his father-in-law was at the head of the Smalcald League, he ranged himself with the enemies of his religion, invaded the territories of his cousin, the Elector John Frederick, and finally helped the emperor to defeat the latter in the battle of Mühlberg Apr. 24, 1546. As a reward Maurice received from the emperor the electorate and all of John Frederick's possessions. As soon, however, as Maurice had realized his aim, the good relations with the emperor ceased, chiefly on account of the latter's alleged breach of faith in seizing and holding prisoner Philip of Hesse, to whom Maurice had pledged his liberty. Charles refused, moreover, to listen to the entreaties of Maurice on behalf of the imprisoned elector. Magdeburg was still under arms, and the work of reducing it was intrusted to Maurice, who now saw his chance of avenging his wrongs and righting himself with his former Protestant friends. Gathering a large force for the ostensible purpose of besieging the city, he made a secret alliance with Henry II. of France in 1551, and in the following spring marched on Innsbruck, where the emperor lay ill of the gout. By a hasty flight the emperor saved himself from being captured by Maurice, but by the Peace of Passau, 1552, he was compelled to consent to all his demands, the first of which was religious liberty for the Protestants. Next year, on July 9, 1553, Maurice was mortally wounded in the battle of Sievershausen against the Margrave of Brandenburg, and died two days afterward. He was succeeded by his brother. His daughter Anne was married to William the Silent. Revised by F. M. Colby.

Maurice, Frederick Denison: clergyman and author; b. in Normanston, Suffolk, England, Aug. 29, 1805; educated at Cambridge; took a degree in law, but because he was a Nonconformist was obliged to forego honors and degrees in other schools. He early took an interest in social, political, ecclesiastical, and scientific questions that agitated thoughtful men in England, writing fervently in *The Athenæum* and other periodicals. In 1831 he joined the Established Church, having convinced himself that it was the best ground for an Englishman to stand and work on, although holding the Church responsible, through its shortcomings, not only for the degradation of the working-classes, but also for the dissent that should have found room for expression within the Establishment. By his work, *The Kingdom of Christ* (1838), his *Lectures on Education* (1839), his *Thoughts on Conscientious Subscription*, and *Reasons for not Joining a Party in the Church* (1841), he laid the foundation of the Broad Church, as it was called, a new party name which he regretted, as pointing to another division in the Church. Maurice was a preacher from the time of his ordination in 1831. His first curacy was at Bubbenhall, a small village in Warwickshire, near Leamington; from 1836–46 he was chaplain at Guy's Hospital, London; from 1846–59 he was chaplain at Lincoln's Inn; and from 1860–69 addressed intellectual audiences in St. Peter's chapel, De Vere Street. In 1866 he became Knightbridge Professor of Casuistry, Moral Theology, and Moral Philosophy at Cambridge. D. in London, Apr. 1, 1872. Maurice was of fertile mind and fluent, abounding utterance. His writings, mostly publications in book-form of his copious lectures on nearly all questions of Church history, social and political ethics, practical and speculative theology, and philosophy bear the stamp of an earnest intellect, a sweet and consecrated spirit, a profoundly humane heart. His Warburtonian lectures on *The Epistle to the Hebrews* (1846), his Boyle lectures on *The Religions of the World* (1847), the lectures on *The Religion of Republican Rome* (1855), *The Patriarchs and Lawgivers of the Old Testament* (1855), *The Ten Commandments*, *The Gospel of the Kingdom of Heaven* (1864), *The Gospel of the Word*, *The Epistles of St. John* (1857), *The Apocalypse, a Vision* (1861), *The Prophets and Kings of the Old Testament* (1853), *History of Moral and Metaphysical Philosophy* (1850–57), the lectures on *The Ecclesiastical History of the First Two Centuries* (1854), on *The Unity of the New Testament* (1854), on *The Word "Eternal"* (1853), on *The Lord's Prayer* (1848) and *The Book of Common Prayer* (1849), on *The Claims of the Bible and of Science* (1863), *The Dialogues on Family Worship* (1862), illustrate the variety and the vitality of his labors. His last works were on *Conscience* (1868) and *Social Morality* (1869). Death surprised him in the fullness of his powers, while he was preparing lectures on *The Ethical Systems of Plato and Aristotle*. In 1854 he became principal of the London Workingmen's College, having as counselors and coadjutors men like Thomas Hughes, John Ruskin, Lawrence, Rossetti, Cave Thomas, and others eminent in science, history, literature, and art. His influence was exerted in favor of a relaxation of the laws respecting Sunday, of healthful Sunday recreations for the working people, the opening on Sunday of the Crystal Palace; his labors meanwhile being directed to the spiritual culture of the people. His *Life*, in two vols., edited by his son, Frederick Maurice, appeared in 1884, and a bibliography of his writings by G. J. Gray, 1885. Revised by S. M. Jackson.

Mauric'ius, Flavius Tiberius: Emperor of Constantinople from 582 to 602; b. at Arabissus in Cappadocia about 539, a descendant of a noble Roman family. His high character and eminent services in the wars against Persia caused the Emperor Tiberius II. on his death-bed to appoint him his successor. Though he was crowned amid universal rejoicing, his popularity soon waned. Constant and sometimes unsuccessful wars with the Avars and Persians, together with mutinies and conspiracies, filled his reign. Mauricius possessed every virtue save firmness. His gentleness provoked contempt; at last, a general named Phocas excited a simultaneous revolt in the army and capital, and seized the crown. Mauricius, unable to resist, fled with his family to Chalcedon. There he was discovered five days afterward and beheaded on the seashore by the tyrant's order, together with his five grown-up sons. His widow and their three daughters were likewise beheaded some time later. Mauricius wrote a work on military affairs, published at Upsala in 1664 by John Scheffer. E. A. Grosvenor.

Maurita'nia: the ancient name of Northwestern Africa, corresponding to the present Morocco and part of Algeria, and inhabited by the Mauri (Moors). After conquering it, the Romans founded many colonies here. In 429 A. D. it was overrun by the Vandals, but it was reconquered by Belisarius, and remained with Italy till the end of the seventh century, when it was taken by the Arabs.

Mauri'tia [Mod. Lat., named in honor of Prince Maurice of Nassau]: an interesting genus of American fan-leaved palm-trees, usually very tall and beautiful. Palm wine, edible fruits, and useful timber and leaves are produced by *M. vinifera* and *fluexuosa*.

Mauri'tius (formerly *Île-de-France*): one of the Mascarene isles; in the Indian Ocean; 550 miles E. of Madagascar, in lat. 20° 32′ S. and lon. 57° 46′ E., and belonging to Great Britain. Area, 705 sq. miles. Pop. (1890) 377,986. It is of volcanic origin, surrounded with coral reefs, and covered with mountains, not very high—the Montagne de la Rivière Noire (the highest in the island) reaches 2,707

feet, and Peter Botte 2,674 feet—but with the most extraordinary outlines. The valleys contain a very rich soil, and the climate is singularly fine, the heat seldom exceeding 90°. The island is subject to visitation by the typhoons of the Indian Ocean, which have several times been very destructive; on Apr. 29, 1892, a typhoon destroyed a third of St. Louis, killing 1,200 persons. The island was discovered in 1507 by the Portuguese, and colonized in 1598 by the Dutch, who soon left it. In 1712 it was colonized a second time by the French, who kept it till 1810, when it was taken by the British. As a British possession it has become very flourishing; the value of its exports in 1891 amounted to 23,705,238 rupees, or about $8,000,000. Sugar is the principal produce, cultivated by coolies who have been brought from India for this purpose. Coffee and rice are extensively cultivated. The soil is of great fertility. The forests which once covered the island have mostly disappeared. It has two railways from Port Louis, with a total length of 105 miles. The colony of Mauritius includes also the islands of Rodrigues, the Seychelles, Amirantes, Chagos, and Oil groups, and other smaller islands. Total area, 881 sq. miles, with a population of 397,637. The capital is St. Louis, on Mauritius; pop. (1891) 62,046. The population of the colony is more than two-thirds Hindu. See MAURITIUS in the Appendix. Revised by M. W. HARRINGTON.

Maury, mow-ree′, JUAN MARÍA: poet; b. in Malaga, Spain, in 1772; d. in Paris, Oct. 2, 1845. Educated in France and England, he traveled in Italy, and then returned to Spain to take part in the troublous affairs of the period of the French occupation. Having espoused the side of Joseph Bonaparte, and served as deputy in the Cortes of Bayonne, he was obliged to spend his last years in exile in Paris. He published an epic in twelve cantos, *La agresión británica* (Madrid, 1806; reprinted in vol. xxix. of Rivadeneyra's *Biblioteca de Autores Españoles*), an anthology of Spanish poetry with French translations and comments; *L'Espagne poétique* (2 vols., Paris, 1826–27); the romantic and chivalric poem *Esvero y Almedora* (Paris, 1840); and various fugitive poems and philological essays. All these were collected and published in the year of his death, under the title *Poesías castellanas* (3 vols., Valencia, 1845). See also vol. lxvii. of Rivadeneyra's *Biblioteca*, etc.

A. R. MARSH.

Mau′ry, MATTHEW FONTAINE, LL. D.: hydrographer; b. in Spottsylvania co., Va., Jan. 14, 1806; spent his childhood in Tennessee; entered the U. S. navy as midshipman Feb. 1, 1825, serving on board the Brandywine during its voyage to France to convey La Fayette thither, and afterward on the Pacific coast in the same vessel; made a voyage around the world in the Vincennes, during which he began his *Treatise on Navigation* (1835), which has since been a textbook in the U. S. navy and a popular manual for the merchant marine. He became lieutenant June 10, 1836, and was appointed astronomer to the Wilkes exploring expedition in the same year, but resigned before sailing. In 1839 Lieut. Maury met with an accident which resulted in lameness and a consequent permanent disability for active naval service. While confined from this cause he wrote, under the pseudonym *Harry Bluff*, in *The Southern Literary Messenger*, a series of articles entitled *Scraps from the Lucky Bag*, chiefly devoted to the exposure of abuses in the navy. He had previously began an accumulation of hydrographical observations, and on being appointed keeper of charts and instruments at Washington was enabled to enlarge the scope of his researches. In 1844 this bureau was united with the National Observatory, of which Maury was made superintendent. In that year he communicated to the National Institute a paper upon the Gulf Stream and other oceanic currents, in connection with great-circle sailing, which was printed in *The Southern Literary Messenger* under the title *A Scheme for Rebuilding Southern Commerce*. The results of these researches were also embodied in *The Wind and Current Charts* and *Sailing Directions* issued by the observatory. At his suggestion the U. S. Government took the initiative in convoking a general maritime conference, which met at Brussels in Aug., 1853, the chief object of which was the adoption of a common method of hydrographical observation and registry, which was effected by the adoption of a model for a log-book previously (1848) prepared by him. In 1855 Maury's great work, *The Physical Geography of the Sea*, was issued, and at once placed his name at the head of the great scientific department of which it treats. In 1855 he was made a commander, but resigned in 1861 to enter the Confederate service, in which he obtained the rank of commodore; spent a year or two in Europe during the war, at the close of which he took service under the Archduke Maximilian in Mexico as commissioner of emigration. This position proving ephemeral, he again went to Europe, where he resided until 1868, in Russia and in England, engaged in the preparation of a series of textbooks. In 1868 he accepted the professorship of physics in the Virginia Military Institute, declined in 1871 the presidency of the University of Alabama, and died at Lexington, Va., Feb. 1, 1873. See Mrs. Fontain Maury Corbin, *Life of Matthew Fontaine Maury* (London, 1888).

Revised by M. W. HARRINGTON.

Mauser Gun: See MAGAZINE GUNS.

Mausole′um [= Lat. = Gr. *μαυσωλεῖον*, liter., tomb of Mausolus, deriv. of *Μαύσωλος*, Mausolus]: the tomb of Mausolus, Satrap and King of Caria; erected at Halicarnassus by Artemisia, his widow, in 353 B. C. It is often referred to by ancient writers as one of the Seven Wonders of the world, and it surpassed all other structures of the kind so much by its magnificence that the name of mausoleum came to be the generic term for a costly tomb. The architects were Satyrus and Pythius; the artists who executed the sculptures of the four sides were Scopas, Bryaxis, Timotheus, and Leochares. The sculptures are discussed in every history of Greek art. Pliny gives a minute description of it. It remained standing and in good condition until the twelfth century, but gradually it fell into decay. One part of it seems to have been destroyed by an earthquake; when in 1402 the Knights of Rhodes took possession of Halicarnassus, and built a castle there, they gathered their materials from the mausoleum, and continued to use it as a quarry until 1522, when most of the sculptures were converted into lime; finally, the Turks disturbed the building so completely that even the site of it was forgotten. In 1857, however, the excavations of Newton, undertaken under the auspices of the British Government, brought to light the site and fundamental outlines of the building, and so many fragments were found that it seems possible to make a complete ideal reconstruction of the whole structure. The sculptures, including the statue of Mausolus, unearthed by Newton, are now on exhibition in the British Museum.

LITERATURE.—Newton, *History of the Discoveries at Halicarnassus, Cnidus, and Branchidæ* (London, 1862–63), and his *Travels and Discoveries*; Ross, *Kleinasien und Deutschland* (Halle, 1850); *Bulletin de Correspondance Hellénique*, xiv., pp. 9–118; *Philologische Wochenschrift* (1890), p. 1126.

Revised by J. R. S. STERRETT.

Mauso′lus (in Gr. *Μαύσωλος*): son of Hecatomnus, Persian Satrap of Caria, all of whose five children (three sons and two daughters) ruled independently over Caria. Mausolus married his own sister, Artemisia, and succeeded his father as Satrap of Caria, which he ruled for twenty-four years. At that time the capital of Caria was Mylasa, from which point Mausolus extended his power over Lycia, several of the Grecian islands, and toward the N. His wealth, gained by shrewd politics and violence, was said to equal that of Crœsus of old. He removed the seat of government to Halicarnassus, which he beautified and greatly enlarged by colonizing it with the people of six neighboring cities. He threw off the Persian yoke, supported the oligarchy in Rhodes, and induced Rhodes, Chios, etc., to revolt from Athens. He was a patron of literature, art, and science; Eudoxus came to the court of Mausolus, and upon the latter's death, Artemisia offered a prize for the best panegyric of him. Theodectes, Naucrates, Isocrates, and Theopompus competed for the prize, which was awarded to Theopompus. Theodectes wrote a tragedy entitled *Mausolus* in his honor, the first historical tragedy ever written. Mausolus was succeeded by his wife, Artemisia, who ruled over Caria from 353–351 B. C. See MAUSOLEUM.

J. R. S. STERRETT.

Mauston: city; capital of Juneau co., Wis. (for location of county, see map of Wisconsin, ref. 6–D); on the Lemonweir river, and the Chi., Mil. and St. P. Railway; 124 miles W. of Milwaukee. It has abundant water-power, several flour and grist mills, foundry and machine-shops, sawmills, barrel and carriage factories, and three weekly newspapers. Pop. (1880) 1,013; (1890) 1,343; (1900) 1,718. EDITOR OF "STAR."

Mauthner, mowt′ner, LUDWIG, M. D.: ophthalmologist; b. at Prague, Bohemia, Apr. 13, 1840; graduated M. D., University of Vienna, in 1861; was docent for diseases of

the eye 1864–69; was Professor of Ophthalmology at the University of Innsbruck from 1869–77; in 1877 accepted the same chair in Vienna. He has been an ardent student in his special field. Among his works are *Lehrbuch der Ophthalmoscopie* (Vienna, 1868); *Vorlesungen über die optischen Fehler des Auges* (Vienna, 1872); *Die Lehre vom Glaucom* (1882). S. T. Armstrong.

Mauthner, Ludwig Wilhelm Ritter von Mauthstein, M. D.: pædiatrist; b. at Raab, Austria, Oct. 14, 1806; studied in Vienna, graduating M. D. in 1831; entered the medical corps of the Austrian army as *Oberfeldarzt*, and was promoted *Regimentsarzt* for his services in a cholera and typhus epidemic in the military hospital; in 1837 settled in Vienna, devoting himself to diseases of children, and, with the assistance of the empress, founded the St. Anne Hospital. In 1844 he opened the first clinic for children's diseases. In 1850 he was made Professor of Pædiatries at the university. In 1849 he was elevated to the nobility. His best-known works are *Die Krankheiten des Gehirns und Ruckenmarks bei Kindern* (Vienna, 1844); *Kinder-Diätetik* (Vienna, 1853). D. Apr. 8, 1858.
S. T. Armstrong.

Mauvaises Terres, mō′vāz′tār′: See Bad-lands.

Mavors: See Mars.

Mavrocorda′tos, Alexander: soldier and statesman; the noblest and the most prominent figure of the Greek revolution, "the Washington of modern Greece"; b. in Constantinople, Feb. 11, 1791. He received a careful education; in 1817, as secretary of his uncle, John Caradja, hospodar of Wallachia, he went to Bucharest. There he learned diplomacy. A natural linguist, he early mastered Greek, Turkish, Persian, French, and Italian, and later acquired English and German. Ardently patriotic, he declined the flattering offers made him by Alexander I. of Russia, and devoted himself to Greece in the revolution just beginning against the Ottoman Government. He expended his entire fortune in equipping a vessel and arming volunteers. Appointed president of the executive council, he signed the proclamation of Greek independence and drew up the provisional Greek constitution. Factional dissensions were paralyzing the efforts of the Greeks, and he resigned his office, hoping that thus he might contribute to harmony. Lord Byron realized his worth and offered the Greeks £4,000 sterling toward the expenses of the war if they would place him again at the head of affairs. As a soldier Mavrocordatos rendered distinguished service in several battles, and at the defense of Missolonghi, Navarino, and Sphacteria. After the independence of Greece was acknowledged, he was head of the ministries of 1833, 1841, 1844, and 1854, and in the intervals filled various positions as ambassador. He was active in promoting popular education. He belonged to the British in distinction from the Russian party. D. Aug. 18, 1865. E. A. Grosvenor.

Mawe, John: mineralogist; b. in Derbyshire, England, in 1764. In 1804 he went to the Rio de la Plata; was imprisoned at Montevideo as a British spy, and after his release was attached to Whitelock's staff in the campaign against Buenos Ayres. From 1807 to 1811 he traveled in Brazil, where he was given the privilege—at that time rare—of visiting the gold and diamond mines. His *Travels in the Interior of Brazil*, etc. (1812), had a wide circulation, and has been several times reprinted. He also published *The Mineralogy of Derbyshire* (1802); *Diamonds and Precious Stones* (1813), etc. In his later years he was a noted practical mineralogist in London, where he died Oct. 26, 1829. H. H. S.

Max, Gabriel: historical, genre, and portrait painter; b. at Prague, Bohemia, Aug. 25, 1840. He studied at the Prague and Vienna Academies and with Piloty in Munich; became professor in the Munich Academy in 1883, and has received various medals at German exhibitions. His *Christ Healing a Child* (1884) is in the National Gallery, Berlin, and *The Last Token* (1874) is in the Wolfe collection, Metropolitan Museum, New York. Studio in Munich.
W. A. C.

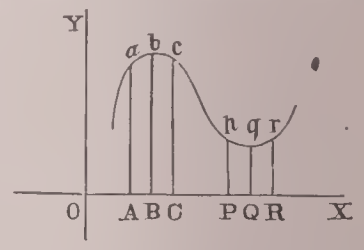
Maxen′tius, Marcus Aurelius Valerius: Roman emperor (306–312); son of Maximianus, son-in-law of Galerius, and brother-in-law of Constantine. On the division of the empire in 305 he received nothing, but was made emperor by an insurrection at Rome the following year. Of the rival emperors, he put Severus to death, defeated Alexander in Africa, and banished his father Maximianus. Soon, however, he declared war against Constantine, alleging as his reason that Constantine had caused the death of Maximianus. Defeated at Saxa Rubra, he endeavored to reach Rome, but was drowned in the Tiber, Oct. 27, 312. E. A. G.

Maxey, Samuel Bell: See the Appendix.

Maxfield, Thomas: preacher; b. in England about 1720; was one of Wesley's converts at Bristol, and subsequently was appointed "to pray and expound the Scriptures, but not to preach," at the Foundry church, London, during Wesley's absence. In contravention to his instructions he soon began to preach with great fervency and success, and Wesley, after hearing one of his sermons, gave him permission to preach. He thus became the first Methodist itinerant lay-preacher. Later he was ordained by the Bishop of Londonderry, attended the first Methodist conference at the Foundry June 25, 1744, and the third conference at Bristol 1746; suffered imprisonment and persecution; became separated from Wesley about 1764, in consequence of a doctrinal schism, and in company with Bell set up a congregation with 170 members, who seceded from the Foundry church. He preached for twenty years longer, and was visited and comforted by Wesley many years later when sinking under paralysis. D. at London in 1785. Revised by A. Osborn.

Max′ima and Min′ima [Lat., neut. plurs. of *ma′ximus*, greatest, superl. of *mag′nus*, great, and *mi′nimus*, least, smallest, superl. of *par′vus*, small]: a function of a single variable is at a *maximum* state when it is greater than the states that immediately precede and follow it; it is at a *minimum* state when it is less than the states that immediately precede and follow it. The terms greater and less are to be understood in their algebraic sense; that is, greater means nearer to $+\infty$, and less means nearer to $-\infty$. It may be shown that every function of one variable may be represented by the ordinate of some curve of which the independent variable is the corresponding abscissa; this curve is called the curve of the function. It may also be shown that the value of the first differential coefficient of the function for any value of the variable is equal to the tangent of the angle which a tangent line to the curve of the function, at the corresponding point, makes with the axis of abscissas. The tangent of this angle is called the *slope* of the curve.

Let *acpr* be the curve of any function, referred to the axes *OX* and *OY*, and suppose the ordinate *Bb* to be greater than *Aa* and *Cc*, *AB* and *BC* each being equal to dx; also suppose that the ordinate *Qq* is less than *Pp* and *Rr*, *PQ* and *QR* being equal to dx; then is *Bb* a maximum and *Qq* a minimum, the former corresponding to the abscissa *OB* and the latter to the abscissa *OQ*. An examination of the figure shows that a tangent to the curve at *a* slopes upward, and that a tangent at *c* slopes downward; in the former case the first differential coefficient is + just before reaching a maximum ordinate, and − just after passing it; that is, it changes sign from + to − in passing over a maximum. In like manner the first differential coefficient changes from − to + in passing over a minimum ordinate. In the case represented in the figure the differential coefficient corresponding both to a maximum and to a minimum is equal to 0. From what precedes we have the following rule for finding all the maximum and minimum states of any function of one variable: *Rule.* Find the first differential coefficient of the function, place it equal to 0, and solve the resulting equations with respect to the independent variable. The values thus found will embrace all that correspond either to maximum or minimum values of the function, and they may embrace other values. Then test each value by forming the second derivative of the function, and substituting in it the values of x, which reduce the first derivative to zero. If the result is *positive*, the function is a *minimum* for this special value of x; if negative, a maximum. If zero, we must proceed as follows: Substitute each root in the successive differential coefficients of the function until one is found that does not reduce to 0; if this is of an even order and *negative*, the root corresponds to a maximum, but if it is of an even order and *positive*, the root corresponds to a minimum. In all other cases the root corresponds to neither a maximum nor a minimum. Thus in the first example above given the second differential coefficient is + 2, which is positive for all values of x; hence $x = 1\frac{1}{2}$ corresponds to a minimum.



Revised by S. Newcomb.

Maximian II.: See GALERIUS.

Maximia'nus: a Latin poet from Etruria of the sixth century, by whom six love elegies, containing in all 686 lines, are extant. Although marked by occasional coarseness, the language and meter is for the period exceptionally good, and the author shows acquaintance with earlier elegiac and lyric poets and with Vergil. The best edition is by M. Petschenig (Berlin, 1890). See also articles by Robinson Ellis *On the Elegies of Maximianus* in *The American Journal of Philology*, vol. v., 1–15 and 145–163. M. WARREN.

Maximil'ian I.: Emperor of Germany; b. at Neustadt, near Vienna, Mar. 22, 1459; succeeded his father, Frederick III., as Emperor of Germany in 1493. Many of the most prominent events of his history are more or less intimately connected with his marriages and those of his children. After the death of Charles the Bold in 1477, he married the latter's daughter and sole heiress, Mary, thus securing Burgundy for his house. Mary died in 1482, and in 1493 Maximilian married Bianca Sforza, a daughter of Galeazzo Maria, Duke of Milan, who had been murdered in 1476. This marriage involved him in wars with Venice, Milan, the pope, Naples, France, and Spain. His participation, however, in the League of Cambray and in the Holy League, and his many Italian campaigns, were not of much consequence; nor was he successful in his attempt to hold Switzerland within the empire. He always lacked money and could form only a small and ineffective army. He was, however, most successful in aggrandizing the house of Austria. The marriage of his son Philip with the Infanta Joanna in 1496 united Spain to the possessions of the house of Hapsburg, and he laid the foundation for the annexation of Hungary to the Austrian crown by marrying his grandchildren into the royal family of that country. He died at Wels, Upper Austria, Jan. 12, 1519. His government of Germany showed his desire to escape from the anarchy and confusion that had marked the government of his predecessors. In his first diet, 1495, a perpetual national peace was decreed, putting an end to the private war within the empire. In the same year he established the imperial chamber (*Reichskammergericht*), and in 1501 the imperial Aulic council, insuring a higher degree of public security throughout the realm. See Ulmann, *Kaiser Maximilian I.* (1884); Kirchlechner, *Maximilian I. als Jäger* (1887); and Adler, *Die Organisation der Zentralverwaltung unter Kaiser Maximilian I.* (1886). F. M. COLBY.

Maximilian II.: Emperor of Germany; b. in Vienna, Aug. 1, 1527; succeeded his father, Ferdinand I., as emperor in 1564. Although he had spent several years at the court of Madrid, he was favorable to the Reformation, and it was even hoped that he might join the Protestant Church. This, however, he did not do, but he showed himself very tolerant. Protestants were appointed to government offices in Austria, and the evangelical theologian, Chytræus, from Rostock, was called to Vienna to arrange the Protestant service. On the other hand, he allowed the Jesuits free scope for their activity, and they gained great influence even in his own family. D. Oct. 12, 1576.

Maximilian, FERDINAND MAXIMILIAN JOSEPH: Archduke of Austria, and during three years Emperor of Mexico; b. in Vienna, July 6, 1832. He was the second son of the Archduke Franz Karl, and brother of Franz Josef who became Emperor of Austria in 1848; was carefully educated; entered the navy in 1846, and in 1854 became rear-admiral and commander-in-chief. In 1856 he visited Napoleon III. in Paris, and the intimacy then formed led to the most important results. In 1857 he married Marie Charlotte Amélie, daughter of King Leopold I. of Belgium, and for the next two years was Viceroy of Lombardy and Venice, where he gained great and deserved honor for his enlightened measures. After a visit to Madeira and Brazil he took up his residence at the palace of Miramar, near Trieste. His great popularity led to intrigues for placing him on the Austrian throne by revolutionary means, but these came to nothing. Late in 1861 a combined French, Spanish, and British force invaded Mexico, ostensibly to secure the rights of foreign creditors of that country; but it is now known that Napoleon III. contemplated from the first the establishment of a Mexican empire under French protection, and it is probable that the Archduke Maximilian was even then cognizant of the scheme, and had secretly agreed to accept the Mexican throne under certain conditions. Great Britain and Spain, so far as known, gave no countenance to the plot, and their forces were soon withdrawn from Mexico. The French, at first repulsed from Puebla (May 5, 1862), eventually took that place and Mexico (May–June, 1863), and established a provisional government. President Juarez was driven into the northern states. Disgusted by the endless civil wars and despairing of a stable government of their own, a large and influential portion of the people looked to the restoration of an empire under the rule of a foreigner as the only way out of their difficulties. In July, 1863, an assembly of notables offered the imperial crown to Maximilian, who after some hesitation accepted it Apr. 10, 1864. Maximilian was obliged by his new position to abdicate his rights of succession to the Austrian throne. He was given assurance from France of aid to establish his empire on a solid basis, and this was backed by a loan for immediate needs. Austrian and Belgian legions were formed; and after receiving the pope's blessing he and his wife set out for Mexico, landing at Vera Cruz May 28, 1864. They were welcomed at Cordoba, Orizaba, Puebla, and especially at Mexico with great apparent enthusiasm. In Apr., 1865, a provisional constitution was granted, and to insure succession to the throne (Maximilian and Carlota being childless) they adopted the infant grandson of the ex-Emperor Iturbide. The very independence shown by Maximilian tended to alienate political support. While his friends were falling away from him, his open enemies, who still held out in the north under Juarez, were gathering force, and they were supported by guerrilla bands in almost every state. Juarez having been driven over the frontier, Maximilian issued a decree (Oct. 2, 1865), in which he declared that no further legal pretense existed for resistance to the empire, and insurgents would henceforth be treated as bandits and executed. This decree was no more severe than various others which appeared during the civil wars in Mexico; but, coming from a foreigner, it raised a storm of indignation, the more so as advantage was taken of it soon after to execute some republican prisoners of rank. The evident favor which the emperor showed to French officers also excited much criticism; an instance occurred at the marriage of Marshal Bazaine to a Mexican lady, when he was presented with government property to the value of $100,000. The U. S., while professing and maintaining neutrality between the Mexican factions, steadily refused to recognize the empire so long as it was supported by France; moreover, it could not prevent the sympathy and financial support given by its people to the republicans. As soon as the close of the civil war left it free to act, the Washington Government intimated through its minister at Paris that the presence of French troops in Mexico was distasteful; this was emphasized by a significant massing of U. S. forces in Texas (July–Aug., 1865). After a number of diplomatic notes had been exchanged, Secretary Seward insisted (Feb. 12, 1866) that the French forces should be withdrawn, and to this Napoleon III. finally acceded, though in doing so he directly violated his agreement with Maximilian. In Mar., 1867, the last French troops left Vera Cruz. Long before this the republicans had been regaining ground in the north, and the imperial government, without any real support, was placed in great straits by its ruinous financial measures. Maximilian, plainly seeing that his throne could not stand alone, was on the point of resigning, a step which Bazaine himself had advised before he left; but the representations of the churchmen and politicians and an exaggerated sense of honor induced him to remain. In Feb., 1867, he took personal command of the army at Querétaro, Miramon, Marquez, Mejía, and Arellano being his principal lieutenants. The city was speedily invested by a republican army under Escobedo, and after a long siege and several bloody assaults it fell, partly through the treachery of an imperialist officer. Maximilian, scornfully refusing opportunities for escape, surrendered May 15. He was tried by a court martial and condemned to death with his principal officers; all efforts to obtain a reprieve or pardon were refused on the ground that he had forfeited indulgence by his severe decree against the Juarists; and he was shot at Querétaro, with his generals Miramon and Mejía, June 19, 1867. He met his fate with his usual chivalric courage. The ex-emperor's remains were surrendered to his family in the following year, and were buried with impressive ceremonies in the cathedral at Vienna, Jan. 18, 1868.—His wife, CHARLOTTE MARIE AMÉLIE (called CARLOTA by the Mexicans), was born at Brussels, June 7, 1840, and married July 27, 1857. In Mexico she was noted for her support of charitable measures, as well as for her winning manners; she strongly opposed sanguinary measures. In July, 1866, she went to France in the vain hope of inducing Napoleon III. to continue his support of Maximil-

ian. The French emperor received her coldly, refused, almost with insult, to fulfill his pledges, and finally dismissed her, it is said, by asking what route she preferred to take out of France. Carlota then went to Rome to seek the intervention of the pope, but received no encouragement, and her disappointment and forebodings brought on an attack of brain fever which left her hopelessly insane. She was not informed of her husband's death. Taken to Miramar and thence to Brussels, she has been kept in strict seclusion. See Bancroft, *History of the Pacific States: Mexico* (vol. vi., 1888); Keratry, *Kaiser Maximilian's Erhebung und Fall* (1868); Salm-Salm, *My Diary in Mexico* (1868); Hall, *Life of Maximilian I.* (1868); Arangoiz, Alaman, and other Mexican historians. H. H. Smith.

Maximi'nus, Caius Julius Verus: Roman emperor from 235 to 238; b. in the latter part of the second century, of barbarian parentage; attracted the attention of Septimius Severus by his strength and gigantic stature; was allowed to enlist in the cavalry, and was promoted by Caracalla; enjoyed the confidence of Alexander Severus, who intrusted him with the organization of a corps of soldiers destined for an invasion of Germany, and was proclaimed emperor by this army on the assassination of Severus. His campaigns against the Germans were successful, but his suspicion, rapacity, and cruelty knew no bounds. An insurrection in Africa and the sympathy it found in Italy threw him into a fit of frenzy. He hastened across the Julian Alps, but was stopped at Aquileia, and while besieging this city was killed by his own soldiers and his head sent to Rome.

Maxims, Legal: brief and epigrammatic expressions of general principles, either of justice, expediency, or policy, which, in their application by the courts to the innumerable varieties of facts and circumstances brought before them in judicial controversies, have furnished special rules for the decision of such disputes. These statements fulfill the same office for courts and lawyers which the ordinary popular proverbs have subserved for the community at large. It is impossible in most cases to trace them to their immediate authors. A considerable number came to us from the writings of Roman jurists; others were struck out and put into a permanent shape by the genius of some old English judge, and since they were either thus taken directly from the repositories of the Roman law, or else were invented during that ancient period of English history in which the Latin was the common tongue of all learned men, and especially of courts and judicial proceedings, they are all expressed in that language. They are very numerous, there being in all about 2,000, many of which, however, are now of no importance. The range of particular subjects over which they extend is also very wide, reaching from the principles fundamental to the science of government on the one hand, to those relating to the practical details and affairs of everyday life and the common rights and duties of person, property, and contract, on the other. See Broom's *Legal Maxims* and Noy's *Maxims*.

Maximum Alloys: See Bronze (*Bronze-brass alloys*).

Maxwell, George Troupe: See the Appendix.

Maxwell, James Clerk, LL. D., F. R. S.: physicist; b. at Edinburgh, Scotland, June 13, 1831; educated at the Academy and University of Edinburgh; graduated at Cambridge 1854; Professor of Natural Philosophy in Marischal College, Aberdeen, 1856–60, and at King's College, London, 1860–65, and became in 1871 Professor of Experimental Physics at Cambridge. D. Nov. 5, 1879. His writings on physics are of a very high order, and include an *Essay on the Stability of the Motion of Saturn's Rings* (1859), *Theory of Heat* (1871), and a *Treatise on Electricity and Magnetism* (2 vols., 1873). The last is the crowning work of his life, and is regarded as a classic on the subject of which it treats. By introducing the conception of a strain of a medium he constructed a theory of electricity in which the mysterious and unmeaning "action at a distance" has no place. He also devoted attention to the perception of color, and was the first to make color-sensation the subject of measurement. He made many investigations on the kinetic theory of gases; he discovered that viscous fluids, while yielding to stress, possess double refraction, and he published a great number of papers on other subjects. He took a prominent part in the construction of the British Association unit of electrical resistance, and in the writing of its reports on the subject. It may be said that the high position accorded to the study of physics at Cambridge is almost entirely due to his impulse. His *Scientific Papers* were edited by W. D. Niven (8 vols., Cambridge, 1890), and his *Life* has been written by L. Campbell and W. Garnett (1882).

Revised by R. A. Roberts.

Maxwell, Mary Elizabeth (*Braddon*): novelist, whose pen-name is *M. E. Braddon*; b. in London in 1837. She is the author of several plays and about sixty novels, some of which have passed through many editions, and is the editor of *The Mistletoe Bough*, a Christmas annual. She was married in 1874 to John Maxwell, a London publisher (d. Mar. 30, 1895). Among her novels are *Lady Audley's Secret* (1862); *Aurora Floyd* (1863); *The Lovels of Arden* (1871); *Ishmael* (1884); and *One Life, One Love* (1890).

Maxwell, William H.: See the Appendix.

Maxwell, William Hamilton: author; b. at Newry, Ireland, in 1794; graduated with honors at Trinity College, Dublin; studied theology; took orders in the Church of England, and in 1820 was presented with the prebend and rectory of Ballagh in Connaught. As there was not a single Protestant in the parish, the rector enjoyed abundant leisure, which he devoted to field-sports and to literature. He wrote many successful sketches of country life and adventure, and was the chief originator of the school of military novels. Among his numerous works were *Stories of Waterloo* (1829); *Stories of the Peninsular War* (1837); *Victories of the British Army* (1839); *Rambling Recollections of a Soldier of Fortune* (1842); *The Fortunes of Hector O'Halloran* (1844); and *History of the Rebellion in Ireland in 1798* (1845). Maxwell was a frequent contributor to *Bentley's Miscellany* and to *The Dublin University Magazine*. D. Dec. 29, 1850. See biographical sketch prefixed to *Rambling Recollections*.

Maxwell, Sir William Stirling, Bart., LL. D.: b. at Kenmure, near Glasgow, Scotland, in 1818; was known by the name of Stirling until 1866, when by the death of Sir John Maxwell, his maternal uncle, he succeeded to a baronetcy, and assumed the name of Maxwell. He graduated at Cambridge (1839), and devoted several years of residence and research in Spain and France to the history, literature, and art of Spain at the close of the mediæval period. He was the author of the valuable works, *Annals of the Artists of Spain* (3 vols., 1848), *Cloister Life of Charles V.* (1852), and *Velasquez and his Works* (1855); was elected to Parliament for Perthshire 1852, and represented that borough most of the time for more than twenty years; was rector of the University of St. Andrews 1863, of that of Edinburgh 1872, and elected chancellor of that of Glasgow Apr. 28, 1875. D. in Venice, Jan. 15, 1878.

May [from Lat. *Maius* (sc. *men'sis*, month), liter., month of *Maia* (= Gr. Μαῖα), daughter of Atlas, and mother of Mercury by Jupiter]: the fifth month of the year in the Gregorian calendar, consisting of thirty-one days, was by the ancient Saxons called *threo-meolee*, three-milk month, because in this season cows were milked three times a day. During the Middle Ages the month of May was generally ushered in by some popular merriment, but it is not clear whether this custom, which was found among all European nations, had any connection with the Roman festival of *Floralia*, beginning Apr. 28 and continuing for several days, or whether it sprang up spontaneously from joyous feelings on the arrival or approach of spring. In England the going out a-Maying was a very common custom in former days; Chaucer and Shakspeare mention it; Henry VIII. and Queen Catharine of Aragon followed it. On May 1, before sunrise, all the young folks repaired to the groves to gather flowers and branches with young foliage. With these the doors and windows of the houses and the Maypole of the village were adorned, and the day was spent in dancing around the pole. To preside at the festival a queen of May, the most beautiful girl of the village, was chosen in England; in Germany, a count of May, the wittiest and handsomest youth; and the life at court and in the castle was imitated in the village streets by the peasants, probably not altogether without satire. With the Puritans the Maypoles and all the merriment connected with them disappeared in England. In Germany and Scandinavia the custom is dying out, though in Denmark the peasants still turn out on May 1 early in the morning to see "the sun dance," and in Stockholm great popular rejoicings take place in Djurgården. In the Highlands of Scotland the day was formerly celebrated as *Bel-tein* day; a fire was made, and certain ceremonies were performed which were supposed to have had a reference to the worship of Baal, who was regarded as a personification of the sun. In Vienna the em-

peror, the empress, and the court drive through the Prater, and the whole city turns out to look at the spectacle.

May, Edward Harrison: figure and portrait painter; b. in England in 1823; was taken by his parents to the U. S. in 1834, and became a pupil of Daniel Huntington in New York; entered the studio of Couture in Paris in 1851, and resided thereafter in Europe, chiefly in Paris, where he was a regular contributor to the annual salons, and received several medals. *The Dying Brigand* is in the Philadelphia Academy of Fine Arts, and portraits of Count Gasparin and Laboulaye are in the Union Club, New York city. D. in Paris, May 17, 1887. William A. Coffin.

May, John Wilder: lawyer; b. in Attleboro, Mass., Jan. 19, 1819; was educated at Phillips Academy, Andover, Mass., and at the University of Vermont, from which university he graduated in 1846; studied law, and practiced in Roxbury and Boston most of the remainder of his life; was district attorney of the County of Suffolk (including the city of Boston) for six years, and subsequently chief justice of the municipal court of the city of Boston, which latter position he held at his death in Boston, Jan. 11, 1883. He edited *Angell on Limitations*, *Greenleaf on Evidence*, and *Stephen's Digest of Evidence*, and was the author of *The Law of Crimes* (Boston, 1881) and *The Law of Insurance as Applied to Fire, Life, Accident, Guarantee, and other Non-maritime Risks* (Boston, 1873; 3d ed. 1891).
F. Sturges Allen.

May, Samuel, A. M.: reformer; a cousin of Rev. Samuel Joseph May; b. in Boston, Mass., Apr. 11, 1810; graduated at Harvard in 1829; was pastor of a Unitarian church at Leicester, Mass., 1834–46; was general agent and corresponding secretary of the Massachusetts Anti-Slavery Society 1847–61, and for a part of this time held the same offices in the American Anti-Slavery Society; was secretary and agent of the committee which raised a national testimonial of $30,000 for William Lloyd Garrison; was a member of the State Legislature in 1875. After the termination of his ministry he made Leicester his home. Mr. May contributed for many years to *The Liberator* and *Anti-Slavery Standard*. He published *The Fugitive Slave Law and its Victims*, and in the *Memoir of James Freeman Clarke* a chapter on his anti-slavery work. D. Nov. 24, 1899.

May, Samuel Joseph: reformer: b. in Boston, Mass., Sept. 12, 1797; graduated at Harvard College in the class of 1817; studied for the ministry; was ordained in Chauncy Place church, Boston, Mar. 14, 1822; was settled immediately at Brooklyn, Conn.; was installed pastor of a church at South Scituate Oct. 26, 1836; in 1842 accepted the charge of the State Normal School at Lexington; in 1845 removed to Syracuse, N. Y., to become pastor of the Unitarian Society there, and remained till his death July 1, 1871. His health became so feeble that in the autumn of 1867 he resigned his ministry, but became a missionary throughout Central New York for the American Unitarian Association. Mr. May was one of the first and one of the most uncompromising advocates of the abolition of slavery, an ardent and enlightened philanthropist. As a writer he is chiefly known by a series of papers recording his *Recollections of the Anti-Slavery Conflict*. A memoir of Mr. May, prepared by T. J. Mumford, was published in Boston in 1873.

May, Thomas: historian and poet; b. at Mayfield, Sussex, England, in 1594; was educated at Sidney-Sussex College, Cambridge, and graduated 1612; began the study of law at Gray's Inn, London, but was never admitted to the bar; inherited a considerable estate on the death of his father, Sir Thomas May (1616), when he began to figure at court and in literary circles as a wit and a brilliant genius; became a favorite of Charles I.; published poetical translations of Vergil's *Georgics* (1622) and Lucan's *Pharsalia* (1627), to which he added a *Continuation* (1630), also in verse, bringing the history down to the death of Cæsar, and afterward translated this continuation into Latin hexameters, published under the title *Supplementum Lucani Libri VIII.* (Leyden, 1640; frequently reprinted). During his period of favor at court he produced five dramas, and by request of Charles I. wrote the historical poems, *The Reign of King Henry II.* (1633) and *The Victorious Reign of King Edward III.* (1635). For some unknown reason, May abandoned the royal cause at the outbreak of the great rebellion, offered his services to the "Long Parliament," and obtained the double office of secretary and historiographer. In the latter capacity he published *The History of the Parliament of England which began Nov. 3, 1640; with a Short and Necessary View of some Precedent Years; published by authority* (1647), which concludes with the battle of Newbury in 1643; in a Latin translation May brought down the narrative to the death of Charles I., and afterward wrote an English epitome with the title *A Breviary of the History of the Parliament of England* (1650). May was also the author of several political tracts, translated by request of Charles I. the poetical portions of John Barclay's famous allegorical romance, the *Argenis* (1628), and left in MSS. a tragedy entitled *Julius Cæsar*. D. in London, Nov. 13, 1650. Revised by H. A. Beers.

May, Sir Thomas Erskine, Baron Farnborough: jurist and historian; b. in England in 1815; was educated at Bedford School; entered the civil service of the crown in 1831 as assistant librarian of the House of Commons; was called to the bar at the Middle Temple 1838; published *A Treatise on the Law, Privileges, Proceedings, and Usage of Parliament* (1844), which was adopted as a parliamentary textbook, and as such translated into German and Hungarian; reduced to writing for the first time in 1854 the *Rules, Orders, and Forms of Proceeding of the House of Commons*, adopted and printed by command of the House; wrote other tracts on legal and parliamentary subjects; contributed biographies and articles on political economy to *The Penny Cyclopædia*, and published a *Constitutional History of England since the Accession of George III.* (3 vols., 1861–63; 3d ed., revised, 1871), reprinted in the U. S. and translated into French and German. He continued more than forty years in the service of the House of Commons in different capacities; was knighted 1866; became clerk of the House 1871; retired from office in 1886, and soon after was raised to the peerage as Baron Farnborough. His last work was *Democracy in Europe: a History* (2 vols., 1877). D. May 18, 1886.

Māyā: a Sanskrit term employed in different senses in the Puranic mythology, in the Buddhistic legends, in the Vedanta philosophy, and in some of the modern sectarian theologies of India. Originally it was the name of a goddess, the wife of Brahmā, who, through her, created the universe; hence when the universe came to be regarded as unreal, its creation was necessarily the work of illusion, which being personified in the goddess, her name became in late Sanskrit a synonym for "illusion," and it has preserved nearly the same mythical sense in the modern theologies. Gautama the Buddha was the son of Māyā, wife of the Prince of the Sakyas. See Buddhism and Gautama.

Mayagüez, mäă-yaa'goo-äth: a town and port of call of the island of Puerto Rico, West Indies; on a bay of the west coast; 70 miles W. S. W. of San Juan (see map of West Indies, ref. 6–J). The harbor is large and shallow, steamers anchoring a mile from the shore. The principal exports are coffee and oranges. Pop. 20,000. H. H. S.

Mayapan: See Central American Antiquities.

May-apple: the common name of a perennial herb, indigenous to the U. S. (the *Podophyllum peltatum*), once referred to the *Ranunculaceæ*, or thought to be the type of a separate natural order, now recognized as belonging to the *Berberidaceæ*. It has also received the name of *mandrake*, but improperly. From a perennial creeping rhizome a slender stem about a foot high rises, which forks near the top into two petioles, each surmounted by a large peltate leaf. At the crotch of the division appears a solitary white flower. The fruit of the may-apple is yellowish and fleshy, and about the size of a pigeon's egg. It is somewhat acid and mawkish in flavor, but may be eaten freely. The dried rhizome constitutes the drug *podophyllum*. Its virtues depend on a duplex resin improperly called *podophyllin*, which is obtained in the form of a light brownish-yellow powder. This resin is a rough and harsh drastic purgative, which seems, like calomel, to include the upper part of the small intestine in its action, and thus to bring away a good deal of bile in the dejections. Hence it has been called "vegetable mercury." In overdose, like all the drastic cathartics, it may cause serious irritation, and even inflammation of the intestinal canal, with severe purging, nausea, and vomiting. Resin of podophyllum is used in small dose in many digestive derangements with constipation and clay-colored stools, and in full dose as an active purge. In the latter case some anodyne extract is commonly combined with it to correct the griping. Revised by H. A. Hare.

Mayas: See Indians of Central America.

May-bug: See Cockchafer.

May, Cape: See Cape May.

Mayence: See Mentz.

Mayenne, mī'en': department of France, in the basin of the Loire, along the Mayenne. Area, 1,996 sq. miles. The ground is a plain, swelling toward the S. E. into a range of low hills. The soil is fertile, producing grain, flax, hemp, and apples, and yielding coal, iron, marble, and slate. Of the entire area, two-thirds are arable and one-twentieth is wooded. Agriculture is in a very flourishing condition. Linens and cider are the principal manufactures. Pop. (1896) 321,187. Capital, Laval.

May'er, Alfred Marshall: physicist; b. at Baltimore, Md., Nov. 13, 1836; was educated at St. Mary's College, Baltimore; devoted his attention to the physical sciences, in which department he became professor in the University of Maryland 1856–58, in Westminster College, Mo., 1859–61, in Pennsylvania College, Gettysburg, 1865–67, in Lehigh University, Pa., 1867–70, and in the Stevens Institute of Technology, Hoboken, N. J., since 1871. He spent a year (1863–64) in scientific studies at the University of Paris. At Lehigh University he made a series of observations of Jupiter; was at the head of the expedition which observed the total eclipse of the sun at Burlington, Ia., Aug. 7, 1869, securing forty-one perfect photographs; began at Hoboken an important series of researches in acoustics, which led to several important discoveries; was in 1873 one of the editors of *The American Journal of Science and Arts*. He published numerous scientific papers, containing his original researches in all departments of physics, and wrote several books, including *Sport with Gun and Rod in American Woods and Waters* (New York, 1883). D. at Maplewood, N. J., July 13, 1897.

Mayer, Brantz: author; b. in Baltimore, Md., Sept. 27, 1809. He studied at St. Mary's College; traveled in the East, and on his return entered the law department of the University of Maryland. In 1829 he was admitted to the bar. Subsequently he was editor of *The Baltimore American*, and in 1841–42 secretary of the U. S. legation in Mexico, traveling extensively in that country. During the civil war he was a strong Unionist, and was commissioned colonel in the Federal army. He published *Mexico as it Was and Is* (1844); *History of the War between Mexico and the United States* (1848); *Mexico, Aztec, Spanish, and Republican* (2 vols., 1853; his best work); *Captain Canot*, a novel (1854), etc. D. in Baltimore, Feb. 23, 1870. H. H. Smith.

Mayer, Constant: See the Appendix.

Mayer, mī'er, Johann Friedrich: theologian; b. at Leipzig, Dec. 6, 1650; studied theology in his native town and at Strassburg; was appointed superintendent at Leisnig in 1673, and at Grimma in 1679, and became in 1684 fourth Professor of Theology at the University of Wittenberg. He was a man of great mental vigor and possessed of a powerful eloquence; his lectures attracted large audiences, but his ambition and greed and certain scandalous disturbances in his domestic life made it difficult for him to remain in Wittenberg, and in 1686 he accepted a position as preacher at St. Jacob's church in Hamburg. He had received his first religious inspiration from Spener, but even while in Wittenberg a certain coolness arose between them, and when Mayer went to Hamburg and found his three colleagues in the ministry, Horbius, Winkler, and Hinckelmann, all more or less influenced by the pietism of Spener, he at once assumed a polemical attitude against this religious movement, and became in a short time famous, or rather notorious, on account of his polemics. By his singularly impressive eloquence he roused the mob of Hamburg to such a pitch of fanaticism against everything which looked like pietism or Spencrism that Horbius fled for his life and his house was razed to the ground, the senate being unable to defend either his life or his property; the emperor himself had to interfere. In 1688, while still pastor in Hamburg, he was appointed honorary Professor of Theology at Kiel, and discharged the duties of both positions, though the distance between the two places where he had to preach and to lecture could not be traversed in one day. In 1701 Charles XII. appointed him first Professor of Theology at the University of Greifswald, and superintendent-general of Pomerania and Rugen; and in this position he died at Stettin, May 30, 1712. His works, numbering in all 378, have no theological worth, but give an interesting picture of the circumstances and characters of the age in which he lived.

Revised by S. M. Jackson.

Mayer, Johann Tobias: one of the most celebrated astronomers of the eighteenth century; b. Feb. 17, 1723, at Marbach, Würtemberg; was principally self-educated; at twenty-two published a treatise on curves for the construction of problems in geometry; in 1751 was appointed professor in the university and director of the observatory at Göttingen, where, during the Seven Years' war, the French troops made the basement of his observing-tower a powder-magazine. Every evening Mayer passed through this magazine with a lantern. At the other extremity of the town the Saxons had established a similar magazine in a similar tower, and one evening this blew up with a frightful explosion, in which seventy persons perished. Mayer continued, nevertheless, his observations, disregarding the danger so startlingly illustrated; and it was under circumstances so unfavorable that he prosecuted the work of preparing his catalogue of zodiacal stars which has been of such value to modern astronomy. He published also tables of the sun and of the moon in 1755, which were sent to London in competition for the prize offered by the British Parliament for a satisfactory method of finding the longitude at sea. They were tested by Bradley, astronomer-royal, and pronounced worthy of the attention of the admiralty; but it was only after his death, in 1762 (Feb. 20), that the merited recompense was awarded: the sum of £3,000 sterling was paid to his widow. Revised by S. Newcomb.

Mayer, Julius Robert: physicist, originator of the doctrine of the conservation of energy; b. at Heilbronn, Würtemberg, Nov. 25, 1814; studied medicine in Tübingen, Munich, and Paris; practiced medicine and surgery in Heilbronn; sailed in 1840, on a Dutch freighting-vessel, to Java, and remained in Batavia through the summer. There he turned his attention to the study of the laws of heat, and through this to a consideration of the nature and relations of all the physical forces. His first publication on the subject, which appeared in Liebig's *Annalen der Chemie und Pharmacie*, under the title *Bemerkungen über die Kräfte der unbelebten Natur*, contained the announcement of what is now known as the doctrine of energy. (See Energy.) In the close of this paper the writer presented a determination of the mechanical equivalent of heat, derived from observation of the elevation of temperature in air compressed by a descending column of mercury. The value thus obtained involves as a factor the specific heat of air, a constant which was not then accurately known. By substituting for this constant the specific heat as established by the later investigations of Regnault, Mayer's result is found to accord very nearly with that obtained in the long-continued researches of Joule, conducted independently and in part simultaneously, but published later. Mayer's priority in the statement of the principle of the conservation of energy is universally acknowledged. Concerning his rank among the investigators to whom the doctrine owes its early development there has been much discussion. Current opinion of the present day would not class him with Helmholtz, Joule, and Clausius as to clearness of view, accuracy, or completeness of treatment. His second publication, which was more extended than the first, appeared in 1845, and embraced a bold extension of the principles of his theory to the phenomena of organic nature. It was published under the title *Die organische Bewegung in ihrem Zusammenhange mit dem Stoffwechsel*. His *Celestial Dynamics* (*Beiträge zur Dynamik des Himmels*) made its appearance in 1848, and in 1851 he published a somewhat extended memoir entitled *Bemerkungen über das mechanische Aequivalent der Wärme*. Three of these memoirs of Mayer, the first, third, and fourth above mentioned, have been published in English by Prof. Grove as an appendix to his work on the *Correlation of Forces*. In 1867 Mayer's collected works were published at Stuttgart under the title *Die Mechanik der Wärme*. D. Mar. 20, 1878.

Revised by E. L. Nichols.

Mayfield: city; capital of Graves co., Ky. (for location of county, see map of Kentucky, ref. 5–C); on Mayfield creek, and the Newport N. and Miss. Val. Railroad; 26 miles S. of Paducah. It is in a tobacco-growing and agricultural region; sells annually an average of 10,000,000 lb. of tobacco grown in the county; and has 2 flour-mills, woolen-mill, several tobacco-houses, tobacco-stemmery, creamery, fire-clay works, ice-factory, spoke-factory, water-works, electric lights, and 2 weekly newspapers. Pop. (1880) 1,839; (1890) 2,909; (1900) 4,081. Editor of "Mirror."

May-fly: the common name of several species of *Ephemeridæ*. (See Ephemera and Entomology.) The entire period

of the preparatory stages the May-fly passes in the water, during which time the larvæ and pupæ make themselves little burrows in the sides of the pond or stream in which they live. The emerging of these insects from the water seems always to take place in the evening, and they generally make their appearance in countless swarms for two or three evenings. By the next morning most of these insects are found lying dead in heaps upon the shore.

Mayhem [ultimately the same as *maim*, from O. Fr. *méhaigner*: Ital. *magagnare*, probably of Teutonic origin, possibly **man hamjan*, maim; cf. Germ. *hammel*, *hämmling*, Eng. *hamble*]: at common law was "a hurt of any part of a man's body whereby he was rendered less able, in fighting, either to defend himself or to annoy his adversary." Hence striking out a man's eye or front tooth was mayhem; but cutting off his ear or nose was not. The early common law dealt with it as a felony, and subjected the felon to the loss of the like part of his own body. This practice of retaliation gave way to punishment by fine and imprisonment, except in cases of mayhem by castration; and the offense remained a misdemeanor, until a number of statutes extending from 5 Hen. IV., c. 5, to 24 and 25 Vict., c. 100, changed it to a felony. By the last-named act every unlawful, malicious, and intentional wounding, disfigurement, or grievous bodily harm inflicted upon another is a felony, and renders the criminal liable to the same punishment as an attempt to murder. In the U. S. the common-law mayhem, unless committed by castration, has been treated generally as a misdemeanor. (*Commonwealth* vs. *Newell*, 7 Mass. 245.) The term has been extended by statute, however, to include nearly every form of bodily harm; and in some of the States the offense is declared to be a felony. Bishop's *New Criminal Law*, vol. ii., ch. xxxi.

FRANCIS M. BURDICK.

May'hew, EXPERIENCE: missionary; son of John, and great-grandson of Gov. Thomas Mayhew; born in Martha's Vineyard, Jan. 27, 1673; succeeded his ancestors in the pastoral charge over the Indians in Mar., 1694, and was employed by the Society for Propagating the Gospel to translate the Psalms and the Gospel of John into the Indian language, which he had learned in childhood. He published in 1727 *Indian Converts*, being the lives of thirty Indian preachers and eighty other converts, and a volume entitled *Grace Defended* (1744). D. Nov. 29, 1758.—His son, ZACHARIAH, was missionary at Martha's Vineyard from 1767 to his death Mar. 6, 1806.

Mayhew, HENRY: humorist; b. in London, England, Nov. 25, 1812; was educated at Westminster School; made a voyage in his boyhood to Calcutta, and served an apprenticeship to his father, a solicitor. He began a literary career by bringing out at the Queen's theater, in conjunction with Gilbert à Beckett, the farce of *The Wandering Minstrel*; founded a comic paper, *Figaro in London*; was one of the promoters of *Punch* (1841), and for some years its chief editor, and in association with his brothers Horace and Augustus wrote numerous popular humorous novels, fairy-tales, and farces. His chief achievement, however, was in making known the everyday life of the lower classes of the British metropolis in *London Labor and the London Poor* (1851; new ed. 1868), originally contributed to *The Morning Chronicle*. He wrote largely for magazines, was author of *The Mormons* (1852), and of several juvenile books. D. July 25, 1887.—His brother HORACE, b. in London in 1816, was for some years on the staff of *Punch*; published several humorous works in his own name; d. in London, Apr. 30, 1872.—Three other brothers, THOMAS (b. in 1810), EDWARD (b. in 1813), and AUGUSTUS (1826–75), aided Henry and Horace in some of their literary undertakings. Thomas was a pioneer in the publication of penny grammars, dictionaries, etc., as part of a Penny National Library; he was also editor of *The Poor Man's Guardian*, and was a conspicuous advocate of reform measures; Edward was theatrical manager and writer of farces in youth, and has published standard works on horses and dogs, especially on their diseases; while Augustus published several successful romances.

Revised by H. A. BEERS.

Mayhew, THOMAS: colonizer and preacher; b. in England, Mar., 1592; was a merchant at Southampton; emigrated to New England in 1631; resided several years at Watertown; obtained in 1641 from the agent of Lord Stirling a grant of a considerable portion of the island of Martha's Vineyard, with the title of governor; began the colonization in 1642, aiding his son Thomas in converting the Indians, and proving himself so true a friend that through his influence they not only abstained from joining in Philip's war, but protected the white settlers against the savages. Gov. Mayhew founded Edgartown in 1647, preached in his old age to the Indians, as well as to the English, in place of his deceased son and grandson, and died in Mar., 1682. From him was descended a remarkable line of missionaries to the Indians of Martha's Vineyard.

May Laws, The: See FALK LAWS, THE.

Maynard, GEORGE WILLOUGHBY: figure and portrait painter; b. in Washington, D. C., Mar. 5, 1843; studied at the Royal Academy, Antwerp; painted and studied in Paris and other places in Europe 1869–74; was elected a National Academician in 1885, a member of the Society of American Artists in 1880, and of the American Water-color Society; was awarded the Temple gold medal at the Pennsylvania Academy of Fine Arts in 1884. He has executed important decorative compositions for various buildings in the U. S. Studio in New York.

WILLIAM A. COFFIN.

Maynard, HORACE, LL.D.: statesman; b. at Westborough, Mass., Aug. 30, 1814; graduated in 1838 at Amherst College; was tutor and afterward mathematical professor in East Tennessee University; was admitted to the bar in 1844, and became a successful lawyer; represented Tennessee in Congress 1857–63; suffered much from loss of property and exile during the war of 1861–65, having immediately on the outbreak of the war declared his loyalty to the U. S. Government; was in Congress again 1866–75, representing the Knoxville (second) district until 1873, when he was chosen representative at large. In 1862 his alma mater gave him the degree of LL. D. In 1875 he was sent as minister to Constantinople, and in 1880 became U. S. Postmaster-General. D. at Knoxville, Tenn., May 3, 1882.

Maynard, ISAAC HORTON: judge of New York court of appeals; b. in Bovina, N. Y., Apr. 9, 1838; graduated at Amherst in 1862; was a member of the New York Assembly 1876–77; county judge and surrogate, Delaware County, 1878–84; was defeated for Secretary of State 1883; was deputy attorney-general, State of New York, Jan. 1, 1884, to June 1, 1885; second comptroller of the U. S. Treasury June 1, 1885, to Apr. 1, 1887; assistant Secretary of the Treasury Apr. 1, 1887, to Apr. 1, 1889; commissioner to revise the general laws of the State of New York May, 1889, to Feb. 1, 1892; deputy attorney-general, New York, Jan. 1, 1890, to Feb. 1, 1892; was appointed associate judge, court of appeals of New York, Feb. 1, 1892. D. June 12, 1896.

Maynard, Sir JOHN: constitutional lawyer; b. at Tavistock, England, in 1602; was educated at Oxford: studied law at the Middle Temple; was elected to Parliament in 1625; called to the bar 1626; was distinguished in the Long Parliament as one of the prosecutors of Strafford and Laud, and afterward as an opponent of the encroachments of the army and of the assumption of supreme power by Cromwell, for which conduct he was twice sent to the Tower; became sergeant-at-law 1654; sergeant to the Commonwealth 1658; made king's sergeant and knighted 1660, refusing to accept a judgeship; took an active part in the "Convention Parliament" (1689) in obtaining the formal acceptance of the resignation of James II., and in the same year was made first commissioner of the great seal. When waiting upon William III., that prince, struck with his great age (eighty-seven years), observed that he must have outlived all the lawyers of his time, upon which Maynard replied that "he had like to have outlived the law itself if his highness had not come over." Sergeant Maynard was a firm friend of liberty and of Presbyterianism, and is ranked by Sir James Mackintosh with Lord Somers as one of the greatest constitutional lawyers of England. Some of his *Reports* were printed, as well as a number of speeches and political tracts. D. at Gunnersbury, Oct. 9, 1690.

Maynooth: village; in the county of Kildare, Ireland (see map of Ireland, ref. 9–I); has a celebrated Roman Catholic college or ecclesiastical seminary, with about 500 students destined to become priests in Ireland. It was founded in 1795. Several attempts were made to repeal the act of endowment, though it was the only state endowment for religious purposes which the Roman Catholic population ever received in Ireland; and in 1869 such an act was carried into effect, the institution receiving instead a capital sum fourteen times the amount of the annual endowment. There is a population, including the college, of about 1,200.

May'o: a maritime county, in Connaught, Ireland; comprising an area of 2,131 sq. miles, and bounded N. and W.

by the Atlantic. It consists of a large and fertile plain inclosed by two ranges of mountains, whose highest peaks, Muilrea and Nephin, reach 2,680 feet. As the climate is moist and windy, the soil is better adapted for pasturage than for tillage; many cattle and sheep of a good breed are reared. Next to agriculture fishing is the chief branch of industry. Excellent marble is quarried. Pop. (1891) 219,-634. Chief towns, Castlebar, Ballina, Ballinrobe, Bellmullet, Claremorris, Swineford, and Westport.

Mayo, Amory Dwight, A. M.: educator; b. in Warwick, Franklin co., Mass., Jan. 31, 1823; was educated at Deerfield Academy and Amherst College; studied for the ministry with Rev. Hosea Ballou, president of Tufts College (Universalist); from 1846–54 was pastor of the Independent Christian Society in Gloucester, Mass.; from Oct., 1854, to Jan., 1856, preached in Cleveland, O.; from Jan., 1856, to Jan., 1863, was minister to the Division Street church at Albany, N. Y.; from Jan., 1863, till July, 1872, was settled in Cincinnati, O., at the Church of the Redeemer (Unitarian); from Nov., 1872, to 1879, was pastor of the Church of the Unity in Springfield, Mass. Mr. Mayo has always been engaged in public-school work; was an active member of the boards of education at Cincinnati and at Springfield, and has written many tracts and addresses on that and related subjects. For several years he has been Professor of Ecclesiastical Polity in Meadville Theological School, where he annually delivers a course of lectures. Since 1880 he has been engaged in furthering education in the Southern States. His published volumes are *The Balance*; *Memoirs of Mrs. S. C. E. Mayo*, his wife, who was also an authoress; *Graces and Powers of the Christian Life*; *Symbols of the Capitol*, a volume of discourses on the elements of Christian civilization; *Industrial Education in the South*, and *Southern Women in the Recent Educational Movement* (the two latter appearing as circulars of the U. S. Bureau of Education); besides many pamphlets on educational topics. Mr. Mayo received the degree of A. M. from Amherst College.

Mayo, Frank: actor; b. in Boston, Mass., Apr. 19, 1839; was educated at the public schools. He went to California in 1854, and made his first appearance in 1856 at the American theater, San Francisco, then under the management of Laura Keene; played through the mining-towns in the companies of Edwin Booth, Julia Deane Hayne, James Anderson, the English tragedian, and the Chapman family. In San Francisco he made a hit as Nana Sahib in Boucicault's drama of *Jessie Brown*, and became from 1863 to 1865, the recognized leading actor on the Pacific coast. On Aug. 28, 1865, he appeared at the Boston theater, Boston, playing Badger in *The Streets of New York* with great success, Hamlet, Richard the Third, Iago, Othello, Jack Cade, d'Artagnan, and Don Cæsar de Bazan. He became a star in 1867, and produced *Davy Crockett* at Rochester, N. Y., Sept. 24, 1872. His name thus became identified with the typical American backwoodsman, and he played the part almost exclusively until June, 1884. With John G. Wilson he wrote *Nordeck*, and played the title *rôle* himself. D. June 8, 1896. B. B. Vallentine.

Mayo, Richard Southwell Bourke, Earl of: statesman; b. in Dublin, Ireland, Feb. 8, 1822; was the eldest son of the fifth earl, and was known during his father's life by the courtesy title of Lord Naas. He was educated at Trinity College, Dublin; published a narrative of travels in Russia under the title *St. Petersburg and Moscow* (1845); was elected member of Parliament for the county of Kildare 1847, and for Coleraine 1852; was Chief Secretary for Ireland in Earl Derby's three administrations (1852, 1858–59, and 1866–68), and was a member of the cabinet during the third period; succeeded to the earldom Aug. 12, 1867; was appointed Viceroy of India in 1868; arrived at Calcutta Jan., 1869, and became noted for executive ability and the reform of abuses. While on a tour of inspection he was stabbed by a Mohammedan (Wahabee) convict in the penal settlement of Fort Blair, Andaman islands, and killed instantly, Feb. 8, 1872. A *Life* was written by Sir W. W. Hunter (1875).

Mayo, William Starbuck, M. D.: novelist; b. at Ogdensburg, N. Y., Apr. 20, 1812; graduated in medicine at the New York College of Physicians and Surgeon 1833; practiced his profession for several years; visited Spain for his health; passed over to Morocco with the design of penetrating into the interior of Africa, but found his project impracticable. Several years after his return to the U. S. Dr. Mayo published *Kaloolah, or Journeyings to the Djebel Kumri* (1849), a novel in which he utilized his knowledge of Northern Africa; *The Berber, or the Mountaineer of the Atlas* (1850); *Romance-dust from the Historic Placer* (1851); and *Never Again* (1873), a romance. D. Nov. 22, 1895.

Mayor, John Eyton Bickersteth: classical scholar; b. at Baddagamme, Ceylon, Jan. 25, 1825; educated at Shrewsbury School and St. John's College, Cambridge, of which he became a fellow 1849; assistant master at Marlborough College 1849–53; college lecturer 1853; took orders in the Church of England 1855; was librarian of the University of Cambridge 1863–67; and became Professor of Latin there in 1872. Prof. Mayor has published a famous edition of Juvenal's *Satires* in two volumes; Cicero's *Second Philippic* (1861); Homer's *Odyssey*, books ix.–xii. (1872); *Quintilian*, book x., unfinished (1872); and numerous Early English historical, biographical, and antiquarian works, and text-books of Latin grammar. He was one of the editors of *The Journal of Classical and Sacred Philology*, of *The Journal of Philology*, and until 1894 of *The Classical Review*.

Revised by A. Gudeman.

Mayo-Smith, Richmond: See Smith, Richmond Mayo.

Mayow, John, M. D., LL. D.: physician and chemist; b. in Cornwall, England, in 1645; was educated at Wadham and All Souls Colleges, Oxford; took degrees in both law and medicine; became a distinguished physician at Bath; wrote several learned medical works, published together in his *Opera Omnia Medica Physica* (Leyden, 1681), and propounded in his chapter on chemical affinities doctrines so far in advance of the science of that day that Dr. Beddow republished a great part in 1790 under the title *Chemical Experiments and Opinions extracted from a Work published in the Last Century*. It was claimed that the chief discoveries of Priestley and Scheele were known to Mayow a century earlier. D. in London, Sept., 1679.

Maypu: See Maipo.

Maysville: city (incorporated in 1833); capital of Mason co., Ky. (for location of county, see map of Kentucky, ref. 2–I); on the Ohio river, and the Ches. and O. and the Ky. Cent. railways; 79 miles N. E. of Lexington. It is in an agricultural region, and has important manufactures, including cotton goods, tobacco, cigars, plows, furniture, foundry and machine-shop products, flour, and lumber. There are water-works, fuel and illuminating-gas plants, electric lights, electric street-railway, academy, seminary, high school, 2 national banks with combined capital of $410,000, 2 State banks with capital of $125,000, and 2 daily and 2 weekly newspapers. Pop. (1880) 5,220; (1890) 5,358; (1900) 6,423. Editor of "Bulletin."

Mazamet': town; department of Tarn, France; on the Arnette; 43 miles E. S. E. of Toulouse; has extensive wool-spinning factories and manufactures of cloth (see map of France, ref. 8–F). At the beginning of the nineteenth century Mazamet was only an insignificant village, but the introduction of the manufacture of a peculiar kind of woolen fabric brought immediate and great prosperity to the place. Pop. in 1896, 13,712.

Mazanderan': province of Persia; bounded N. by the Caspian Sea, W. by Ghilan, and S. by Irak-Ajami, from which it is separated by the Elbruz Mountains, and E. by Astrabad. The ground is low along the shore of the sea, but farther inland it rises, covered with spurs of the Elbruz. The soil is fertile; rice, cotton, mulberry-trees, sugar-cane, and fine fruits are grown. The climate is cooler and more equable than that of the rest of Persia. Firdausī called Mazanderan the "land of roses," and Shah Abbas the Great often resided here. The province abounds in iron ores, and in mineral pitch in every state of transition from pure petroleum to the finest naphtha. The numerous rivers which flow from the Elbruz Mountains to the Caspian Sea are well stocked with trout, mullet, carp, and sturgeon, supplying large quantities of caviare to the Russian market. The domestic animals are noted for their small size, and include among the most important the black, humped cattle similar to the Indian variety, also horses, sheep, and goats. Area estimated at 10,000 sq. miles; pop. at 300,000. Capital, Sari. Bárfarósh, Amol, Ashraf, and Farah-ábád are also important towns. Revised by M. W. Harrington.

Mazarin, măă'zăă'răń', Jules (Ital. Giulio Mazarini): cardinal and French statesman; b. at Piscina, in the Abruzzi, July 14, 1602; was the eldest son of the intendant of the household of Philip Colonnar. Young Mazarin was

educated in the schools of the Jesuits at Rome, but refused to enter their order; studied law at Alcalá and Salamanca, where he led a very gay life; entered the military service of the pope, and was employed in some political missions in which he evinced great diplomatic skill. He was introduced in 1628 to Richelieu, who entertained so high an opinion of his abilities that he had him appointed vice-legate of Avignon in 1634, made a cardinal in 1641, though he never entered major orders, naturalized as a French citizen in 1639, and appointed his successor as minister. After the death of Richelieu (Dec. 4, 1642) Mazarin governed France for eighteen years with absolute power, though not without some violent interruptions. He was as crafty a diplomat as Richelieu, but he was far inferior to him as an administrator, and having no other ideas than those inherited from Richelieu, and no other aims than those dictated by his own vanity and rapacity, his subtlest intrigues sometimes turned out gross blunders. It has been well said however, that "he was not like Richelieu, a Frenchman, but a citizen of the world, and always paid most attention to foreign affairs; in his letters all that could teach a diplomatist is to be found, broad general views of policy, minute details carefully elaborated, keen insight into men's characters, cunning directions when to dissimulate or to be frank." The aversion of Anne of Austria—who, after the death of Louis XIII., May 14, 1643, became regent during the minority of her son, Louis XIV.—he conquered by his bland manners and elegant flattery; she became his firm friend, and the contemporary gossip was that they were secretly married. For this no serious proof has been offered, though the queen regent was devoted to him, and the minor orders he had accepted were no ecclesiastical obstacle; but the rich dotations he made in order to gain the good-will of the princes, the prodigality of the court, and his own lack of thorough capacity as a financier exhausted the treasury. The Parliament of Paris refused to register the new tax-edicts. He answered by throwing its president and several of its members into prison. The next day (Aug. 27, 1648) Paris rose in rebellion, and the wars of the Fronde (*q. v.*) began. A peculiar feature of this whole movement were the so-called *Mazarinades*—pamphlets, about 4,000 in number, published against the cardinal, and speaking in a very unrestrained manner of his life at Alcalá, his relation to Dame Anne, his foreign birth, his rapacity, and his nieces. He was intensely hated, and the hatred was not tempered with awe. Twice between 1651 and 1653 he had to resign his office and retire from the court—the first time to Brühl, near Cologne, the second time to Sedan, where Turenne and his army were. He was arraigned as a traitor and enemy of France; his property was confiscated; his library, furniture, and statues were sold, but after the end of the wars of the Fronde and the flight of the Prince of Condé to Spain, Mazarin re-entered Paris (Feb. 3, 1653) in triumph, and was received not only by the king and the court, but even by the people, with great ovations. The subsequent years of his government were more quiet. He could now prosecute the war against Spain, begun in 1635, with undisturbed vigor, and by the Peace of Westphalia (Oct. 24, 1648) and of the Pyrenees (Nov. 7, 1659) he succeeded in curbing both branches of the house of Hapsburg, and procured for France the foremost place in the political system of Europe. Another idea of Richelieu's, the establishment of the absolute authority of the crown in France, he carried out with considerable success, but the interior administration, the finances, commerce, industry, agriculture, etc., were in confusion and decadence when he died at Vincennes, Mar. 9, 1661. He left an enormous fortune, 200,000,000 livres, which he presented to the king a few days before his death, probably because he considered this manœuver the only means of securing it for his family; the king returned it graciously, and his nieces inherited it. Mazarin contributed very much to the triumph of the royal authority in France, and to the overthrow of the last vestiges of the old feudal powers and privileges. The memoirs of his rival, de Retz, have contributed to make his character darker than it really was, but the publication of his correspondence throws a new and favorable light upon his public life. Several volumes of these letters have already appeared, under the direction of Cheruel. During his life he was a friend of the arts and of men of letters; his will made ample provision for learned men and the advancement of the sciences, while he left to the Collège Mazarin his large and costly library. His was not a talent of the first order, but he rendered great services to France, among them being the treaties of Westphalia and the Pyrenees, the securing of Alsace for France, and the preponderance assured to the latter over Spain by his diplomatic skill. See Chernel, *Histoire de la France pendant la minorité de Louis XIV.* (4 vols., Paris, 1879–80), and *Histoire de France sous le ministère de Cardinal Mazarin* (2 vols., 1881–82); Cousin, *Jeunesse de Mazarin* (1865); Renée, *Les Nièces de Mazarin* (1856). Revised by J. J. Keane.

Mazar-i-Sherif (i. e. tomb of the sherif): city of Central Asia; capital of Afghan Turkestan; 20 miles E. of Balkh and 200 miles N. N. E. of Cabul, 1,200 feet above sea-level (see map of Asia, ref. 5–D); population, according to Grodebek, 25,000, consisting of Uzbegs and Afghans. The city contains the mausoleum of the prophet Ali and is a sacred place, attracting thousands of pilgrims from Turkestan, Afghanistan, and Baluchistan. The city has risen in importance since 1858, when the Afghan Government established the important fortress of Takhtipul, 3 miles to the W. This fortress contains a cannon-foundry and a factory of arms, and is the permanent residence of an Afghan governor and the occasional residence of the amir. The country around Mazar is well cultivated. In the mountains, 20 miles S., are some natural waters celebrated for their curative properties. See Grodekop, *From Herat to Samarkand* (trans. by Charles Marvin, 1885).

Mark W. Harrington.

Mazarredo y Salazar, maă-zaă-rā′dō-ee-saă-lăă-thaar′, José Maria: naval officer and statesman; b. at Bilbao, Spain, in 1744; entered the navy 1760; participated in the campaign against Algiers 1775; was instrumental in saving the remnant of the army from destruction; negotiated peace with the regency; was appointed major-general of naval forces; took part in the naval operations against the British 1780–83; was made lieutenant-general 1789; appointed commander-in-chief of the Spanish navy, which he reorganized, 1793; defended Cadiz against the British July, 1797; was ambassador to Paris 1799, and again 1804; was a partisan of Joseph Bonaparte, by whom he was made councilor of state and Minister of Marine, and held the offices until his death at Madrid in 1812. He was considered one of the most scientific seamen whom Spain has produced; published *Rudimentos de Tactica Naval* (1785), and built the naval observatory at Cadiz.

Mazatlan′: a city and port of the state of Sinaloa, Mexico; on a small peninsula opposite the Bay of Olas Altas, which forms its harbor, and near the entrance to the Gulf of California; lat. 23° 10′ 37″ N., lon. 106° 24′ 35″ W. (see map of Mexico, ref. 5–D). The surrounding scenery is very beautiful, but the climate is hot, and the town is poorly supplied with water. The bay is deep and of easy access, but is open to south and southwest winds, during which it is unsafe; the inner harbor does not admit deep-draught vessels. The exports consist mainly of silver ores, fruits, cabinet and dye woods, drugs, orchilla, and pearls. Pop. (1889) about 16,000.

Herbert H. Smith.

Mazdak: a Persian religious enthusiast and founder of a sect; b. at Persepolis about A. D. 470; became *mobed* or chief priest at Nishapur, and on the occasion of a pestilence and famine in 500 presented himself to King Kobad as a prophet sent for the regeneration of mankind. His system was based upon the dualism of Manes, and his practical teaching was a form of communism. He succeeded in converting the king, and his projects became law, causing great commotions. Under Khosru Nushirvan, Mazdak was put to death at Nahrvan between 530 and 540, with thousands of his followers, but his ideas took deep root after the rise of Islam in the following century.

Mazep′pa, John: hetman of Cossacks; b. about 1645; descended from a noble family in Podolia; was educated as a page at the court of John Casimir of Poland. Surprised in an adventure with a Polish lady, her husband stripped him naked, bound him stretched along the back of his half-wild horse, and put the frightened animal to flight. It carried its owner to his own estate, but Mazeppa fled for shame into the Ukraine, and joined the Cossacks. He soon made himself very popular among them, and became secretary to their hetman, Samvilowich, whom he overthrew in 1689, becoming hetman himself. In this position he soon gained the confidence of Peter the Great, who made him Prince of the Ukraine. After the Peace of Altranstadt (Sept. 24, 1706) he opened negotiations with Charles XII. for the purpose of throwing off the Russian authority. Peter the

Great was informed of this treachery, but did not believe it; he sent the informers to Mazeppa, and Mazeppa had them put to death. The czar afterward obtained indubitable proofs, and Mazeppa was compelled to join Charles XII. openly. He took part in the battle of Pultowa, June 27, 1709, and fled to Bender, where he died 1710.

Mazères, măă-zār', more correctly **Masères**, FRANCIS, M. A.: mathematician; b. in London, Dec. 15, 1731, of a French family who settled in England on the Revocation of the Edict of Nantes; was educated at Kingston and at Cambridge, where he was made B. A. 1752 and M. A. 1755; published *A Dissertation on the Negative Signs in Algebra* (1758), denying the propriety of such expressions as negative roots, etc.; was called to the bar, and appointed attorney-general of Quebec; returning to England, was made cursitor baron of the exchequer Aug., 1773, also agent to the Protestant settlers of Quebec. He urged the adoption of conciliatory measures toward the disaffected colonies in North America, and his deep interest in the laboring classes resulted in the publication of his *Principles of the Doctrine of Life Annuities* (1783). Besides many mathematical works, he edited or wrote *An Account of the Proceedings of the British and other Protestant Inhabitants of Quebec* (1775); *The Canadian Freeholder* (3 vols., 1779); *Inquiry into the Extent and Power of Juries* (1792); *Essays on Various Subjects, chiefly Historical and Political* (1809); *The Curse of Popery and Popish Pains* (1807); and *Select Tracts relating to the Civil Wars in England* (2 vols., 1815). D. at Reigate, May 19, 1824.

Mažuranić, măă-zhoor-aan'yich, IVAN: poet; b. at Novi, Croatia, a province of Hungary, Aug. 11, 1813; was educated at Fiume and Sombotel; was a zealous supporter of the "Illyrian" movement which, under the leadership of Ludevit Gaj, sought to unite the Serbians and Croatians, who are, in fact, one people whom religion and alphabet have divided. His first poems appeared in the *Danica*. In 1836 he returned home, studied, and afterward practiced law at Zagreb (Agram). When, in 1841, Gundulić's great epic *Osman* (originally written in 1627) was to be republished, Mažuranić supplied the two missing "songs" (xiv. and xv.) which made him famous. His greatest work is the epic *Smrt Smail-age Čengića* (The Death of Smail-aga Čengić), first published in the almanac *Iskra* (1846) and repeatedly re-edited (1853–57, etc.), since translated into Bohemian, Polish, Russian, Slovenic, and German. These poems make him the greatest among Croatian poets. In politics he was a moderate nationalist, issuing in 1848 a remarkable brochure *Hrvati Magyarom* (The Croat's Answer to the Magyars). In 1850 he became procurator-general; in 1861 first chancellor of Croatia and Slavonia; was recalled by Belcredi's cabinet in 1865, but in 1873 received the highest office, being appointed ban (*baan*, governor), and held the position until 1880. J. J. KRÁL.

Mazur'ka [Polish, named from the East *Mazurs*, the inhabitants of Mazovia, southern portion of East Prussia]: a dance in $\frac{2}{4}$ or $\frac{3}{8}$ time, having a peculiar and pleasant rhythm. From four to eight couples join in the mazurka, which is lively and sometimes rather grotesque. It was originally a Polish dance, but was by the music of Chopin spread over the whole of Europe.

Mazzara del Vallo, măă-zaa'răă-del-vaa'lō: town in the province of Trapani, Sicily; 32 miles by rail S. of Trapani (see map of Italy, ref. 9–D). It is a walled town, lying on the seashore, with a good harbor overlooked by a castle, but the roadstead is unsafe. The streets are narrow and crooked, and there is but a single square—that on which stands the cathedral. The first landing of the Arabs on the island was made here in 827. About 600 vessels of different sizes enter this port annually. Pop. (1881) 13,074.

Mazzi'ni, măăt-see'nĕe, GIUSEPPE: patriot; son of a physician; b. at Genoa, Italy, June 28, 1808. His first master, Giuseppe Patroni, a colonel of artillery and a cousin of his mother, had the insight to divine the future greatness of his pupil, who already gave proof of unusual abilities. The Piedmontese revolution of 1821, and the sight of his banished fellow citizens embarking from Genoa for the land of exile, made the deepest impression upon Mazzini, then a boy of sixteen; and from that time he devoted himself wholly to the liberation of his country. He studied at the university, became acquainted with the brothers Ruffini, and confided to them his bold designs. Giovanni Ruffini—afterward distinguished in England as a romance-writer, and the author of *Doctor Antonio* and of *Benoni*—describes the young conspirator, Mazzini, in his *Memorie d'un Cospiratore* under the name of Fantasio, representing him as something very like a utopist. Mazzini began to be known as an author at an early age. His first essay, which treated of Dante's love of country, was written in 1826, but did not appear till some years afterward in a Genoese journal entitled *Il Subalpino*. Mazzini felt that in order to have a free country it was necessary first to liberate the literature from classic and academic shackles, and make it a political instrument. He began his politico-literary conflicts in the journal *L'Indicatore Genovese*, where appeared his articles upon Manzoni, Botta, Guerrazzi, Monti, and Schlegel in the year 1828. Mazzini at an early age took part with the Carbonarists, and in consequence he was arrested in Genoa in 1830, and imprisoned at Savona. While there he became convinced that Carbonarism was no longer suited to the times, and he conceived while in prison the idea of Young Italy, an organization which had for its objects the unity, independence, and liberty of Italy—objects which he thought could be realized only by the Italian people themselves without the aid of the foreigner. The means to secure these ends were declared to be education and insurrection. Acquitted by the tribunal, but forced to choose between exile and police surveillance, he retired to Marseilles, where he began to organize his society and circulated manifestoes and a newspaper in its interest. Condemned to the gallows by Charles Albert, he nevertheless contrived to remain at Marseilles, and united with Garibaldi in planning the insurrection of Genoa. When this plot failed Mazzini withdrew to Switzerland, and there formed a conspiracy to invade Savoy; this was the unfortunate expedition of 1834, in which the conspirators dispersed on the first conflict with the troops, and Mazzini fainted away at the first fire. After this failure he returned to Switzerland where he continued his machinations, and founded the journal *La Jeune Suisse*; but the hostility of foreign governments caused the Swiss authorities to proceed against the revolutionists, and in Jan. 1837, Mazzini withdrew to London. From London, which then became his headquarters, he instigated various attempts at revolution in Italy—attempts that cost the lives of many noble victims, among others, of the brothers Bandiera in 1844, but which were not without fruit for the future. It was at this time that the British post-office incurred serious blame by opening Mazzini's letters. The moderate Guelph school turned to its own advantage the agitation created in Italy by Mazzini and his followers, and thus it may be said that the Italian revolutionary movements of 1848 were in great part the work of this active conspirator. In the spring of 1848 Mazzini established and edited in Milan *L'Italia del Popolo*, in which he manifested a strong opposition to King Charles Albert and the moderate monarchical party. The Grand Duke of Tuscany having been expelled, and Mazzini chosen member of the new provisional government, he hoped to secure the proclamation of a republic. Not succeeding in this, he withdrew to Rome, where the republic was proclaimed, and he himself became the first of the triumvirs. After the fall of Rome he first took refuge in Switzerland, then once more returned to London, where he entered into close relations with Kossuth and Ledru-Rollin, for it was a part of his programme to encourage revolutionary movements everywhere. Young Europe, Young Switzerland, and other radical organizations, framed on the model of Young Italy, already bore witness to his influence in several European states. He incited the Italians to fresh insurrectionary movements, which proved disastrous and fruitless—that of Mantua in 1852, that of Milan in 1853, and that of Genoa in 1857. In the events which occurred in Italy in 1859 and 1860 Mazzini took no active part, though he assured the Sardinian monarchy of republican support in attaining Italian unity and independence. When it seemed to him that the Italian monarchy had failed to satisfy the requirements of the people he renewed his conspiracies with a purely republican aim. In this last period of his revolutionary labors his desire to separate republicanism from socialism and atheism is most noteworthy. He was neither Catholic nor Christian, but he had taken for the motto of his banner "God and the People!" and in the last years of his life he struggled energetically against everything which implied the negation of a God. For this reason before his death he emphatically condemned the Commune of Paris and the objects and the acts of the Internationals. With the same zeal Mazzini opposed the ultra doctrines of the pontifical syllabus. Some of the last months of his life Mazzini

passed at Lugano, being already seriously ill, and finally, in search of a milder climate, he went to Pisa. In 1866 a general amnesty removed the sentence of death that had been passed against him; but in 1870 he was arrested for conspiring with Garibaldi, and imprisoned at Gaeta for two months. D. at Pisa on Mar. 10, 1872. Mazzini often wrote in English and in French, and his works in both these, as well as in his native language, are remarkable for ability, for purity and vigor of style, and for an elevation of sentiment which, in spite of great political indiscretions, distinguished him through life. The most complete edition of his works is *Scritti editi e inediti di Giuseppe Mazzini*, begun by himself and continued by Satti (18 vols., 1861–91). A partial collection of his writings, including autobiographical papers, has appeared under the title of *Life and Writings of Joseph Mazzini* (1891). His two principal works, *Thoughts on Democracy in Europe* and *On the Duties of Man*, are in *Joseph Mazzini*, a memoir (1875). For an account of his political career, see Thayer, *The Dawn of Italian Independence* (1893).

Revised by F. M. Colby.

Mazzo'ni, Guido: poet and scholar; b. at Florence, June 12, 1859. He studied first at Florence, then at Leghorn under the poet Giuseppe Chiarini, whose daughter he afterward married; and finally at Bologna, under Carducci. In 1881 he began his career as teacher of Italian literature in various secondary schools. In 1887, after a short period as private secretary to the Minister of Public Instruction, he was given a place as Professor of Italian Literature in the University of Padua. As a poet he has been largely dominated by the influence of Carducci; but he is a scholar, and his acquaintance with foreign literatures, notably English, has had a favorable effect upon his work. We have from him: *Epigrammi di Meleagro da Cadora* (1880); *In Biblioteca* (1882); *Esperimenti metrici* (1882); *Poesie* (1883); *Nuove Poesie* (1886); *Rassegne letterarie* (1887); *Fra libri e carte* (1887); *Un ritratto di Gesù* (1887). Besides these works, Mazzoni has edited several works of Italian authors, Cesarotti, Tasso, Monticchiello, Rucellai, etc. He has also contributed much to the *Nuova Antologia* and other reviews.

A. R. Marsh.

Mazzoni, Guido, called *Il Modenino*: sculptor; b. at Modena, Italy, about the middle of the fifteenth century. His work is interesting in comparison with that of Luca della Robbia and his successors, being all, so far as known, in enameled and colored terra-cotta, of extraordinary realism and generally of life size. In the Church of San Giovanni Decollato at Modena is a surprising and impressive group of the dead body of Christ mourned by the disciples. In the crypt of the cathedral is a nativity, with four life-sized figures besides the child. Works of his exist at Ferrara and Naples, and others are ascribed to him; but his work and life have not been adequately studied. D. at Modena in 1518.

Russell Sturgis.

Mazzuo'li, or **Mazzuola**, Francesco, known as *Il Parmigiano* and *Il Parmigianino*: painter; b. in Parma, Italy, in 1503; he studied painting with his uncles, and at the age of fourteen painted a remarkable picture, having as its subject the *Baptism of Christ*, and afterward became a pupil of Correggio. Five years later Pope Clement VII. was so much impressed with his talents that he commissioned him to paint the Sala dei Pontifici, which Giovanni da Udine had begun. He also painted a *Circumcision of Christ* for the Pope. In 1527, after the sacking of Rome, Mazzuoli worked at Bologna in St. Petronio; he painted some of his best portraits and Madonna pictures here, besides producing many wood-engravings and designs for goldsmiths. He then returned to Parma to paint the archway of the choir of the Madonna della Steccata. After returning to his earlier style, and executing many fine works, he gave up painting for alchemy in order to enrich himself. This soon led him into difficulties, and being condemned to prison as an alchemist and on other charges, he fled to Casalmaggiore, where he painted a *Madonna* for St. Stephen's and a Roman *Lucretia*. His mania for alchemy again took possession of him, and, after dissipating his fortune, he died of melancholia at the age of thirty-seven. Some attribute the discovery of engraving by aqua-fortis to Parmigianino, because he was the first Italian artist who etched his own subjects by this method. The Germans, however, claim that Dürer was the inventor.

W. J. Stillman.

Mead [M. Eng. *mede* < O. Eng. *meodo* : O. H. Germ. *metu* > Mod. Germ. *meth* < Teuton. *medu* : Lith. *midùs* : Welsh *medd* : Gr. μέθυ, wine : Sanskr. *mádhu*, honey]: an alcoholic drink made by fermenting a mixture of honey and water or the washings of honeycomb. It is sometimes flavored with aromatic substances. It is the same as hydromel and metheglin. It was a favorite drink among the Norse peoples of antiquity, and was known in ancient Greece and Rome. It is very intoxicating. According to Brande, it contains but 7·32 per cent. of alcohol, but the percentage is of course variable.

Mead, Larkin Goldsmith: sculptor; b. at Chesterfield, N. H., Jan. 3, 1835; removed in childhood with his parents to Brattleboro, Vt., where he was educated, and first made known his artistic genius by modeling in snow a colossal figure of an angel. He became a pupil of Henry Kirke Brown in Brooklyn, N. Y., for three years, after which he produced in marble his *Recording Angel* (1855); executed the colossal statue of *Vermont*, now placed over the dome of the State-house at Montpelier (1857), and a statue of Ethan Allen (1861), which stands in the portico of the same building. In 1862 he went to Florence, whence he returned to the U. S. some years later, bringing a model for a monument to Lincoln, which was ordered for his tomb at Springfield, Ill., and unveiled there Oct. 15, 1874. He has since executed several important works.

Mead, Richard, M. D., F. R. S.: physician; b. at Stepney, London, Aug. 11, 1673; was educated under Grævius at Utrecht; studied medicine at Leyden and Padua; settled at Stepney 1696; became physician to St. Thomas's Hospital 1703; anatomical lecturer at Surgeon's Hall 1711; attended Queen Anne in her last illness; removed to London 1714; was admitted fellow of the College of Physicians 1716; was consulted by the Government in 1719 as to the means of preventing the spread of the plague to England; wrote a treatise on the subject which ran through seven editions in that year, and was charged in 1721 with conducting experiments as to the effects of inoculation upon criminals condemned to death, which resulted so favorably that the Princesses Amelia and Caroline were soon afterward inoculated. In 1727 Dr. Mead became physician-in-ordinary to George II. The extraordinary reputation which Dr. Mead enjoyed for half a century as the highest English medical authority dated from his work, *A Mechanical Account of Poisons* (1703), and was strengthened by his intimacy with Boerhaave. Several of his medical works were written in elegant Latin; of these the best known was *Medicina Sacra* (1749), on the principal diseases mentioned in the Bible, notable for taking the position (then a novel one) that the demoniacal possessions of the Gospels are to be considered cases of lunacy and epilepsy. D. in London, Feb. 16, 1754. His *Medical Works*, which had appeared in Latin, French, and Italian, were published in English in 1762. See Maty, *Authentic Memoir of the Life of Richard Mead* (London, 1755).

Meade, George Gordon: officer and scientist; b. Dec. 31, 1815, in Cadiz, Spain, his father being at the time U. S. navy-agent at that port. After receiving a careful education he entered the U. S. Military Academy at West Point in 1831, where he graduated June 30, 1835, and was appointed in the army a brevet second lieutenant of artillery, receiving his full rank the same year. Remaining in the army little more than a year, during which time he was engaged in Florida against the hostile Seminoles, he resigned Oct., 1836, and entered upon the profession of civil engineer, which he followed for about six years, being employed by the Government to assist in an elaborate survey of the mouths of the Mississippi river, making some original experiments which led to important improvements of that river. He was next engaged in the survey of the boundary-line of Texas, and subsequently in the survey of the northeast boundary-line between the U. S. and Great Britain, where we find him in 1842, in which year he was reappointed in the army a second lieutenant of topographical engineers, and retained for some time upon the same duty; then in river and harbor improvements. In the Mexican war he served with distinction on the staffs of Gen. Taylor and of Gen. Scott in the battles of Palo Alto, Resaca de la Palma, and Monterey, winning the brevet of first lieutenant for the latter battle. In 1851 he was promoted to be first lieutenant in his corps, captain in 1856, and major in 1862. After the close of the Mexican war he was engaged in light-house construction, and during the four years preceding the civil war had charge of the geodetic survey of the Great Lakes, in which he added largely to his scientific and engineering reputation. In Aug., 1861, he was appointed a brigadier-general of volunteers, and placed in command of

the second brigade of the Pennsylvania Reserve Corps, which constituted a division in the Army of the Potomac, with which army he remained prominently identified until the close of the war. In the Virginia Peninsular campaign of 1862 he took an active part in the battles of Mechanicsville, Gaines's Mill, and Glendale, being severely wounded in the latter. Returning to the field as soon as his wound would permit, he was assigned to the command of a division, and distinguished himself in the battles of South Mountain and Antictam, being placed in command of the First Corps when Gen. Hooker was wounded at the last-named battle, where he was later himself slightly wounded. For these services he was promoted to be major-general of volunteers in Nov., 1862. Upon the recovery of Gen. Hooker he returned to the command of his division, and in Dec., 1862, at Fredericksburg, he led the attack which broke through the right of Lee's line and penetrated far to the rear, but being at length outnumbered, was driven back with heavy loss. In the latter part of this month he was promoted to the command of the Fifth Corps, and at Chancellorsville (May, 1863) his sagacious advice so impressed Gen. Hooker that upon requesting to be relieved, two months later, he designated Gen. Meade as his successor, and on June 28, 1863, he was appointed by President Lincoln to command in chief the Army of the Potomac, then scattered and moving hastily through Pennsylvania to the great battle-field of Gettysburg, at which he commanded, and on July 1, 2, and 3 won a victory with whose glory and decisive results his name will forever be identified. From that time he commanded the Army of the Potomac until the close of the war. For his skill and valor at Gettysburg he received the thanks of Congress, and was promoted in the regular army to the rank of brigadier-general. The operations of the army during the winter of 1863–64 were unimportant, and before the return of the season for active operations Gen. Grant had been placed in command of all the armies with the rank of lieutenant-general, and had taken up his headquarters with the Army of the Potomac. During the extraordinary campaign which opened in May, 1864, with the battle of the Wilderness, and terminated with the surrender of the army of Northern Virginia, Meade's ability as a commander was conspicuous; and his services were recognized by his promotion to the rank of major-general in the regular army in Aug., 1864. After the close of hostilities Meade was (July 1, 1865) assigned to the command of the military division of the Atlantic, with his headquarters at Philadelphia; this post he held, with one short period of detached service in Georgia, till his death, which occurred in Philadelphia, Nov. 6, 1872. A colossal equestrian statue of him was unveiled in Fairmount Park, Oct. 18, 1887.

Meade, Richard Worsam: See the Appendix.

Meade, William, D. D.: bishop; b. in Frederick (now Clarke) co., Va., Nov. 11, 1789; graduated at the College of New Jersey 1808. He was prepared for the ministry under the direction of the Rev. Walter Addison, of Maryland, and by Bishop Madison he was ordained in the Protestant Episcopal Church in 1811; for many years he preached gratuitously near his home, besides contributing freely to educational and missionary work. His first charge was Christ church, Alexandria. He became in 1829 assistant bishop and in 1841 Bishop of Virginia; was a recognized Low Church leader; opposed earnestly the secession of the State from the Federal Union in 1861, but when the separation was practically effected participated in the organization of the Church in the Confederate States, and was the presiding Bishop of the Southern Church; was author of valuable devotional works, and of *Old Churches, Ministers, and Families in Virginia* (2 vols., 1856). He contributed very much to revive the Episcopal Church in Virginia, and in 1823 was largely instrumental in founding the Protestant Episcopal Theological Seminary of Virginia. D. Mar. 14, 1862.

Revised by W. S. Perry.

Meade River: a river of Alaska, flowing northward into the Arctic Ocean, S. W. of Point Barrow; discovered by Lieut. Ray in 1883. It passes through a country rich in lakes, lagoons, marshes, and streams, covered in summer with abundant vegetation, but almost destitute of trees.

Meadow [O. Eng. *mād*, plur. *mādwe*: O. Fries. *mēth*: O. Low Germ. *mātha*; akin to Germ. *matte*, of different ablaut grade, and connected with Lat. *mē'tere*, mow]: the general name for any tract of grass-land in which the natural herbage is permanent and frequently made into hay, but more especially applied to the low grounds on the banks of rivers, which are kept moist by their situation and occasionally flooded by the rise of the waters. In the low, wet meadows the herbage is coarser and less nutritious than in those which lie higher and which are never, or only for short intervals, flooded. For this reason upland meadows are very valuable wherever there is a demand for good hay, but as they are not recruited by annual flooding, some pains must be taken to keep up their natural fertility. The best means of preventing them from degenerating is, of course, a frequent application of rich animal and vegetable manure, spread over the surface either early in spring or immediately after mowing, when showers are abundant and able to wash the nutriment down to the roots of the grass. Artificial manures, particularly those rich in phosphates and nitrogen, may also be used, and have the advantage of introducing no weed seeds. Whether the hay is taken off by mowing or by the grazing of cattle, the effect is nearly the same with respect to the formation of a closer sward; but it is a mistake to suppose that pasturing can replace manuring. The urine of cattle greatly promotes luxuriant vegetation in rainy weather, but in hot and dry weather it does more harm than good. The dung when dropped on the grass is of little value compared with what it would be if mixed with straw, earth, or peat, or diffused through water in a tank. If a natural meadow deteriorates and the grass becomes mixed with rank weeds and mosses, the shortest method of restoring it, and in most cases also the best, is to plow it up clean, and manure it during a course of tillage, without taking very exhaustive crops from it, and then to lay it down again in a clean and enriched state by sowing the best sorts of grass-seed. Another remedy is to harrow the surface thoroughly in early spring and sow liberally a mixture of grass-seeds, with a dressing of 100 lb. per acre of nitrate of soda and 300 lb. of bone-meal. Where the sward is thin it is prudent to mow before the seeds of the grasses are formed, contrary to a common notion that in a thin meadow the seed should be allowed to shed, in order to increase the number of plants. Such an increase should be effected by sowing seeds produced on other ground, as the ripening of the seed tends to exhaust the soil.

Revised by H. H. Wing.

Meadow-lark: a bird of the oriole family (*Icteridæ*), having a handsomely variegated plumage of pale brown, streaked with dark brown and blackish. The under parts are bright yellow, and there is a black crescent on the breast which is merely indicated in the young. The bird is not even a near relative of the lark, but possibly was called lark on account of its song, while meadow indicates its favorite haunts. The eastern meadow-lark (*Sturnella magna*) is common in the Eastern U. S. West of the Mississippi it is replaced by a paler race (*S. magna neglecta*), while a darker-colored variety (*S. m. mexicana*) occurs in Southern Texas and Northern Mexico. F. A. Lucas.

Meadow-mouse: See Arvicola.

Meadow-saffron: the common name of a small perennial bulbous herb (*Colchicum autumnale*) of the natural order *Melanthaceæ*, growing wild in moist soil in England and Middle and Southern Europe. The mode of growth is peculiar. From the corm of one year there sprouts a new one, from which, late in the summer, a stem grows, bearing for that season only flowers. These are from two to six in number, and are of a lilac or light-purple color. The following spring the young plant matures, bearing leaves and fruit, and the old corm shrivels. The leaves are large, broad, and lanceolate; the fruit is a three-celled capsule, containing small brown seeds about the size of black mustard-seeds. The corm and seeds are used in medicine. Their virtues depend upon a crystallizable principle called *colchicine*.

Edward Curtis.

Meadville: city (founded in 1788); capital of Crawford co., Pa. (for location, see map of Pennsylvania, ref. 2–A): on the Venango river, and the Pitts., Shen. and Lake E. and the N. Y., Pa. and O. railways; 126 miles N. of Pittsburg. It is in an agricultural region; contains 15 churches, high school, 2 graded schools, 2 conservatories of music, mercantile college, 6 libraries (Allegheny College, Allegheny Literary Society, Philo-Franklin Literary Society, High School, Theological School, and Library, Art, and Historical Association, with over 45,000 volumes in all), and 10 hotels; and has a national bank with capital of $100,000, 2 private banks, and 2 daily, 6 weekly, 2 monthly, and 2 other periodicals. The city is the seat of Allegheny College (*q. v.*, Methodist Episcopal, opened 1815) and of a Unitarian Theolog-

ieal School (opened 1840). The industries include the manufacture of engines and boilers, oil-well supplies, wood mantels, leather belting, sash, doors, and blinds, and distillery and brewery products. Pop. (1880) 8,860; (1890) 9,520; (1900) 10,291.

EDITOR OF "TRIBUNE-REPUBLICAN."

Meaford: a port on Nottawasaga Bay, the southern end of Georgian Bay, Lake Huron, Grey co., Ontario; the terminus of a branch of the Grand Trunk Railway (see map of Ontario, ref. 3–C). It is a good port, accessible for vessels drawing 12 feet, and has saw and grist mills and an iron-foundry. Pop. 2,000. M. W. H.

Meagher, THOMAS FRANCIS: revolutionist and soldier; b. at Waterford, Ireland, Aug. 3, 1823; studied at the Jesuit college of Clongowes Wood, Kildare, and at Stonyhurst College, England; became a favorite orator with the Young Ireland party of 1846–48; was sentenced to death for sedition; but the sentence was commuted to transportation for life; escaped from Tasmania in 1852 and went to New York; lectured with success in various parts of the U. S.; was admitted to the bar, and wrote for the press; became editor of *The Irish News* in 1856: became in 1861 a captain and then major of the Sixty-ninth New York Volunteers; raised a brigade of Irish volunteers in 1862; commanded this brigade as brigadier-general 1862–63; left the brigade after the battle of Chancellorsville; was assigned in 1864 to the command of the district of Etowa; resigned May 15, 1865. In 1865 he became secretary of Montana; was drowned by falling from a steamer into the Missouri river at Fort Benton, Mont., July 1, 1867. Revised by JAMES MERCUR.

Meal: See FLOUR.

Meal-worm: See TENEBRIO.

Mean [M. Eng. *mene*, from O. Fr. *meïen* > Fr. *moyen* < Lat. *media'nus*, median, in the middle, deriv. of *medius*, middle, mid; cf. Gr. *μέσσος*: Eng. *mid*]: a term expressing a quantity lying between two other quantities, and connected with them by some mathematical law. There are several kinds of mean values, the principal ones being the *arithmetical mean*, the *geometrical mean*, and the *harmonic mean*.

(1) The *arithmetical mean* of two quantities is one-half their sum; the arithmetical mean of several quantities is equal to their sum divided by their number; it is the same as their average. Thus we say that the mean temperature of a day is equal to the sum of the temperatures at every hour (or minute) of the day, divided by the number of hours (or minutes) in the day; and the mean temperature of a year is equal to the sum of the mean temperatures of every day in the year, divided by the number of days in the year.

A *mean by weights* is, in the simplest case, an arithmetical mean of quantities which are not all unequal. If m_1 of the quantities are each equal to a_1, m_2 of them to a_2, m_3 of them to a_3, etc., then the arithmetical mean of the whole of them is

$$\frac{m_1a_1 + m_2a_3 + m_3\,a_3 + \text{etc.}}{m_1 + m_2 + m_3 + \text{etc.}}$$

This is called a "mean by weights" of the quantities a_1, a_2, a_3, etc., the coefficient m_1, m_2, m_3, etc., being called *weights*. The term is extended to the case when these coefficients are not whole numbers.

(2) The *geometrical mean* of two quantities is the square root of their product; if several quantities form a geometrical progression, the first and last are called extremes, and all the others are said to be geometrical means between them. The ratio of the progression is equal to the nth root of the quotient of the last term by the first, $n + 1$ being the number of terms. Thus any ordinate of a circle is equal to the geometrical mean of the corresponding segments of the diameter.

(3) The *harmonic mean* of two quantities is the reciprocal of the arithmetical mean of the reciprocals of the two quantities. Thus the harmonic mean of 6 and 12 is $1 \div \frac{1}{2}(\frac{1}{6} + \frac{1}{12})$, or 8. The harmonic mean of two quantities is a third proportional to their arithmetical and geometrical means; that is,

$$\frac{a+b}{2} : \sqrt{ab} :: \sqrt{ab} : \frac{2ab}{a+b}.$$

(4) The *arithmetico-geometric mean* is a mean of two quantities formed by taking their arithmetical and geometrical means, then the arithmetical and geometric means of these means, and so on. The two sets of means will approach the same limit, which limit is the arithmetico-geometric mean.

The method of geometrical means is used in solving many practical problems. Thus to find the rate per cent. at which a sum of money will double in a given number of years, we regard the amounts at the ends of the successive years as terms of a geometrical progression, and then find the value of the corresponding ratio; this ratio (which is the annual amount per cent.), diminished by 1, is the required rate. Let it be required to find the rate per cent. at which a given sum of money will double in 10 years; here there are 9 geometrical means to be inserted between 1 and 2, and by the rule we find the ratio equal to $\sqrt[10]{2}$, or to 1·0717; hence the required rate is ·0717. Revised by S. NEWCOMB.

Meares, JOHN: navigator; b. in England about 1756; entered the navy in 1771; served against the French in the West Indies; became captain in the merchant service after the Peace of 1783; went to India; formed at Calcutta the Northwest America Company for opening trade with Russian America; sailed from Calcutta in the Nootka, a vessel of 200 tons, Mar. 12, 1786, with which he explored a portion of the coasts of the present Territory of Alaska; returned to the coast of China viâ the Sandwich islands; later he reconnoitered the neighboring coasts, of which he took possession for the crown of England. In 1789 he sent two more vessels to join the Nootka, all of which were seized by Spanish vessels on the ground that the coast and adjacent waters belonged to Spain. Thereupon Meares went to England to appeal to the House of Commons. A fleet known as "the Spanish armament of 1790" was equipped to bring Spain to terms, but before it sailed the Spanish Government acceded to the demands of Great Britain. He published *Voyages made in the Years 1788–89 from China to the Northwest Coast of America and China* (2 vols., London, 1790). Capt. Meares's discoveries form the chief basis upon which the British title to Oregon and British Columbia was based. He was made a commander in 1795. D. in London in 1809.

Mearns, The: See KINCARDINESHIRE.

Measles [cf. Dutch *mazelen* and Germ. *masern*, measles, liter., spots; cf. Eng. *mazer*, drinking-bowl, orig. spot or excrescence on a maple-tree]: an acute, exceedingly contagious eruptive disease of frequent occurrence. It is most commonly seen in the young, less frequently in the adult, and uncommon during the first half year of life. Most people are affected but once; cases, however, of second, third, and even fourth attacks are not very rare. It is due to a specific poison, as yet not isolated, which exists in the exhalations and secretions of the body, usually infecting by entrance of the active principle through the mucous membrane of the respiratory tract. The contagion is most effective about the time when the eruption is first seen, but it remains active until the skin has been restored by peeling (desquamation) and successive development to its normal state. The eruption consists of small, elevated, raspberry-like red spots, gradually merging into one another in places, and forming discolorations the size of a pea to that of a dime, separated from one another by normal skin. It appears from a few to thirteen days after the contagion has occurred, during which period of incubation a number of premonitory symptoms usually develop to a greater or less degree, such as a loose or barking cough, congested inflamed eyes, nasal catarrh, headache, fever, etc. The eruption then appears, first on the temples, forehead, and cheeks, progresses downward for a day or two, and slowly disappears in about four days. The skin then peels off in exceedingly small scales (not in flakes as in scarlet fever), and returns to a normal condition after a week. During this period the cough will decrease in severity, the discharge from nose and bronchial tubes lessens, and the fever subsides. The large majority of cases run this mild regular course with a very small mortality. There are cases and epidemics, however, in which great dangers in consequence of complications arise. The most frequent danger lies in an accompanying inflammation of the bronchial tubes and lungs, which may prove fatal in a short time or result in a chronic inflammation, perhaps consumption. Besides these, inflammations of the throat, ear (not as frequent as in scarlatina), eyes, kidneys, etc., may remain behind. As these affections are of a serious nature, every case, no matter how mild, should be under the guidance of a physician. The usual treatment of mild cases consists of rest in bed in a

well-ventilated cool room, darkened somewhat on account of the inflamed eyes, appropriate diet, and cooling beverages. Where the cough is obstinate a mild expectorant is indicated; a child two years of age may take twenty-five drops of paregoric or a grain of Dover's powder at bedtime. Any complications necessitate skillful medical aid. When convaleseence is complete a warm bath should be given and the clothing changed; then the room can be fumigated and thoroughly aired. In some cases there is a difficulty in regard to distinguishing measles from scarlet fever, especially when the former is also complicated with sore throat of a simple or diphtheritic character. The ushering-in symptoms belonging to the respiratory organs and eyes, as described above, are characteristic of measles, while scarlet fever symptoms are seen principally in the mouth, throat, and digestive apparatus. See FILTH DISEASES.

A. JACOBI and F. E. SONDERN.

Measure, or **Bar** [*measure* is viâ O. Fr. *mesure*, from Lat. *mensu'ra*, a measuring, measure; deriv. of *meti'ri*, *men'sus*, to measure]: one of the small regular portions into which written or printed music is divided by bar-strokes. These measures mark and regulate the accent and rhythm of the notes included in them. In every regularly constructed melody the ear observes a certain rhythmical order, under which the melody seems to form itself into clauses, phrases, sections, or periods. In the performance of each of these portions there will also be noticed a constant series of pulsations or accents recurring at equal distances or lapses of time. These smaller divisions, marked out and defined by the periodical strokes of the accent, are the "measures" or bars of modern music; and the first note of each such measure always bears the principal accent. A faulty form of expression consists in the misuse of the word *time* when only *measure* is meant. Thus we hear of "common *time*," three-quarter *time* ($\frac{3}{4}$), sixth-eighth *time*" ($\frac{6}{8}$), etc. These terms are scientific misnomers. The time of a musical piece is its relative *rate of speed*, an idea entirely separate from that of measure. The latter governs the accents and rhythms from bar to bar, reproducing such accents with continuous regularity quite irrespective of how fast or slow the composition may be performed. The proper expression, then, is common or $\frac{4}{4}$ measure, $\frac{6}{8}$ measure, etc. In other languages richer than the English in musical technology we find this criticism sustained by their usage.

DUDLEY BUCK.

Measure of Damages: See DAMAGES, MEASURE OF.

Measures: See WEIGHTS AND MEASURES.

Measuring-machines: machines for measuring and comparing units of length, usually called *comparators*. When a given length is defined by the perpendicular distance between the parallel faces of the two ends of a bar of metal, this distance is determined by end-measure comparison. When the unit is defined by the perpendicular distance between the initial and the terminal line traced upon the surface of the bar, the distance is determined by line-measure comparisons. The length of a bar of metal varies with its temperature; and for this reason it becomes a matter of the utmost importance to determine the temperature with exactness.

Two methods of determining the temperature of the bars compared are employed, viz.: by measuring the temperature of a liquid in which the bars are immersed, and from the readings of thermometers placed upon the graduated surface of the metal, or, when feasible, inserted in holes made longitudinally in the bars. By the first method, the bars are said to be compared under liquid contact, and by the second method, under air contact. Each method has its advantages and its disadvantages. When water is employed, the immersed bars of metal quickly take the temperature of the liquid, but the evaporation from its surface always prevents the temperature of the liquid from rising to that of the surrounding air, the cooling effect varying with the temperature. At 80° F. this difference in temperature amounts to nearly 2°. On the other hand, in air-contact comparisons, which are for the most part a necessity in practical work, the reading of the thermometer is dependent upon the action of several controlling forces which are not easily separated.

Fig. 1 gives a view of the instrument used at the International Bureau of Weights and Measures at Breteuil, near Paris, for comparing standards of nearly the same length. The bars to be compared are placed side by side in the water-carriage, by which they are brought in succession under the two microscopes, which are placed at a distance apart nearly equal to the length of the standards compared.

When, in addition to the comparison of the total lengths of two standards, it is required to determine the errors of

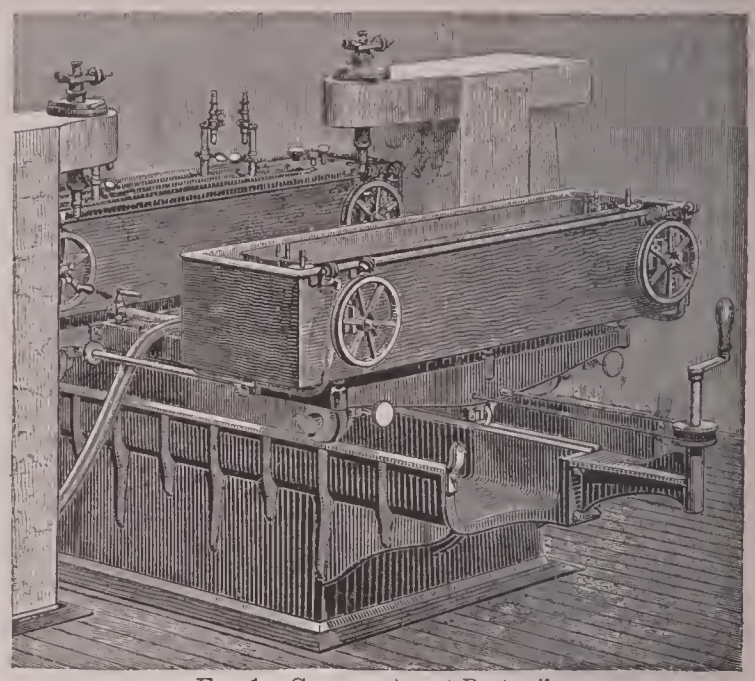


FIG. 1.—Comparator at Breteuil.

subdivision into aliquot parts, a good comparator must, in its construction, fulfill two conditions, viz.: (1) the carriage to which the microscopes are attached must move in the same horizontal plane from end to end, and (2) it must move in a straight line in that plane.

In Fig. 2 the end view of a comparator which fulfills these conditions is shown at (4). The microscope-carriage

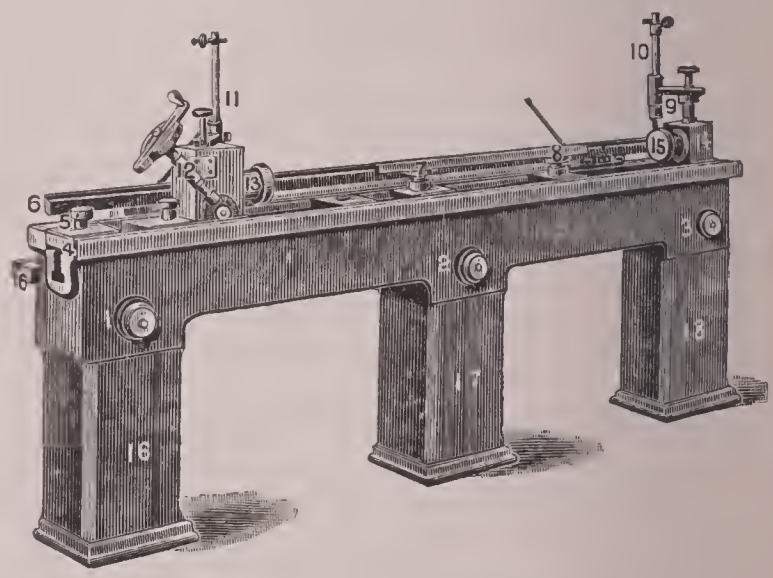


FIG. 2.—100-inch comparator.

(12) moves upon the surfaces of flat ways, and is kept in contact with the face of the vertical wall (4) by means of spring-plugs placed in the left side of the base, which, pressing against the opposite vertical wall, keep the carriage in contact with the vertical face of the right wall. This face is made a plane surface in construction.

Two methods of comparison may be employed in a comparator of this form, viz.: (*a*) the two-microscope method and (*b*) the stop method. In the first method the microscopes (9) and (11) are placed at a distance apart nearly equal to the distances to be compared. The bars to be compared are placed upon a universal adjustment carriage (not shown in this view), which rests upon the plate shown at (16). By means of these adjustments the bars can be brought into position successively under the two microscopes, without contact with the hands of the observer. By the stop method the stop-plate marked (5) and a corresponding plate placed between (7) and (13) are placed at a distance apart nearly equal to the distance to be compared. The microscope-carriage is brought into contact with each stop in succession, and the readings of the micrometer of the microscope (11) are taken for coincidence with the defining lines upon the bar. This operation defines the relation of the distance between the lines to the distance between the

stops. A similar operation being performed upon another standard, each distance is thus compared with the constant distance between the stops.

The comparison of the subdivisions of a graduated scale may be made either by means of two microscopes, both

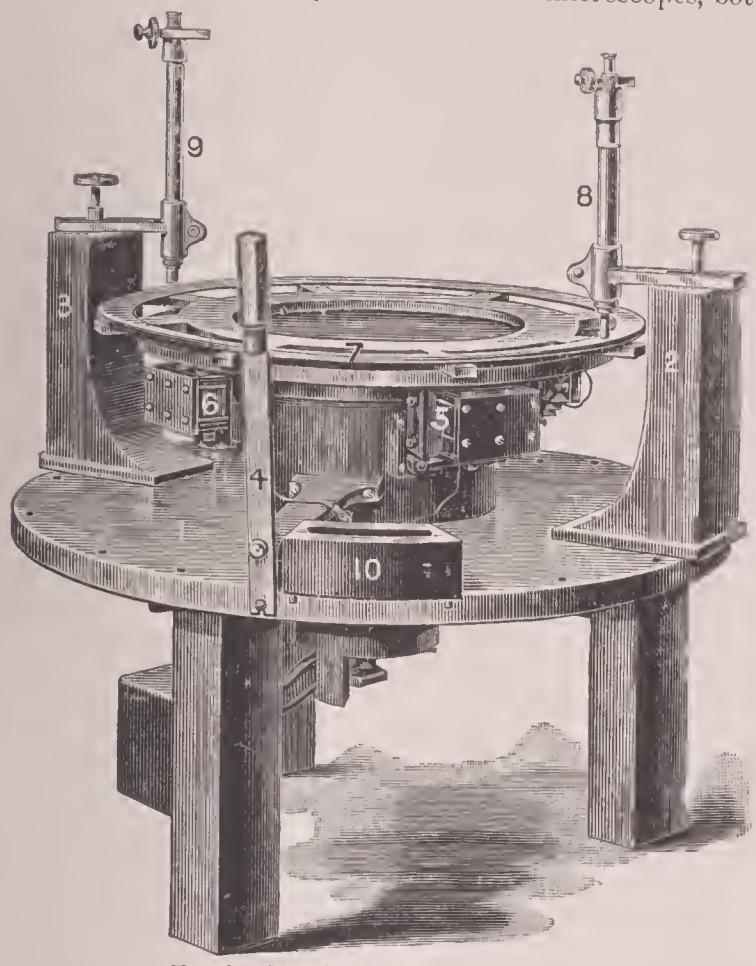


FIG. 3.—Circular measuring-machine.

placed upon the carriage (12) at the required distance apart, or by means of the stops. The latter method allows comparisons to be made between the most minute subdivisions, while in the former the smallest subdivisions of the same scale that can be directly compared are about 2 inches long.

In end-measure comparisons the bars to be compared are placed upon the adjustable supports (7) and (8). Contact is made between the plugs with conical ends with the parallel face-plates (13) and (15). The operation of comparison is as follows: Plate (9) is firmly clamped to the bed-plate of the comparator and (13) is brought into contact with (15). Coincidence is then made with the initial line of the bar (6) by means of (11). The microscope-carriage is then moved back to allow the insertion of the bar numbered (7) and (8). Contact of the end of the bar with (15) having been made, the carriage is then moved forward and contact is made between (7) and (13), when the micrometer is read for coincidence with the terminal line of the bar. It is evident that the microscope-carriage has moved from the position of contact between (13) and (11), a distance equal to that between the two faces of the end-measure bar.

In the circular measuring-machine shown in Fig. 3, only comparisons of the subdivisions of the circle into aliquot parts are required. Either the stop method or the two-microscope method may be employed. The graduated disk (7) revolves with a cylindrical shaft, to which it is attached, and which is accurately fitted to a bearing attached to the bed-plate (1). Four magnets (5) are attached to a deep ring, which is attached to the bearing within which the revolving shaft moves, and which has a movement in revo-

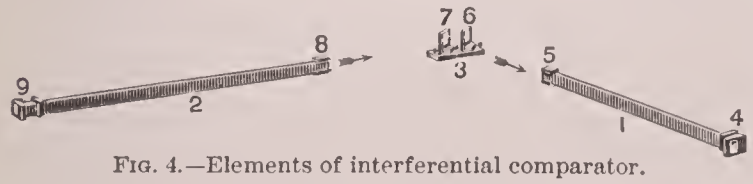


FIG. 4.—Elements of interferential comparator.

lution concentric with the motion of (7). The plates to which these magnets are attached move between guides, and contact with the under face of (7) is made by balancing weights. The electric current clamps the graduated disk (7) to the circular frame and the projecting arm (4). The disk is then moved forward a distance determined by the position of two stops, one numbered (10) and the other like it to the left of (4), but not shown in the figure. Breaking the circuit of the current, the magnet arm is moved backward into contact with the first stop without moving the disk (7).

Microscopes (8) and (9) can be set at any distance apart required to obtain an aliquot subdivision of the entire circle, and by the revolution of the disk (7) comparison of the lengths of the successive subdivisions can be made.

The Interferential Method.—By this method a given length is determined by counting the corresponding number of wave-lengths in a ray of monochromatic light of known refrangibility. The device by which interferences of light are formed is called a refractometer. The instrument with which such measurements are made has been called by Prof. Michelson, who devised this method of observation, an interferential comparator.

The form of the interferential comparator shown in Figs. 4 and 5 is the invention of Prof. Morley. His method proposes the determination in a vacuum of the absolute coefficient of expansion of metals between the limits of the freezing and the boiling points. The elements of the interferential comparator are shown in Fig. 4. Mirrors having plane and parallel silvered surfaces are attached to the ends of the bars shown in the figure. (6) is a mirror so silvered that one-half of an incident ray of monochromatic light is transmitted, and the other half is reflected. (7) is a plate of unsilvered glass, by means of which rays reflected from (5) and (8) pass through glass of the same thickness.

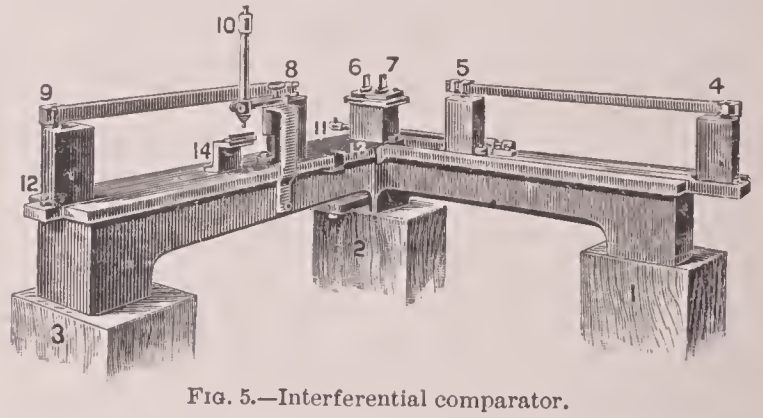


FIG. 5.—Interferential comparator.

A ray of monochromatic light enters (6). One-half is transmitted through (6) to (5) and is reflected back to (6). The utilized half of this reflected ray is again reflected from (6) to the eye of an observer. In the same manner, the reflected half of the incident ray is reflected from (8), and transmitted through (6), reaching the eye of the observer in front of (6). Since two rays which suffer internal and external reflection differ by half of a wave-length, the light of the ray is extinguished by interference.

The bars to be compared are mounted as shown in Fig. 5. Plate (14) is moved by a weight, which keeps it in contact with a wedge-shaped cross-plate actuated by a precision-screw. By means of interference phenomena, (5) and (8), and then (4) and 9), can be made equidistant from (6). The motion of the bar numbered (8) and (9) in passing from the first to the second position can be measured by counting interference bands during the motion. A microscope and graduated scale are shown at (10), with which distances corresponding to an observed number of wave-lengths are measured.

WILLIAM A. ROGERS.

Meat, or **Flesh**: in the main, the muscular tissue of animals, though this is always accompanied by blood-vessels, nerves, sinews, and fat. The constituents of meat are in general: (1) water; (2) albumen and albuminoids; (3) nitrogenous substances, not albuminoids, so-called extractive matter; (4) nitrogen-free compounds, mostly CARBOHYDRATES (*q. v.*); (5) inorganic salts. Meat free from fat contains on the average about 75 per cent. of water. The albumen and albuminoids constitute about 20 per cent. of meat. Among these substances are albuminoids soluble in water, myosin, collagen, etc. The nitrogenous extractive matter includes creatin, hypoxanthin, xanthin, and carnine. The substances included under the head of nitrogen-free compounds are certain carbohydrates, as glycogen and inosite, and, further, sarcolactic acid, glycerinphosphoric acid. When meat is treated with cold water, the inorganic salts, the creatine and similar substances, together with the nitrogen-free compounds, pass into solution. Some of the albuminoids are also dissolved. If the meat is boiled with water some of the albuminoids are coagulated, and not so

much of the meat passes into solution as when the temperature is kept down. Liebig gave much attention to the study of foods, endeavoring to determine which of the constituents of various kinds of food are of special value for nutrition. After an elaborate study of the changes effected in meat by treatment with water, he conceived the idea that the nutritious constituents of meat might be extracted in countries where meat is cheap and this extract transported to other countries where meat is dear. His principal object appears to have been to place within reach of the poor inhabitants of Europe some of the valuable material going to waste in other parts of the world. See EXTRACT OF MEAT and FOOD. IRA REMSEN.

Meath: county of Ireland; in the province of Leinster; bordering on the Irish Sea. Area, 906 sq. miles. It forms the eastern portion of the great limestone plain which occupies the whole central part of Ireland. The ground is level or gently undulating; the soil consists of a rich loam and is very fertile. The occupations are almost exclusively agricultural, chiefly grazing and dairy-farming. Of the total area about 92 per cent. (582,708 acres) are arable land. The coast is about 10 miles long, low, and shelving, but has no important harbor. The beautiful river Boyne divides the county into two nearly equal parts. Pop. in 1891, 76,987. The Irish language is still spoken to a large extent in the county. Principal town, Trim.

Meaux, mō: town; in the department of Seine-et-Marne, France; on the Marne; 28 miles N. E. of Paris (see map of France, ref. 3–F). It is the see of a bishop, and has a fine cathedral with a monument of Bossuet, who was bishop here. It has large manufactures of cottons, calicoes, sailcloth, vinegar, and saltpeter, and numerous flour-mills on the Marne from which great quantities of flour are sent to Paris. Pop. (1896) 13,520.

Mecca (probably the anc. *Makaraba* of Ptolemy; possibly the *Mesha* of Gen. x. 30): chief city in the vilayet of Hedjaz, Arabia; in lat. 21° 30′ N. and lon. 40° 8′ E.; 48 miles E. of Jeddah, its port on the Red Sea (see map of Persia and Arabia, ref. 7–C). It is situated in a narrow and barren valley inclosed by naked hills. Though it has neither trees, squares, public buildings, nor paved streets, and is dusty and muddy by turns, Mecca is handsomer and better built than most Eastern cities. As birthplace of Mohammed it is the most celebrated city of Islam. It also contains the KAABA (*q. v.*), around which has been built the immense mosque El Haram, begun by the Caliph Omar (634–644), added to by various caliphs, sherifs, and sultans, so that now the original form is lost in an agglomeration of buildings. El Haram has 7 minarets, more than any other mosque in the world, and 19 gates. According to Burckhardt it surrounds an oblong square 250 paces long and 200 broad, none of the sides of which are straight. The roof is sustained by 554 pillars. Inside the mosque is the well Zemzem. Over 200,000 pilgrims visit Mecca every year. The city has no manufactures or trade properly speaking, the main support of the inhabitants being derived from letting rooms to the pilgrims and supplying their necessities. Pop. 80,000, with lodging-room for three times that number. In 1517 Mecca and Medina passed under the control of the Ottoman sultans, part of whose title has since been Servant of the two Holy Cities. In 1803 Mecca was pillaged by the Wahabees, a fanatical sect of Mussulman reformers, and was held by them till their expulsion in 1818 by Mehemet Ali. See Burton's *Pilgrimage to El Medinah and Meccah*; Des Verger's *Arabie*; Nawab Sikander's *Pilgrimage to Mecca*, translated from the Urdu; and especially Burckhardt's *Travels in Arabia*; also see HADJ and MEHEMET ALI PASHA.
E. A. GROSVENOR.

Mecca Balsam, called also **Balm of Gilead**: the resinous exudation from a small evergreen shrub, known to botanists as *Balsamodendron gileadense*, that grows on the banks of the Red Sea. In the East it is much employed in medicine and perfumery, but the inferiority and spurious character of the material sent under its name into Western commerce have led to the almost entire abandonment of its use. I. R.

Mechanical Calculation: the employment of mechanical devices for assisting arithmetical computations. The practice dates from very early times, as is shown, in fact, by the etymology (Lat. *calculus*, a pebble), which indicates that the earliest "calculations" of a rude people were effected by means of an actual counting of grains or bits of stone, each representing a unit of the staple of traffic. They would not be employed, however, until the number of the fingers on the two hands, which forms the basis of the decimal notation, was exceeded. The second step in the development of arithmetic must have been to make a single pebble or grain represent a group of 5 or 10 units. The third step would be reached at a much later period by making a pebble or grain (of larger size or different color) represent 100, when a problem of addition involving many thousands of units could be mechanically performed by the aid of a small number of pebbles of three different kinds, the operation of "carrying ten" being mechanically represented by the substitution of a unit of the larger denomination for 10 of the smaller. This was the principle from which originated the abacus. It is thus seen that mechanical methods of computation preceded the perfection of mental arithmetic and the use of writing for the same purpose. Plato invented a sliding square to solve the problem of two mean proportionals, and Nicomedes in the first century B. C. devised a conchoid curve for the solution of the same problem, as well as for trisecting an angle. The Greeks and Romans employed the abacus for their ordinary problems of arithmetic, and the same or similar instruments continued in common use in Southern Europe till the end of the fifteenth century, and in England still later, until they were superseded by written arithmetic. (See ABACUS.) Gunter's scale and Napier's bones, invented in the seventeenth century, were extremely ingenious contrivances, but of little practical use from the limited nature of their operation. Blaise Pascal, constructed in 1642, at the age of nineteen, a machine for performing the routine operations of arithmetic. It consisted of a group of wheels and cylinders. On the convex surfaces of the latter were inscribed the numbers with which the operations were to be performed, consisting of the ten figures of the decimal system, and the numbers adapted for the addition and subtraction of livres, sous, deniers. These cylinders were connected by wheels in such manner that a single revolution of one wheel produced, according to the character of the desired operation, ten, twelve, or twenty revolutions of the other wheels. The first cylinder was turned by hand, and the others were moved in conformity to the desired arithmetical rule. In 1673 Leibnitz described a machine for a similar purpose, said to have been superior to Pascal's in practical operation, but too complicated and expensive to be brought into use. In 1822 Charles Babbage read two papers before the Royal Astronomical Society descriptive of a machine he had invented for solving mathematical problems of some complexity, and at the same time printing its own results by means of types. This would evidently have been of incalculable service in the tedious toil of computing astronomical tables, and the society therefore memorialized the Government for pecuniary aid in constructing a machine. The subject was referred to the Royal Society, and a committee, of which Herschel, Davy, Young, and Wollaston were members, reported in favor of the invention. The Government thereupon made a liberal grant, but the plan of the machine was extremely complicated, and was more than once modified, so that artisans had to be specially educated to understand it. Large sums were advanced from from time to time for many years, but the machine was never completed, and in 1843, after twenty years' labor and a fruitless expenditure of £17,000, the Government refused to countenance any further outlay, and the unfinished "difference engine," as it was called, was placed in the museum of King's College, London. Had the plan of the inventor been successfully carried out, this machine would perform all the operations of simple arithmetic on any numbers whatever; combine quantities algebraically or arithmetically in an unlimited variety of relations; use algebraic signs according to their proper laws, and develop the consequences of those laws; arbitrarily substitute any formula for any other; effect processes of differentiation and integration on functions in which the operations take place by successive steps; execute the operations of the combinatory analysis, and compute the numbers of Bernouilli. The cardinal principle of Babbage's machine is the fact that if we begin with a table of logarithms or sines, then make a second table consisting of the differences between the successive numbers of the first, then a third from the differences of the second, etc., we ultimately reach a table in which all the numbers are the same. Reversing the process, and the first number of each table being given, the first table could be recovered by a series of additions starting from the table of equal numbers.

Moreover, the machine stamps each figure as fast as calculated upon a stereotyped plate, so that no errors of the press could be made in the publication of tables thus calculated. A machine for effecting the same object upon a different principle was begun by two Swedish brothers, George and Edward Scheutz, in 1834, and successfully completed in 1853. It was exhibited in London in 1854, and in Paris in 1855, and was purchased by the Dudley Observatory at Albany in 1856. It calculates to fifteen places of decimals, impressing upon lead the result to eight places, at the rate of twenty-five figures per minute. By taking out certain wheels and putting in others it will calculate and record in pounds, shillings, and pence; in degrees, minutes, and seconds; in tons, hundredweights, and pounds, and in many other modes of notation. Some of the results obtained by the use of Babbage's machine were used by him as illustrations in his *Ninth Bridgewater Treatise* (London, 1838).

Revised by S. NEWCOMB.

Mechanical Engineer: See ENGINEERING.

Mechanical Powers: certain elementary forms of mechanism in which the simplest possible material connection between two points or surfaces is such that the action of a force applied at one point in a given direction is caused to overcome a resistance at another point in any required direction. In its general acceptation the term "mechanical power" implies also the condition that an "advantage" is gained by the use of one of these elementary machines; or, in other words, that a small force acting through a given space may be made to overcome a greater force acting as a resistance through a less space. When increase of motion is the principal object, a force acting through a given space may overcome a less resistance acting through a greater space. Where a simple transfer of the direction or point of application of a force takes place, without any possible "advantage" in either of these respects, the material connection between the points of application of the power and resistance does not necessarily involve the employment of one of the elementary machines or mechanical powers.

In discussing the motions which are transmitted by means of elementary machines it is unnecessary to take into account the nature of the forces which act upon them. These may be any of the ordinary forms in which force exhibits or is employed by men and animals, such as gravity, inertia, friction, etc.; one general principle being sufficient for all—viz., that in any elementary machine the product of the force or effort into the distance passed over by its point of application must be equal to the product of the resistance multiplied by the distance passed over by its point of application. If the force or effort be a liquid pressure acting on a surface, the resistance being a corresponding liquid pressure acting on a different surface, then the volumes through which the two surfaces move under the influences of the action and reaction must be equal. This latter enumeration of the general principle is applicable especially to hydrostatic machines.

Under these general definitions and conditions all the elementary machines which are met with in mechanical constructions, or which are employed by man and animals in locomotion, may be arranged under four heads, each depending, for the calculation of the work performed by the moving force and the resistance, upon certain elementary theorems of mechanics. The classifications are the *lever*; the *inclined plane*; the *jointed links* (called also the funicular machine, and also the "toggle-joint"); and the *hydrostatic press*. All machines of artificial construction and all movements of animals in locomotion depend on the action of these simple machines or mechanical powers, either in their elementary forms or in various combinations.

The lever is based on the theorem of *moments of forces*, and involves a rotation of a material, rigid bar or form about a point called the fulcrum. The moment of a force is the product of the force measured in units of force (pounds), multiplied by the perpendicular distance from its line of action to the center of rotation, the fulcrum. Whatever be the directions of the effort or power, and the resistance, applied to two points of a lever, the products obtained by multiplying each by the perpendicular distance from its line of action to the fulcrum must be equal. The pressure upon the point of rotation in the fulcrum acts as a third force, which at any instant maintains the other two in equilibrio. To find this pressure in any given direction, it is only necessary to find the components of the other two forces, which act in directions parallel to the given direction, and the equilibrium is established by the general theorem of parallel forces—viz., the resultant of two parallel forces is always equal to their sum if they act in the same direction, and to their difference if they act in contrary directions. This resultant in the case of the lever is the pressure upon the fulcrum, acting in the direction of the greater force if the parallel components of the forces act in opposite directions, and in the common direction of the forces if they act in the same direction. All problems of levers, whether they be straight or bent, and whether the forces applied to them are parallel or oblique, may be solved by the application of the preceding rules.

The wheel-and-axle and the movable pulley are elementary machines, depending for their action on the principle of the *lever*, although sometimes classed as separate mechanical powers. The fixed pulley merely changes the direction and point of application of the force applied to the cord passing over it, but no other advantage results from it. In the case of the movable pulley the fulcrum is movable, and acts as an instantaneous axis, the resistance acting between the power and the fulcrum.

The *inclined plane* and the *jointed links* depend for their action on the theorem of the parallelogram of forces. Representing the relations between the height, length, and base of an inclined plane by the altitude, hypothenuse, and base of a right-angled triangle, the relation between the forces which cause a sliding of a body on an inclined plane is as follows: If the effort or power be applied parallel to the length of the plane, and the resistance parallel to the height, the effort will be to the resistance as the height of the plane to the length. When a man rolls a barrel up an inclined plane into his wagon, he obtains not only the advantage of the inclined plane, but also the advantage of rolling over sliding friction. The total useful work performed, leaving friction out of consideration, is the work of elevating the weight of the barrel from the ground to the wagon; and this total work can in no way be avoided. It is, however, accomplished by a small muscular effort exerted through a greater space than the height of the wagon, the diminution of the effort necessary depending on the length of the plane.

The wedge is an example of an inclined plane. When a pressure is exerted against the end of a wedge to force it forward, the resistance against the face of the wedge will be to the pressure applied to the end as the distance through which the wedge moves is to the distance, perpendicular to the face, through which the material yields to the action.

The screw is an inclined plane in the form of a helix wound around a cylinder, and its action is determined by the same laws.

The jointed links, in which the relation between the power and resistance is found by the application of the parallelogram of forces, is not so often found in artificial constructions as some of the other elementary machines, but it possesses especial interest in being found applied in the mechanism of all walking or leaping animals. A few artificial constructions, among which may be named Hicks's press, are based on this mechanical power, the elements of which are two rigid bars or *links* jointed together, the effort being applied at the joint in such a manner as to enlarge the angle between the bars. If one bar rest against an immovable point of resistance, and the other be guided in a given direction, when the two bars approach a straight line the action of the force at the joint is to overcome a much greater resistance at the end of the guided bar. A succession of jointed links, as in the hinder legs of leaping animals, not only multiplies motion, but enables the animal to exert the greatest effort in the direction of the terminal motion.

The *hydrostatic press* is an elementary machine which depends for its action on the principle of distribution of pressures through the medium of a liquid. If a closed vessel filled with a liquid be tapped at any point, and a small piston be inserted in such a manner that an external pressure may be applied to the piston, no liquid being allowed to escape—when such a pressure is applied, every part of the internal surface of the vessel, equal in area to the piston, will feel the additional pressure independently of all the other parts. If one end of the vessel be closed by a tight piston movable outward, the total additional pressure upon the surface of this larger piston will be equivalent to the sum of all the additional pressures upon its parts, each of these small parts being equal to the area of the smaller piston. The force required to resist the total additional pressure on the large piston will then be as many times greater than the force applied to the small piston as the

surface of the larger is greater than the surface of the smaller piston. If motion take place, the extent of motion of the two pistons must follow the inverse of this rule. The distance passed over by the two pistons will be inversely proportional to their areas. See HYDROSTATIC PRESS.

Ordinary machines, whether they be *prime movers*—i. e. whether they receive directly and utilize the action of muscular force, the force of gravity acting through falling water, the wind, or the moving force of heat—or whether they be secondary machines driven by prime movers, are elementary machines, or combinations of the elementary machines which have been named. They consist generally of a framework for sustaining and supporting the moving pieces, and certain connections between the moving pieces by which motion is communicated from one moving piece to another, or from the driving point to the working point. The principles according to which such motions are communicated are based on the laws of motion (see MOTION), and have been fully developed for all ordinary machines in modern works on the principles of mechanism. Prof. Robert Willis, M. A., F. R. S., of the University of Cambridge, is entitled to the credit of having been the first to develop this interesting and useful branch of practical mechanics into a special science.

Mechanics [Gr. *μηχανικός*, mechanical, pertaining to machines or contrivances, deriv. of *μηχανή*, device, contrivance, machine]: a term originally employed to designate the principles of action of machines; the science which treats of the nature of forces and their action on bodies, commonly called the *science of mechanics*, having derived its origin principally from practical operations rather than from theoretical abstractions. The proficiency of the ancients in practical mechanics is sufficiently evinced by the descriptions of machines which have been preserved in their writings. In the construction of temples, pyramids, bridges, aqueducts, and other great works, the elementary machines must have performed an important part; indeed, some ideas of modern physics seem to have entered into the conceptions of the old Greek philosophers, such as that of the elements or atoms, the ether, and the idea that all things are in incessant motion. Archimedes (287–212 B. C.) may even be said to have laid the foundation of theoretical mechanics in his investigations in regard to the lever, centers of gravity, etc. The theory of Aristotle, that a body contains in itself the principles of rest and motion, uninfluenced by external causes, continued, however, to be received until the time of Galileo (1564–1642). Galileo disputed the ideas of Aristotle, and by experiments on falling bodies showed the existence of a force independent of the falling body which produced a velocity of motion dependent on the time of descent, and not on the mass of the body. After this the science made slow but gradual progress, and was extended in its signification beyond the principles of mere mechanical contrivances to embrace the laws of force and motion as exhibited in universal phenomena. With this signification the science became enlarged and subdivided, writers on mechanics dividing the subject into two parts—*statics*, embracing the principles or theorems which apply to bodies at rest under the action of natural forces; and *dynamics*, embracing the principles of action of bodies in a state of motion. (See MOTION.) There are further subdivisions according to the nature of the body acted upon. See HYDROSTATICS, HYDRAULICS, PNEUMATICS, and THERMODYNAMICS.

A brief summary of the laws and principles of the science of dynamics under this broad acceptation has been given under DYNAMICS (*q. v.*), and it only remains to follow a little further the enunciations of these general principles, and to give a brief history of their discovery or development. Benedetti (1530–90) was the first to discover the true *cause* of acceleration in falling bodies in properly considering the principle of inertia, it having been previously supposed that every movement was due to an independent and additional exercise of force.

Of the principles which form the foundation of the science of mechanics or dynamics—viz., the principle of inertia, the equality of action and reaction, the non-dependence of the effect of a force on the previous motion acquired by a body, and the independence of the effects of forces which act simultaneously upon the same body—the first was recognized by Descartes (1596–1650), who, observing the acceleration of bodies moving in straight lines, called the force of continuance the indwelling force of the matter, a property called by Newton (1642–1726) *inertness*, while the resistance to change due to the body alone he called *inertia*.

According to Lagrange, Guido Ubaldi (1545–1607) was the first to make an exposition of the principle of *virtual velocities*. The virtual velocity of a point due to a force is the motion of the point in a right line to a position infinitely near, projected upon the line of the force; and the *virtual moment* is the product obtained by multiplying the virtual velocity by the intensity of the force. This principle has been useful in investigating the analytical conditions of equilibrium of a system of forces.

Galileo announced the principle that two forces are in equilibrium if their moments are equal and opposed, the moments being proportional to the products of the forces by their virtual velocities. The conception of the parallelogram of forces is due to Galileo, and its subsequent applications to motions and velocities to Descartes, Wallis, Roberval, and others.

A theorem which has been most useful in analytical investigations, called the *Theorem of d'Alembert*, is found in most text-books. The principle is that at every instant the entire amount of force applied to a body is absolutely equivalent to the sum total of the effects produced.

The property called inertness—viz., that if there be no continuous action of forces upon a mass or material point, it either remains at rest or moves uniformly in a straight line—was announced by Descartes, Huyghens, and Newton.

The following are general theorems relating to any system whatever:

1. The center of gravity of any system acted upon by exterior force moves in the same path as if the whole mass of the system were concentrated at that point, and as though the exterior forces were transported parallel to themselves to that point. This theorem shows that the motion of a material system may be traced by referring it to the motion of its center of gravity regarded as a material point. As a familiar application of this general theorem, suppose a shell to be fired from a cannon. Its path will at first be approximately a parabola. If it explodes in its course, the resistance of the air being left out of consideration, the paths of the separate pieces will diverge, but the path of the common center of gravity of all the pieces will remain unaltered. The explosion of the powder, being only an exertion of internal forces, can not alter this path; it is only when one of the pieces strikes an obstacle that the path of the center of gravity of the whole is changed, a new external force being thus introduced. Applied to the planetary system, this theorem shows that if the influence of the fixed stars be disregarded, the center of gravity of the system must be either at rest or moving in some path due to forces external to the system.

2. The theorem of moments of momentum may be enunciated as follows: "The increase in the sum of the moments of momentum of a system in reference to any axis during a given time is equal to the sum of the moments of all the impulses of the exterior forces with reference to the same axis in the same time."

The principle of the indestructibility of force or the conservation of energy is of recent development, although discussions of the subject may be found in the works of the older writers. Some modern authorities give Newton the credit of anticipating the more recent discoverers. The investigations of Carnot, Clapeyron, Mayer, Colding, Joule, Clausius, Helmholtz, Rankine, and Thompson have served to definitely establish the principle. See ENERGY and FORCE.

The more recent establishment of the principle that the laws of dynamics embracing motion and force hold true as well for the minute invisible motions of the particles of bodies as for the great masses of the solar system has had a most important effect on the development of the physical sciences. The energy of a body is no longer confined to its sensible movements as a whole, but embraces the living force due to molecular motions which give rise to the phenomena of heat; and the sciences of heat, electricity, magnetism, chemistry, and even astronomy, have derived new interest and experienced a great expansion from a knowledge of the above principle.

Revised by R. A. ROBERTS.

APPENDIX.

Labori, lăă'bō'ree', FERNAND GUSTAVE GASTON: French lawyer; b. in Rheims, Aug. 18, 1860; studied law in Paris, where he became noted as a brilliant student; won the first prize in civil law in 1881, and the first prize in Roman law in 1883; and then traveled in England and in Germany. He was made a member of the bar of the court of appeal in 1881, and secretary of the conference of advocates for the judicial year 1887-88. While still a young man he achieved distinction as a special pleader, and was the advocate for the assassins Duval and Chevallereau. He defended the deputy Gabriel Compayre, in a suit for defamation, against the deputy Numa Gilly, and was advocate for the alleged traitor Dreyfus. He has also been retained in a number of cases involving important rights in theatrical productions, including the case of La Plume against Sar Peladan, the case of the *Théâtre réaliste*. He was chief redactor of the *Gazette du Palais*, and with others has undertaken the publishing of the *Répertoire encyclopédique du droit français*.

F. STURGES ALLEN.

Labrador: All of Labrador, except the coast regions which are a dependency of Newfoundland, now constitutes the Canadian district of Ungava. Until very recently the interior of Labrador was almost wholly unknown, but it has now been quite clearly revealed by the work of R. Bell, A. P. Low, D. J. V. Eaton, and Messrs. Hind, Bryant, Stupart, Payne, and others. Particularly notable were the journeys in 1895 and 1896 of Mr. Low, who traced the water-parting between the drainage tributary to the Atlantic and to Hudson Bay. Traveling through the interior to Ungava Bay on Hudson Strait, he found the country throughout a rolling plateau, broken by rocky ridges, with stunted trees confined to the valleys, the higher parts being without timber. The table-land, for the most part, is about 800 feet above sea-level, the water-parting rising to about 900 feet, and in the S. it is higher, where the eastern part of the peninsula, draining to the Atlantic, is 1,000 feet or more above the sea. He discovered two large lakes—Clearwater, 45 miles long, 25 wide in its broadest part, and dotted with numerous islands, and Seal Lake, more than 50 miles long and from 1 to 5 miles wide. In the latter fresh-water lake are seals that seem to be identical with a species known in the ocean. The facts point to their introduction when Labrador was overflowed by the ocean, and to their adaptation to the changed conditions when the land was raised above the sea. The coast fishing stations are surpassing in importance many of those of Newfoundland, and the catch of codfish has considerably increased in recent years. Salmon and trout are also caught and sent salted to Great Britain and to other parts of America. At the head of some of the bays are a few large areas of timber, chiefly spruce, adapted for lumbering. Twenty-one applications for timber limits were made in 1898. Some of them are said to have been granted, and capital will be invested in the lumbering industry. From the end of July to the middle of October there is a fortnightly steamer service between Labrador and Newfoundland, all the fishing stations being visited. The coast population, not including the Newfoundland fishermen, who are there only in the fishing season, was 4,106 at the time of the latest census.

C. C. ADAMS.

Lachaume, lăă'shōm', AIMÉ: pianist; b. in Paris, France, Dec. 13, 1871, and educated entirely at the conservatory there, taking the first prize in 1889. He then made his public appearance as a pianist at the Concerts Colonne. He went to New York with the Belgian violinist Eugene Ysaye, with whom he made a tour of the U. S. He has composed a few pieces for the pianoforte.

La Guaira: The increasing trade between Europe and Venezuela led to the establishment of three new lines of steamships to La Guaira in 1894, among them a monthly line from Genoa. The completion in 1897 of the cable line from Puerto Cabello to La Guaira, connecting with the line to New York, has been of much service to Venezuelan merchants; 312 vessels of 676,500 tons entered and cleared from La Guaira in 1897.

Lake Leopold II.: one of the fifteen administrative districts into which the Congo State is divided. The lake which gives it its name was discovered by Stanley in May, 1882. It is shallow, has an area of nearly 800 sq. miles, sends its waters to the Kassai and Congo through the Mfini river, and its head is situated in 1° 28′ S. lat. and 18° 35′ E. lon. Two German explorers, usually accurate, reported later that they could not find this lake where Stanley said it was, the fact being that they had forgotten to make allowance for the magnetic declination of the compass.

Lakey, EMILY JANE: artist; b. in Quincy, N. Y., June 22, 1837; was educated privately; taught in Ohio and Tennessee; studied painting, and exhibited at the National Academy of Design in 1873; afterward studied art in Paris. Her cattle pieces include *The Leader of the Herd*; *An Anxious Mother*; *Right of Way*; and *From Pasture to Pool*. D. in Cranford, N. J., Oct. 24, 1896.

Lambert, ALEXANDER: pianist; b. in Warsaw, Poland, Nov. 1, 1862. His first teacher was his father, and at the age of twelve, by the advice of Rubinstein, he was sent to the Vienna conservatory, where he remained for six years. Then he went to the U. S. and played at some concerts, and returned to Europe in 1882, but after fifteen months again went to New York, where he has since remained as a teacher.

Lambeth Conference: an assembly of all the bishops in communion with the Church of England, under the presidency of the Archbishop of Canterbury, at Lambeth Palace in London, sometimes spoken of as the *Pan-Anglican Synod*. The correct name is the Lambeth Conference, and four of these gatherings of bishops have been held at intervals of about ten years, in 1867, 1878, 1888, and 1897. They have grown greatly in size and importance, and may now be regarded as an established institution, though entirely without any legislative power.

The first suggestion of such an assemblage, including the English colonial episcopate and the bishops of the Irish, Scotch, and American Episcopal Churches, was made, so far as can be discovered, by the Right Rev. John Henry Hopkins, Bishop of Vermont, in 1851, in a letter to the Archbishop of Canterbury (Dr. John Bird Sumner). Nothing, however, came of the suggestion of Bishop Hopkins until the matter was taken up and urgently pressed by a Canadian bishop, Dr. J. T. Lewis, now Archbishop of Ontario, who brought the subject before a synod of the English Church in Canada. The idea was new, and there were difficulties to be overcome. The English bishops were hampered then, as now, by their connection with the state, and to take such a step as the calling of such a meeting required, in the first place, that the Primate of all England should be something more than the old-fashioned "Church and state" bishop. This proved to be the case when Archbishop Longley, a wise and gentle but courageous prelate, was translated from York to Canterbury. While the proposed conference was hailed with joy and satisfaction in the U. S. and the colonies, it excited no little apprehension in England. Archbishop Thomson (Dr. Longley's successor at York) held aloof, and Dean Stanley not only opposed the project, but persisted in refusing to allow the bishops to assemble as a conference in Westminster Abbey. His reason, as stated by himself, was that it was "impossible for him as guardian of a building like the abbey, which belongs to the whole Church and people of England, to take the responsibility of giving its sanction to a meeting which includes only a portion of the English bishops, and of which the objects are undefined, the

issues are unknown, and the discussions secret." (See *Life of Bishop Kerfoot*, of Pittsburg, p. 467, New York, 1886; also, *Life of Bishop Hopkins*, pp. 472–481, New York, 1873.) The above quotation from Dean Stanley well expresses the fears and objections on the part of many distinguished English churchmen which Archbishop Longley had to encounter and surmount. The archbishop was ably supported by Bishop Wilberforce of Oxford, the most eminent of all the English prelates. Bishop Wilberforce was perhaps the leading mind in the management of this first conference, and the actual penman of the pastoral letter that was issued.

Though Archbishop Longley did not succeed in removing the apprehensions of his brother primate of York and of like-minded churchmen, he carried out his purpose and issued his invitation (dated Feb. 22, 1867). The result was crowned with abundant success at the time, and the meetings have unquestionably proved very influential and advantageous to all the churches concerned. This is shown by the larger attendance of the bishops and increased interest of the general public, which are also proofs of the growth of the Anglican branch of the Church throughout the world. In 1867 Archbishop Longley invited 144 bishops, and 76 attended. In 1878 Archbishop Tait invited 173 bishops, of whom 108 accepted, and 100 attended. In 1888 Archbishop Benson issued 211 invitations, and 145 bishops attended. Of those who took part in the conference, 46 belonged to England and Wales, 11 to Ireland, 6 to Scotland, 29 to the U. S., and 53 to colonial and missionary dioceses throughout the world. In 1878 Archbishop Thomson of York had not only withdrawn his opposition, but he preached the sermon at the opening of the conference, and in 1888 (the third conference) both St. Paul's Cathedral and Westminster Abbey were thrown open to the bishops and impressive services were held. In 1897 the interest aroused was greater than ever. Archbishop Temple presided, and 200 bishops were in attendance.

In his opening address to the conference of 1867, Archbishop Longley clearly set forth the objects and limitations of the assembly, and the principles laid down by him have thus far not been departed from. "It has never been contemplated," said the archbishop, "that we should assume the functions of a general synod of all the churches in full communion with the Church of England, and take upon ourselves to enact canons that should be binding upon those here represented. We merely propose to discuss matters of practical interest, and pronounce what we deem expedient in resolutions which may serve as safe guides for future action. Thus it will be seen that our first essay is rather tentative and experimental in a matter in which we have no distinct precedent to direct us."

Few, if any, are now found who refuse to admire the wisdom and courage of Archbishop Longley in making this experiment, and none deny that the four meetings which have been held in the last thirty years "for brotherly communion and conference" have proved beneficial even beyond what the first promoters dared to hope. The London *Guardian*, the leading organ of the Church of England, spoke as follows in 1878 of the impression made by the American bishops: "No one can hesitate to acknowledge how largely any general conference of bishops must gain—and in fact how much these conferences have gained—from the presence of bishops of the Church in the U. S. They are just sufficiently foreigners in England to call for the exercise on our part of the courtesy due to guests and strangers, yet so far one with us as to share all the Christian feelings and highest Church interests which give an ecclesiastical conference its value and life. Their diocesan and conventional organizations demand careful study from us, even if they do not exactly harmonize with our traditions; and the spirit in which their laymen appear to do their part in the whole business of the Church is full of instruction to all promoters of Church assemblies on this side of the water. Their bishops seem to have commended themselves to the good opinion of their brethren at Lambeth by that straightforward simplicity of speech which springs from a practical habit of mind. It is always satisfactory to have to do with men who know what they mean, and who are accustomed to translate their meaning into action. American bishops have not been fettered by the social and political complications of an old country; and out of their freedom they can spare some gifts to us in return for the obligations under which the mother Church has laid them long ago. The eloquent sermon which the Bishop of Pennsylvania (Dr. Stevens) preached in St. Paul's on Saturday [July 27, 1878] must have suggested to many hearers that it is well for the churches to take mutual counsel, and that their members have some things mutually to learn." Similar expressions might be quoted from American bishops as to the benefits which they felt they had derived from meeting in council their English brethren and becoming more intimately acquainted with English Church life. It is not improbable, too, that one effect of the Lambeth Conference upon American bishops, and of the familiarity with English customs and ways, may be seen in a certain change which has gradually come over the Episcopal Church in matters of æstheticism and ritualism—a change which, be it for better or worse, has made considerable advances in the last quarter of a century.

Work of the Conferences.—The nature of the work attempted by the Lambeth Conferences can best be shown by mentioning briefly some of the many topics discussed and some of the conclusions arrived at.

In 1867, when the conference was, so to say, feeling its way, much less was attempted than in subsequent meetings. An unsuccessful effort was made by Dr. Gray, the Bishop of Cape Town in South Africa, supported by Bishop Hopkins of Vermont, to induce the conference to condemn the doctrines and writings of the famous Dr. J. W. Colenso, Bishop of Natal, and much time was occupied in this discussion. Perhaps the most important resolution passed by the conference of 1867 was the following:

"Resolution III. Question of appeal. That, in the opinion of this conference, it is very desirable that there should be a board of reference, or a spiritual tribunal for final appeal and decision in all matters of faith, including representatives from all branches of the Anglo-Catholic Church; and the bishops here assembled earnestly recommend this most important matter to the deliberate consideration of the convocations, conventions, and synods of the said Anglo-Catholic Church."

In 1878, under the presidency of Archbishop Tait, among the topics discussed were the following: Church organization; diversities in worship; laws of marriage; the "Old Catholics" and the Vatican Council of 1870; difficulties arising in the Church of England from the revival of obsolete forms of ritual, and from erroneous teaching on the subject of confession.

As to the Vatican Council, at that time a burning question, the conference said: ". . . It is therefore our duty to warn the faithful that the act done by the Bishop of Rome in the Vatican Council, in the year 1870—whereby he asserted a supremacy over all men in matters both of faith and morals, on the ground of an assumed infallibility—was an invasion of the attributes of the Lord Jesus Christ." As to ritual, "no alteration from the long-accustomed ritual should be made contrary to the admonition of the bishop of the diocese."

On the subject of confession, then and since so warmly discussed, the conference of 1878 spoke in very decided terms: "Further, having in view certain novel practices and teachings on the subject of confession, your committee desire to affirm that in the matter of confession the churches of the Anglican communion hold fast those principles which are set forth in the Holy Scriptures, which were professed by the primitive Church, and which were reaffirmed at the English Reformation; and it is their deliberate opinion that no minister of the Church is authorized to require from those who may resort to him to open their grief a particular or detailed enumeration of all their sins, or to require private confession previous to receiving the holy communion, or to enjoin or even encourage the practice of habitual confession, or to teach that such habitual confession, or the being subject to what has been termed the direction of a priest, is a condition of attaining to the highest spiritual life. At the same time your committee are not to be understood as desiring to limit in any way the provision made in the Book of Common Prayer for the relief of troubled consciences."

Although this opinion of the appointed committee was put forth by the conference as the judgment of the one hundred bishops assembled, it is needless to say that it was much criticised, and gave great offense to the "advanced" section of the High Church party.

The third Lambeth Conference (1888) issued an encyclical letter (about 12 pages 8vo), which began as follows: "To the faithful in Christ Jesus, greeting.—We, archbishops, bishops metropolitan, and other bishops of the

Holy Catholic Church, in full communion with the Church of England, 145 in number, all having superintendence over dioceses or lawfully commissioned to exercise episcopal functions therein, assembled from divers parts of the earth at Lambeth Palace, in the year of our Lord 1888, under the presidency of the Most Reverend Edward, by Divine Providence Archbishop of Canterbury, Primate of all England, and Metropolitan, . . . having taken into consideration various questions which have been submitted to us affecting the welfare of God's people," etc. The encyclical then delivers the conclusions of the conference on the following subjects: Temperance, purity, sanctity of marriage, polygamy, observance of the Lord's Day, socialism, care of emigrants, definite teaching of the faith, mutual relations, Old Catholics, the Eastern churches, and authoritative standards.

The conference of 1897 was one of the most important of all, as well as the largest in point of attendance. It was summoned to meet one year earlier than usual so as to coincide with the thirteenth centenary of the coming of St. Augustine, the first Archbishop of Canterbury. Coinciding also with Queen Victoria's diamond jubilee, the meeting of the bishops had a peculiar interest which had not attended any previous gathering, and may never occur again. The occasion was more than usually momentous, because there was an undefined movement in the air looking to some closer connection between the various churches represented at Lambeth, something in the nature of a more *organic* union, coupled perhaps with a promise of allegiance on the part of all the bishops to the see of Canterbury. This was strenuously opposed not only by the U. S. bishops, but also by the English colonial bishops. The views of the U. S. bishops were well expressed by Bishop A. C. A. Hall of Vermont, in an address to his convention prior to the assembling of the conference. As Bishop Hall is an Englishman by birth and education, his words are worth quoting. After emphasizing the fact that the conference would have no legislative authority, the bishop remarked that though most of the colonial churches have some kind of constitutional link with Canterbury, the Scottish and Irish churches are "as entirely free from any allegiance to the see of Canterbury as is the American Church, and as unlikely to allow any. A papacy at Canterbury, even in a modified form, is no more desirable than one at Rome." After a long discussion, in which Bishop Doane of Albany took a prominent part, a quietus was given to any movement designed to increase or extend the powers of the Archbishop of Canterbury. The proposed "tribunal of reference" disappeared, and in its place provision was made for appointing a "central consultative body," consisting of about eighteen bishops, for supplying information and advice. And it was expressly declared that this body would have no other than "a moral authority based on the services it may be able to render to the workings of the Church." Even this apparently harmless proposal has not yet been formally acceded to by the General Convention of the Episcopal Church. What may come of it is still *in futuro*.

AUTHORITIES.—*The Lambeth Conferences of 1867, 1878, and 1888*, by Randall T. Davidson, Dean of Windsor, now Bishop of Winchester (London, 1889); *Lives* of Bishops Hopkins, Kerfoot, Wilberforce, Selwyn, Ewing, etc.; *The Second Lambeth Conference: A Personal Narrative*, by Bishop W. Stevens Perry of Iowa; and the *Guardian*, London.

HALL HARRISON.

Lammas Lands, or **Lammas Meadows**: in English law, arable or pasture lands held in severalty and inclosed during the time of growth of corn and hay crops, but open as commons during the rest of the year, thus coming under the term of *commonable* lands and being distinguished from *commons*. Lammas lands are generally distinguished from *shack* lands by the fact that the former were commonable to others than those having rights in severalty in the land, but this distinction is denied by some authorities.

The period during which lammas lands were subject to common rights varied, generally beginning Aug. 12 for arable lands and July 6 for meadows, and ending in some cases in November and in others about the middle of February. The fixed dates for opening lands to the common rights gave rise to public disturbances, as the population in some cases issued out in considerable numbers to destroy the fences, tear down the gates, and commit other lawless acts. The rights of common in lammas lands during the winter season upon the introduction of root crops, requiring winter cultivation of two years for growth, made the custom of lammas lands wasteful, and owing to this and these disturbances they were gradually discontinued, although they were abundant in England as late as 1844.

The date of opening and closing the lands was variable in some instances by custom or by virtue of statutory enactment, by agreement of the occupiers of the land or the tenants of the manor. See Williams's *Rights of Common*; Alton's *Treatise on Commons and Waste Lands*; Main's *Village Communities*; Marshall's *Rural Economy*.

F. STURGES ALLEN.

Lampman, ARCHIBALD: author; b. in Kent, Ontario, Nov. 17, 1861; graduated with honors at Trinity University, Toronto, in 1882. The following year he became a clerk in the post-office of Toronto. In 1887 some of his poems were published in *Scribner's*, *Harper's*, and the *Century* magazines. Among his published books are *Among the Millet, and other Poems* (1888), and *Lyrics on Earth* (1896). He was elected a fellow of the Royal Society of Canada in 1895. D. in Ottawa, Can., Feb. 10, 1899.

Lancefield, RICHARD THOMAS: author; b. in London, England, Aug. 10, 1854; went to America while a child and was educated in the public schools of Hamilton, Canada. He became connected with the book-trade early in life, and in 1888 took a leading part in the copyright agitation. He was the founder of the *Canadian Bookseller and Literary Journal*, and in 1893 became its editor. He is a member of the American Library Association and of the American Academy of Political and Social Science. Among his works are *Utopias*; *Ideals and Idealism*; *One Man's Life-work*; *Notes on Copyright, Domestic and International* (1897); *Victoria, Sixty Years a Queen: a Sketch of her Life and Times* (1897).

Landry, AUGUSTE CHARLES PHILIPPE ROBERT: statesman; b. in Quebec, Jan. 15, 1846; graduated at Laval University, Quebec, in 1866. Later he studied agricultural science and devoted himself to farming. He was elected president of the Quebec Exhibition Company in 1894, and president of the Council of Agriculture in 1896. He served in the volunteer militia for many years and was promoted to the rank of lieutenant-colonel in 1885, and was an honorary aide-de-camp to the Earl of Aberdeen. He was a member of the Canadian House of Commons for many years, and was chosen Senator in 1892.

Lane, GEORGE MARTIN, LL. D.: educator; b. in Charlestown, Mass., Dec. 24, 1823; graduated at Harvard in 1846, taught there a year, and spent four years at the Universities of Berlin and Göttingen. He was Professor of Latin at Harvard 1851–94, and was then appointed professor emeritus and received the degree of LL. D. He promoted the introduction into the schools of the Continental system of Latin pronunciation. D. in Cambridge, Mass., June 30, 1897. He left unfinished a work on Latin grammar.

Lang, BENJAMIN JOHNSON: pianist and teacher; b. in Salem, Mass., Dec. 28, 1830; made his first public appearance as an organist at the age of fifteen; for many years, beginning in 1859, served as pianist for the Boston Handel and Haydn Society, and for a short time was conductor of that society after the resignation of Carl Zerrahn. He was also conductor of the Apollo Club of Boston, and during the long years of his service many of the best of American musicians have been his pupils.

D. E. HERVEY.

Lang, LOUIS: artist; b. in Waldsee, Würtemberg, Feb. 29, 1812; studied art in Stuttgart and Paris; removed to the U. S. in 1838; spent 1841–45 in Italy, then settled in New York city; became a member of the National Academy of Design in 1852. His best-known pictures include *Portrait of a Little Child*; *Maid of Saragossa*; *Mary Stuart Distributing Gifts*; *Blind Nydia*; *Jephtha's Daughter*; *Neapolitan Fisher Family*; *Little Graziosa among the Butterflies*; and *Romeo and Juliet* (in the Century Club). D. in New York city, May 8, 1893.

Lang, MARGARET RUTHVEN: pianist and composer; daughter of Benjamin J. Lang; b. in Boston, Mass., Nov. 27, 1867; pupil of her father and studied in Munich during the winter of 1886–87. On her return to Boston she studied composition under George W. Chadwick. Her works are numerous and important, and include several concert overtures for full orchestra; songs and dramatic arias with orchestral accompaniment; cantatas for male, female, and mixed choruses; many songs, and detached pieces for pianoforte.

D. E. HERVEY.

Lansdell, Henry, D. D.: Church of England clergyman; b. in Tenterden, Kent, Jan. 10, 1841; educated at the London College of Divinity 1865–67; curate of Greenwich 1867–69; Metropolitan Association secretary to the Irish Church Missions Society 1869–79; honorary secretary of the Church Homiletical Society, of which he was the founder, 1874–86; editor of *The Clergyman's Magazine*, of which he was the originator, 1875–86; since 1892 he has been chaplain of Morden College, Blackheath, London. He has traveled very extensively over Asia, and distributed tracts as an amateur missionary. His publications include *Through Siberia* (London, 1882, 2 vols.; 5th ed., 1 vol., 1883); *Russian Central Asia, including Kuldja, Bokhara, Khiva, and Merv* (1885, 2 vols.); *Through Central Asia* (1889); *Chinese Central Asia: a Ride to Little Tibet* (1893, 2 vols.).

S. M. J.

La Pérouse, laa-pā'rooz' (also written *Lapérouse*), Jean-François Galaup, de: French sailor and explorer; b. near Albi, Aug. 22, 1741. He served creditably in the French navy during the wars with England in 1759 and 1778–83, but his celebrity rests chiefly upon the expedition he led for the discovery of the northwest passage and its disappearance and loss, which were not explained for many years. His expedition sailed from Brest Aug. 1, 1785, on the frigates Astrolabe and Boussole, and visited the Hawaiian islands and the coast of Northeast Asia, where he discovered Sangar and La Pérouse Straits, proving that Yezo and Saghalien are each an island. Deterred by storms from attempting to search for the northwest passage, he visited the South Pacific, where twelve of his men were massacred by natives on one of the Navigator islands. Going to Botany Bay, Australia, he prepared for another attempt upon the Arctic Ocean, and sailed for that purpose in Jan., 1788. It was thirty-nine years before anything was known of the fate of the expedition, though the French had sought assiduously for information. In 1827 Capt. Peter Dillon found relics of the expedition on Vanikoro island, N. of the New Hebrides. The natives said both vessels were wrecked on the coast in a hurricane, that one crew perished in the surf or at the hands of the aborigines, the other reaching the land, where they remained a long time, and then departed to the W. in a small vessel they had built from the timbers of their ships. No further facts of the fate of the explorers have ever been learned, but a few more relics of the party were discovered on Vanikoro in 1898.

C. C. Adams.

La Salle, Jean Baptiste, de: ecclesiastic and educator; founder of the Institute of the Brethren of the Christian Schools; b. in Rheims, Apr. 30, 1651; embraced the ecclesiastical calling at an early age; studied at the college of the University of Rheims; became canon of the Chapter of Rheims Jan. 17, 1667; entered the Seminary of Saint-Sulpice for his theological studies, but after eighteen months returned home on account of the death of his parents; was ordained priest in 1678, and in 1683 resigned his prebendship, and during the winter of 1684 distributed all his property among the poor. On June 24, 1681, he had already received into his house some young teachers employed in charity schools in Rheims, an act which brought him more blame than praise. Little by little the number of the teachers in his house increased. In 1684 he called them together and gave to them the name of the Brothers of the Christian Schools, and admitted twelve of them for three years to the vows of obedience. At the same time the distinctive garb was adopted, which is still retained. With the Brethren of the Christian Schools begins the history of Catholic primary education. La Salle had early shown indications of strong character. He was weak and sickly, and to overcome sleep in order to prolong his studies he sometimes kneeled on sharp stones and sometimes placed in front of him on the study table a board fitted with iron points, against which his head would strike if he dozed. These traits were well calculated to make him the ascetic that he was. He was intensely devout, imposing upon himself the most rigorous manner of life, and inclined to impose it also upon others, so that he laid himself open to criticism on the ground of cruelty to his pupils. But he gave himself with rare devotion and single-mindedness to the work of primary instruction, and accomplished in that field work similar to that done by the Jesuits for secondary education. His task was by far the harder, however, since he undertook to instruct gratuitously, and in the face of pressing obstacles, large numbers of young children, whereas the Jesuits taught, under favorable circumstances, older pupils who paid tuition. The individual method of instruction prevailed before his time, but he introduced the so-called mutual-simultaneous method, and graded the pupils in his schools. In order to secure suitable teachers, he established in Rheims, 1684, a normal school, and afterward another in Paris. He also established a technical school in Paris, and in Saint-Yon a reformatory school and Sunday-school. For the direction of his institute he drew up a very minute code of rules entitled *The Conduct of Schools*, the first edition of which appeared in 1720. Practically the same work—*Management of Christian Schools*—was published in New York in 1893. In this book very minute and definite regulations are laid down, much after the plan of the Jesuit rules. La Salle recommends penances as well as corporal corrections. Corporal punishment has now been abandoned by the brethren themselves. Mutual espionage was recommended. It is not difficult at this date to find points to criticise in La Salle's Institute of the Brethren of the Christian Schools, but it should not be forgotten that his work marked a very great advance over anything that had preceded it. "Unlike some school reformers of the present day, he did not limit himself to destructive criticism. His mission was to build up, and he laid the foundation so deep, broad, and firm that, after many storms and sieges, after some alterations and additions, it is still a noble, commanding, and symmetrical structure." See *Management of Christian Schools*; Compayré's *History of Pedagogy*; Buisson's *Dictionnaire de Pédagogie*.

C. H. Thurber.

Laurie, Thomas: clergyman and author; b. in Edinburgh, Scotland, May 19, 1821; went to the U. S. in 1830, and graduated at Illinois College in 1838 and at Andover Theological Seminary in 1841. He was sent as missionary to the Nestorians in Kurdistan, but in 1844 he joined the Syrian mission, and in 1846 returned to the U. S., and held pastorates in South Hadley and West Roxbury, Mass., and in Providence, R. I. Among his published works are *Dr. Grant and the Mountain Nestorians* (1853); *Woman and her Saviour in Persia* (1863); *Glimpses of Christ* (1869); *The Ely Volume; or, The Contributions of Foreign Missions to Science* (1883); *Assyrian Echoes of the Word* (1894). D. in Providence, R. I., Oct. 10, 1897.

Lawson, John Davison, LL. D.: lawyer; b. in Hamilton, Ontario, Mar. 29, 1852; admitted to the bar in 1875. He practiced first in Illinois and then in Missouri, where he remained till 1885. During this time he was a director of the Missouri Bar Association, and for five years was editor of the *Central Law Journal*. Later he contributed many articles to legal journals. He received the honorary degree of LL. D. from the University of the State of Missouri, and in 1891 became Professor of Canon Law in the same university. Among his published works are *Contracts of Common Carriers* (1879); *Laws of Usages and Customs* (1881); *Concordance of Legal Words and Phrases* (1882); *Expert and Opinion Evidence* (1884); *Presumptive Evidence* (1884); *Defenses to Crime* (1886); *Rights, Remedies, and Practice in the Civil Law* (1892).

Lawton, Henry W.: soldier; b. in Ohio, Mar. 17, 1843; served as volunteer in the civil war, was breveted colonel Mar. 12, 1865, and was honorably mustered out Nov. 25, 1865. He was appointed second lieutenant in the Forty-first Infantry July 28, 1866, and first lieutenant July 31, 1867. He was transferred to the Twenty-fourth Infantry Nov. 11, 1869, and was assigned to the Fourth Cavalry Jan. 1, 1871. He was appointed captain May 20, 1879, served as acting assistant inspector-general in the Department of Arkansas from Jan. 15, 1881, to May 10, 1881; was appointed major inspector-general Sept. 17, 1888, and lieutenant-colonel inspector-general Feb. 12, 1889. In the war with Spain in 1898 he was put in command of the Second Division of the Fifth Army-corps in the operations against Santiago. El Caney was taken by his troops on July 1. He was made brigadier-general Mar. 4, 1898, and major-general July 8 of the same year. On Aug. 10, 1898, he was put in command of the Department of Santiago, and on Dec. 29 was ordered to duty in the Philippines as second in command to Gen. Otis. Killed in battle, San Mateo, Luzon, Dec. 19, 1899.

Lebret, le-brā', Georges, LL. D.: French deputy and lawyer; b. in Etampes, Nov. 7, 1853, of Norman parentage; studied law in Paris, where he was for a number of years a notarial clerk; received the degree of doctor of laws, and was by the Minister of Public Instruction placed in charge of missions for study in England and Scotland; was made a member extraordinary of the faculty of law at Caen, and five

years afterward filled the chair of the Civil Code, and was made full professor in 1885. He has held a number of public offices in the municipality of Caen, including that of municipal counselor, mayor, and Republican member of the first circumscription. He has published *Étude sur propriété foncière en Angleterre* (1882). F. Sturges Allen.

Lee, Fitzhugh: soldier; b. in Clermont, Fairfax co., Va., Nov. 10, 1835; graduated at the Military Academy in 1856 at the head of his class. He was commissioned second lieutenant in the Second Cavalry and was ordered to the Western frontier, where he was severely wounded in a fight with the Indians. At the outbreak of the civil war he was instructor in cavalry tactics in the Military Academy, but resigned his commission and entered the army of the Confederacy, in which he rose to the rank of major-general and had command of the entire cavalry corps of the Army of Northern Virginia. At the close of the war he returned to his home and devoted himself to farming. In 1885 he was elected Governor of Virginia. In 1896 he was sent to Havana as consul-general, which position he held until Apr. 5, 1898, when he was recalled on account of the threatened outbreak of war with Spain. He was nominated major-general May 4, 1898, and was put in command of the Seventh Corps of volunteer troops on May 26 of the same year. At the close of the war he was placed in command in Havana province.

Lee, Samuel Phillips: naval officer; b. in Fairfax co., Va., Feb. 13, 1812; entered the U. S. navy as a midshipman in 1825; commissioned lieutenant in 1837; commander 1855; captain 1862; commodore 1866; rear-admiral 1870; retired in 1873. In 1861, as commander of the war-sloop Oneida, he was active in the attack on Forts Jackson and St. Philip and the capture of New Orleans, preventing the capture by the Confederates of the officers and crew of the Varuna, and in other battles on the Mississippi. He was in command of the North Atlantic blockading squadron 1862–64, and of the Mississippi squadron 1864–65; was president of the board to examine volunteer officers for admission into the navy 1866–67; chief signal officer of the navy 1868–70, and in command of the North Atlantic fleet 1870–73. D. in Silver Springs, Md., June 7, 1897.

Leet Court: in the law of England, a court of record which originally was a court having criminal jurisdiction over the tenants and persons resident within the manor in those matters in which the sheriff's tourn had jurisdiction, and also was charged with the duty of view of frankpledge, or the duty of seeing that these associations were maintained perfect in order and number. The privilege of holding leet court still attaches to the lords of many manors in England, but the jurisdiction of these courts is now obsolete except for the purpose of presenting minor offenses in the nature of common nuisances requiring immediate redress.

In detail the jurisdiction of the leet courts originally included the presenting of minor criminal offenses arraignable at the next jail delivery, and also various smaller crimes, including the use of false weights and measures, breach of the peace, view of frankpledge, the breaking of manorial boundaries and hedges, the pursuit of villains, the impounding and release of stray cattle, eavesdropping, and numerous minor matters pertaining rather to the social and economical rights of the community and considered as nuisances, such as the corruption of public waters, keeping of diseased cattle, exposing for sale of stale fish and meat, etc. The leet courts were also charged with the duty of enforcing the repair of highways, the practice of archery, the preservation of fish and game, the wearing of such apparel as was prescribed by law as suitable to the rank of the wearer, the regulation of the consumption of wines according to the rank of the consumer, the fixing of the price of victuals to middlemen, the regulation of the felling of trees, the carrying on of the business of tanning, the receipt of tolls by millers, the prevention of forestalling the market and of laborers' conspiracies, etc. They have been gradually replaced since the sixteenth century by the issuing of commissions appointing persons to act as justices of the peace within certain districts. See Stubbs's *Constitutional History*; Pollock and Maitland's *History of England*; Pollock and Maitland's *Select Pleas in Manorial Courts*.

F. Sturges Allen.

Leeward Islands: Great Britain denominates her possessions in the Lesser Antilles as the Leeward and Windward island colonies; but the geographical expression Leeward islands, as applied to the northern part of the Lesser Antilles, is disappearing from some of the most authoritative atlases, because the name was based upon an erroneous distinction and has no geographical value. The British Government, in adopting the name, misunderstood or was misled by the reports of navigators, the fact being that all these islands on the outer margin of the Caribbean Sea are exposed at every season of the year to the action of the trade-winds and are all windward islands. Some of the leading atlases now apply the expression Windward islands to the entire chain, and designate the islands that hug the South American coast within the Caribbean Sea as the Leeward islands.

C. C. Adams.

Le Gallienne, Richard: author; b. in Birkenhead, England, 1865. He received education at the Liverpool College; abandoned a business life for the profession of letters. In 1887 he privately published a small volume of poems, later works being *Volumes in Folio* (1889); *George Meredith: some Characteristics* (1890); *The Book-Bills of Narcissus* (1891); *English Poems* (1892); *The Religion of a Literary Man* (1893); *Prose Fancies* (1894); *Robert Louis Stevenson, and other Poems* (1895); *Retrospective Reviews* (1896); *Prose Fancies* (1894–96); *The Quest of the Golden Girl* (1896); *If I were God* (1897); has edited an edition of William Hazlitt's *Liber Amoris*. In 1898 he traveled and lectured in the U. S.

Leggett, Mortimer Dormer: soldier; b. in Ithaca, N. Y., Apr. 19, 1831; graduated in medicine at Willoughby, O., in 1844; then studied law, and was admitted to the bar in 1845. In 1846 he organized the first system of union free schools in the State of Ohio. He was Professor of Pleadings and Practice in the Ohio Law College 1855–58, and superintendent of public schools in Zanesville 1858–62. Early in 1862 he recruited the Seventy-eighth Ohio Regiment of Infantry, and became its colonel, commanding it in the battles of Fort Donelson, Shiloh, and Corinth. In June, 1862, while acting as brigade commander, he captured Jackson, Tenn., and defended Olivia, Tenn., against a superior force. He was made brigadier-general in Nov., 1862. He was severely wounded at Champion Hills, and again at Vicksburg. Accompanying Gen. Sherman on his march to the sea, Gen. Leggett commanded the Third Division of the Seventh Army-corps. He was promoted to be major-general of volunteers in Aug., 1865, and resigned in September. He was appointed commissioner of pensions in 1871. He had been practicing law in Cleveland since 1881 until his death, in Cleveland, Jan. 7, 1896.

Legitim: in Scots law, the right of succession of children to one-third of the personal estate of their father. This right vests in them at once upon the decease of the father, and can not be diverted by him by a will, but may be expressly released or renounced by the child, or discharged by a special provision. This is one of the three parts into which the father's estate is divided, including the widow's Jus Relictæ (*q. v.*), and a third which is subject to his absolute disposal. F. Sturges Allen.

Lehmann, Liza (Mrs. Herbert Bedford): singer and composer; b. in London, England, of a German father and a Scotch mother; educated in Germany, Italy, and England. In 1896 she composed the work *In a Persian Garden*, by which she is best known. It is a selection from the *Rubáiyát* of Omar Khayyam, as translated by Edward Fitzgerald, set to music for soprano, contralto, tenor, and bass in solos and concerted numbers. D. E. Hervey.

Lemoinne, John Emile: French publicist; b. in London, Oct. 17, 1815; his education was begun in London and completed in France. He had been for some time employed in the Ministry of Foreign Affairs, and was acquainted with matters of state in England as few Frenchmen are, when, in 1840, he joined the editorial staff of the *Journal des Débats*. He retained this editorship more than fifty years, writing especially on English and other foreign political questions. He was alternately an advocate of the republic and of a constitutional monarchy, but in 1873 announced himself definitely in favor of the republic. Under the empire he often contrasted English institutions with French, and attacked the imperial rule with keen sarcasm. Under the republic, being no longer in the opposition and forced to look elsewhere for subjects to satisfy his critical bent, he directed against England his full force of sarcastic criticism. He was chosen a member of the French Academy in 1875, on the death of Jules Janin. In 1880, as a moderate Republican, he became a life member of the French Senate.

He was a frequent contributor to the *Revue des Deux Mondes.* He published numerous works on political history and biography. D. in Paris, Dec. 14, 1892.

Lenox, James: philanthropist; b. in New York city, Aug. 10, 1800; son of Robert Lenox, a merchant, from whom he inherited a large fortune in 1839; was educated at Columbia College, and studied law, but did not practice; during a visit to Europe began collecting rare books; spent the greater part of his life in gathering a library and paintings, which, together with numerous valuable manuscripts, engravings, marble statues and busts, and curios, he presented to New York city in 1870, together with the costly building which he had erected for their keeping; was president for many years of the Presbyterian Hospital, to which he gave about $500,000; was also president of the American Bible Society, which he liberally assisted financially; and gave freely to Princeton College and Theological Seminary and to many churches and charities connected with the Presbyterian Church; unostentatiously aided many poor authors and others; never married, and lived in strict seclusion, politely declining visits from many distinguished persons at home and abroad. He charged his relatives to give out no details of his life for publication after his death, and requested that not even the time of his funeral should be publicly made known. D. in New York city, Feb. 17, 1880.

Leo XIII., Encyclicals of: An encyclical is a circular letter sent by the pope to "all patriarchs, primates, archbishops, and bishops of the Catholic world," in which he condemns some erroneous teaching, emphasizes some line of conduct, warns against some impending danger, discusses some practical subject, or otherwise shows his paternal solicitude for the Church confronted by some problem or hindrance. The present pope has written a number of these letters, and each time has been listened to respectfully by the whole Christian world, while sometimes his opinions thus expressed have occasioned much discussion and even controversy. The original language of these letters is Latin, which the pope writes with the skill and elegance of a master, but they are always promptly translated. They abound in apt quotations of Scripture and the patristic writings, and are always in good temper.

Leo XIII. was enthroned as pope on Mar. 3, 1878; on Easter Sunday, Apr. 21, 1878, he issued his first encyclical, "The Church as the Mother of True Civilization," which is in the nature of a salutation to the Church and more general in its contents than those which follow. He deplored the degeneracy of the times, which he attributed to the widespread defection from mother Church; claimed that the Church has always been the bulwark of civilization and the source of popular happiness, that the popes as heads of the Church have fostered the things that make for progress, and that it is to them that Italy owes her "substantial glory and magnificence." But temporal power is essential for the guarding and continuing of the entire freedom of the spiritual power. Hence it is a crime to deprive the papacy of its secular government. His predecessor, Pius IX., was right in condemning the errors of the times. One such error is that marriage is a civil contract. In conclusion he declared that the unanimity with which the Church welcomed him was an inspiration in the discharge of his onerous duties.

On Dec. 28, 1878, he issued an encyclical against the "Dangers from Socialism, Communism, and Nihilism," each of which "sects" he declared to be inimical to authority, the family, and private property. He found their common source in the Protestant Reformation of the sixteenth century, whence rationalism sprang. Opposite these "sects" he put the Catholic Church, the determined foe to all error and the preserver of civilization. This encyclical so pleased Czar Alexander II. that he ordered it to be read in all the Catholic churches of Russia. On Aug. 4, 1879, his theme was the "Restoration of Philosophy according to the Philosophical Principles of St. Thomas Aquinas." (The pope evinced his devotion to Aquinas by being the inciter and patron of the definitive edition of the works of Aquinas, whose preparation began in 1880, and which has been appearing from the press since 1882.) On Feb. 10, 1880, his theme was "Christian Marriage." He laid great stress on its sacramental character, and deprecated the degradation involved in viewing it as a civil contract, and especially in the permission of divorce. On Sept. 30, 1880, he wrote on "The Sainted Apostles of the Slavs, Cyril and Methodius," whose feast he raised to higher rank, and thus gave a distinct mark of favor to Slav Catholics; on Dec. 3, 1880, on "Catholic Missions," which he commended to the prayers and pecuniary support of the faithful, and mentioned three especially worthy missionary societies by name.

On June 29, 1881, he discoursed on the "Origin of Civic Authority," which he found to be in God; on Sept. 17, 1882, on St. Francis of Assisi and the Third Order of St. Francis, whose history he sketched, and whose value, especially as a weapon against socialism, he particularly emphasized. It is interesting to know that the mother of Leo XIII. belonged to the Third Order of St. Francis, as it gave a personal note to this encyclical. On Sept. 1, 1883, Aug. 30, 1884, Sept. 22, 1891, Sept. 8, 1892, Sept. 8, 1893, and again on Sept. 8, 1894, his theme was the Rosary of the Blessed Virgin Mary, and to the special use of this rosary he urged the faithful to set apart the entire month of October. This fact accounts for the date of these encyclicals. Thus he gave public and repeated testimony to his faith in the rosary as teaching perseverance in prayer and in the Virgin Mary as the loving helper in the battle with the evils of the time. On Apr. 20, 1884, he condemned Freemasonry. On Nov. 1, 1885, he set forth the "Christian Constitution of States"—God is the founder of civil society and the source of public authority; he has founded the Church also, and thus State and Church both derive their authority from God and each has its proper sphere. He reaffirmed the syllabus of Pius IX., but showed how it had been misinterpreted. On June 20, 1888, he discoursed on "Human Liberty," showing the true and false views on the subject; on Dec. 25, 1888, on the "Christian Life," describing its nature and giving directions for its culture; on Jan. 10, 1890, on "The Most Important Duties of Christians in the State"—both Church and State are to be loved, and the latter obeyed, also, when not ordering contrary to divine authority; the Church is the ruler of rulers.

The encyclical which was issued on May 15, 1891, "On the Condition of Labor," attracted wide attention. It was promptly brought out in a special edition, with an open letter from Henry George to the pope. The pope acknowledged that his subject was difficult and delicate, but the urgency of the matter was the excuse for handling it. He began with a long deliverance against socialism, which he condemned because it would destroy private property; he denied that rich and poor are intended by nature to live at war with one another, but he exhorted the rich to deal kindly and liberally with the poor, and remember that all are alike the children of the same Heavenly Father. He asserted the claim of the Church to be considered the arbiter of all disputes between the poor and the rich, the dispenser of that divine grace whereby the ills of society are to be cured, and in an especial sense the friend of the needy. He then passed on to speak of the part the State should play in the work of remedy and relief. To it the interest of all should be equal. It should not interfere with the individual or the family, but should allow both to act freely, provided the common good is respected. It should protect the weak against the strong, the rights of property against spoliation; secure to the laborer rest on Sunday and on certain holy days, and arrange the hours of labor in accordance with the kind of work and the age and sex of the worker. As to wages, workman and employer should make free agreements, but the remuneration should be sufficient for the workman's reasonable and frugal support of himself and family. Societies for mutual help should be encouraged, as also workmen's associations, when they are founded in religion. Catholic associations are of invaluable service to discouraged and wronged work-people, as they help them out of their difficulties, invite them to companionship, and receive the repentant to a shelter in which they may securely trust.

On Nov. 18, 1893, Pope Leo's important deliverance on "The Study of Holy Scripture" appeared, in which he gave a sketch of the reception and study of the Scriptures in the Church, and directions for a thorough course of biblical study. On June 20, 1894, he pleaded for "The Unity of the Faith" of all princes and peoples on earth, and on June 29, 1896, for "The Unity of the Church." Both encyclicals showed how deeply desirous he was that the schismatic Greek and other Oriental churches and the heretical Protestant Church should return to the true fold. He set forth the advantages of such a reunion of Christendom both as it would affect the present Christian world and the heathen world, which would be quickly won by united effort.

Leo XIII. was the author of two apostolic letters which especially roused the English-speaking world. The first was on Apr. 14, 1895, addressed to the English people. He mourned the separation of so many of them from mother Church, and in gentle, earnest tones pleaded with the "separate brethren" to return. He called upon the Catholics of England to show their possession of the true faith by the superior lives they led. He reminded them that long ago England was called "Mary's dowry," and invoked the special aid of St. Gregory, St. Augustine, and "those other saints of God through whose wonderful virtues and no less wonderful deeds England has merited the title of 'Island of the Saints,'" and of SS. Peter and George, and especially Mary, the Holy Mother of God, to bring back the errant people to the fold. He appended a special prayer to Mary to this end, and promised an indulgence of three hundred days to whosoever would repeat it piously. The second letter was on "Americanism," dated Jan. 22, 1899, and was addressed to Cardinal Gibbons. It is sharper in tone than was customary with the pope, because he believed the evils it combated threatened "the integrity of the faith and the security of the faithful." The grievance was the currency given to "certain opinions concerning the way of leading Christian life," in the biography of Father Isaac Hecker, founder of the Paulist Fathers (d. 1888), as written by Father Walter Elliott, and published by the press of the order in New York city in 1891. "The underlying principle of these new opinions is that in order more easily to attract those who differ from her the [Roman] Church should shape her teachings more in accord with the spirit of the age, relax some of her ancient severity, and make some concessions to new opinions. Many think that these concessions should be made, not only in regard to ways of living, but even in regard to doctrines which belong to the deposit of the faith. They contend that it would be opportune, in order to gain those who differ from us, to omit certain points of her teaching which are of lesser importance, and to tone down the meaning which the Church has always attached to them." The letter showed that "such a policy would tend rather to separate Catholics from the Church than to bring in those who differ." So the pope was "not able to give approval to those views which, in their collective sense, are called by some 'Americanism.'"

A complete collection of the encyclicals of Leo XIII. has been published by Herder in Freiburg in Baden in the original Latin, with a German translation on opposite pages (4 collections, 1878–80, 1881–85, 1888–91, 1891–96). Several of them in English translation appear in one volume, *The Pope and the People: Selected Letters and Addresses on Social Questions* (London, 1895). Others have appeared separately. SAMUEL MACAULEY JACKSON.

Leonard, ALBERT, Ph. D.: educator; b. in Logan, O., Dec. 21, 1857; graduated at the Ohio Central Normal School in 1876, and at Ohio University 1888; A. M., Ohio University, 1891; Ph. D., Hamilton College, 1894; tutor in Ohio University; principal of high school, Dunkirk, N. Y., 1888–93; principal of high school, Binghamton, N. Y., 1893–97; dean of the College of Liberal Arts and Professor of Pedagogy, Syracuse University, since 1897; editor of *The Journal of Pedagogy*.

Leoncavallo, RUGGIERO: composer; b. in Naples, Italy, in 1858; studied in the conservatory there, and at the age of sixteen began a professional career as a pianist. Becoming acquainted with Wagner's works, he determined to be an opera composer. In 1888 he had finished the text of *I Medici*, and a year later completed the music. Three and a half years later he offered the opera *I Pagliacci* to Sonzogno, the publisher. This work established his fame. Since then he has composed several other works.
D. E. HERVEY.

Leschetizki, THEODORE: pianist and teacher; b. in Langert, Austrian Poland, in 1830; a pupil first of his father, and later of Carl Czerny; began to teach when fifteen years old; and from 1842 to 1852 played at many concerts with success. In 1852 he went to St. Petersburg, remaining there for twenty-seven years as a teacher, performer, and composer. He then returned to Vienna, where he has since remained. In 1880 he married Annette Essipoff, the pianist, his former pupil. He numbers among his pupils many of the world's best pianists. His compositions are not numerous, and are entirely for the piano, except an opera, *Die Erste Falte*, given in Prague in 1867. D. E. HERVEY.

Leutze, EMANUEL: historical painter; b. in Gmünd, Würtemberg, May 24, 1816; early emigrated to the U. S. with his parents, first living in Philadelphia, and then in Fredericksburg, Va.; after experimenting in art, studied in Düsseldorf, devoting himself to historical subjects, especially such as relate to the discovery and history of America; studied under Kaulbach in Munich in 1843; visited Venice and Rome, and after an Italian tour returned to Düsseldorf, where he remained for fourteen years; returned to the U. S. in 1859, and opened a studio in New York city. He was commissioned by the Government in 1860 to paint a large mural fresco for one of the grand staircases in the Capitol, Washington, the subject chosen being *Westward the Star of Empire Takes its Way*, for details in the scenery of which he visited the Rocky Mountains, and again resorted to Kaulbach in Munich for instruction in fresco mechanism. He became a member of the National Academy in the same year. Among his celebrated paintings are *Columbus before the Council of Salamanca* (purchased by the Düsseldorf Art Union); *Columbus in Chains* (purchased by the Art Union of New York); *Columbus before the Queen*; *Landing of the Norsemen in America*; *Cromwell and his Daughter*; *The Court of Queen Elizabeth*; *Henry VIII. and Anne Boleyn*; *The Iconoclast*; *John Knox and Mary Stuart*; *Washington Crossing the Delaware*; *Washington at Monmouth*; *Washington at the Battle of Monongahela*; *News from Lexington*; *Sergeant Jasper*; *Washington at Princeton*; *Elaine*; *Mother's Visit*; *The Storming of Teocalli*; *Settlement of Maryland by Lord Baltimore*; *Mary Stuart Hearing the First Mass at Holyrood after her Return from France*; portraits of Gen. Grant, Gen. Burnside, and some artists; and *Lafayette in Prison at Olmütz Visited by his Relatives*. He received other commissions from the Government, which were never finished, and had sketched in pencil a large picture to be called *The Emancipation*. D. in Washington, D. C., July 18, 1868.

Levasseur, *le-vaăs'sėr'*, PIERRE EMILE: geographer and economist, member of the Institute; b. in Paris, Dec. 8, 1828; studied at the Collège Bourbon; entered the École normale in 1849, and was assistant professor at the Lycée d'Alençon 1852–54. He was engaged in educational work in several higher institutions of learning in France till 1876, when he became Professor of Statistical and Economic Geography at l'École libre des sciences politiques in Paris. He has since taken a distinguished part in the international statistical and geographical congresses held in Europe and America. He was very active in the reorganization of geographical instruction in the French schools, was one of the founders of the Society of Commercial Geography in Paris, is the author of a series of school geographies, and has written many historical and geographical works, among which are *La France avec ses colonies* (1878); *Les Alpes et les grandes ascensions* (1889); and *Grand Atlas de géographie physique et politique* (1890–92). C. C. ADAMS.

Levi, HERMANN: conductor; b. in Giessen, Germany, Nov. 7, 1839, and after studying in Leipzig obtained his first engagement as a conductor, when twenty years old, in Saarbrucken. In 1861 he was opera conductor in Rotterdam, in 1864 in Carlsruhe, and in 1872 at the Court theater, Munich. He was selected by Wagner to conduct the first representation of *Parsifal* in Baireuth July 28, 1882. He ranks among the few great conductors of the world. D. E. H.

Lewis, ABRAM HERBERT, D. D.: Seventh-day Baptist clergyman; b. in Scott, Cortland co., N. Y., Nov. 17, 1836; graduated at Alfred University, Alfred Centre, N. Y., the chief denominational educational institution, 1863; was pastor in Westerley, R. I., 1864–67; in New York city 1867–68; became Professor of Church History and Homiletics in Alfred University 1868; was general agent of the American Sabbath Tract Society, 1869–72; pastor in Plainfield, N. J., 1880–96; since then has been corresponding secretary of the American Sabbath Tract Society. He edited *The Outlook and Sabbath Quarterly* from 1882 to 1896, and since *The Sabbath Recorder*, with which it has been merged. His publications include *A Critical History of the Sabbath and the Sunday in the Christian Church* (New York, 1886, 2 vols.); *A Critical History of Sunday Legislation from 321 till 1888 A. D.* (1888); *Paganism Surviving in Christianity* (1892); *Swift Decadence of Sunday: What Next?* (Plainfield, N. J., 1899).
S. M. J.

Liadow, ANATOLE: musician; b. in St. Petersburg, Apr. 29, 1855; educated there and has always remained there. He is a musician of the Neo-Russian school, and is now a

teacher of theory at the St. Petersburg conservatory and also at the imperial chapel. He has composed much music of great merit.

Liberia: The growing and exporting of coffee has become the leading industry. The exports increased from 600,000 lb. in 1886 to 3,000,000 lb. in 1896. American vessels seldom touch at Liberian ports, but about one-fourteenth of the coffee exports are sent to the U. S. viâ Liverpool. The best coffee grown there is the Liberian, which is limited to the latitude of the country. It was found growing wild by the original settlers in 1822, and they took it from the forests and transplanted it into their gardens. It is not a shrub, like many species, but grows to a robust and hardy tree which thrives for a long period. Coffee-trees are still in vigorous bearing that are known to be more than fifty years old. A plantation does not yield its full crop until about seven years after planting. It is still cleaned and prepared for market in a crude and primitive way. The population is nearly stationary, the citizens numbering not more than 20,000. In 1897 the population of Monrovia, the capital, was estimated to be 5,000; Robertsport, 1,200; Buchanan and Edina, 5,000; Harper, 3,000; and Greenville (Sinoe), 1,000. In the year 1896–97 Germany held the first place in the exports from Liberia, with $330,-106; England second, with $253,673; Holland third, with $102,023; and the U. S. received goods direct valued at only $3,227. All these European states have direct steamship communications. Total exports were $689,031, of which coffee, palm-kernels, and palm-oil were the chief items. The value of imports was $505,235, of which Germany supplied $260,510; England, $188,359; Holland, $33,323; U. S., $16,937; and British and Spanish colonies, $6,103. The chief imports were liquors, rice, and tobacco. C. C. A.

Liebling, George: pianist; b. in Berlin, Jan. 22, 1865, and studied there and with Liszt in Weimar; when sixteen years old was appointed teacher in Kullak's academy in Berlin, remaining until 1876. Since then he has been playing in concerts in all European countries. In 1890 he was appointed court pianist to the Duke of Saxe-Coburg-Gotha.

Liebling, Max Emil: pianist; b. in Hultschin, Silesia, Sept. 22, 1846; studied in Posen and Berlin; went to the U. S. in 1878 and made a tour of the West with Wilhelmj, the violinist, creating a great sensation by his brilliant performances. Settled in New York, where he remains teaching. His compositions are all for the piano and are of the light and popular style.

Liebling, Sally: pianist; brother of George Liebling; b. in Posen, Prussian Poland, Apr. 8, 1859, and was educated there and in Berlin; gave concerts when twelve years old in the principal German towns, and in 1875 went to the U. S. and played in concerts with Theodore Thomas's orchestra, also traveling with various violinists and singers on tours till 1883, when he returned to Berlin. In 1884 he remained for a season with Liszt in Weimar, and in 1888 founded the new Conservatory of Music in Berlin.

Lighthall, William Douw, M. A.: author; b. in Hamilton, Ontario, Dec. 27, 1857; graduated at McGill University in 1879. He took the degree of B. C. L. at the same university in 1881 and that of M. A. in 1885. He practiced his profession in Montreal, but devoted much of his time to letters. He became honorary corresponding member of the Scottish Society of Literature and Art, and a fellow of the Royal Society of Literature of Great Britain. Among his published works are *Thoughts, Moods, and Ideals* (1887); *The Young Seigneur* (1888); *Montreal after 250 Years* (1892); *The False Repentigny; or, The Life-Guard of Marie Antoinette* (1889); and *An Account of the Battle of Chateauguay* (1889).

Light, Standards of: In photometry, which is the art of measuring the illuminating power of flames and other sources of light, the unknown light is compared with some fixed and definite source as a standard. A *primary standard* is one which is accurately reproducible. The apparatus for producing the light must be so completely defined both as to construction and operation that it is always possible by following the description to obtain precisely the required illuminating power. Sources of light which are not thus reproducible, but which, after comparison with a primary standard, are steady enough to serve for photometric purposes, are termed secondary standards. On account of the great industrial importance of the art of photometry, long-continued efforts have been made to find a satisfactory standard of light. Many such standards have been proposed and have been subjected to searching investigation to determine their fitness.

Standard Candles.—The first of these in order of mention are the standard candles, which are important on account of the very long time during which they have been in use, and because, at the present time, illuminating power is almost invariably expressed as candle-power. The name, on account of its familiarity, seems likely to remain long after the candle as a standard of light has gone out of use. The unit most widely employed in photometry is the *British candle*, which was specified by act of Parliament in 1860 to be the light of a sperm candle weighing six to the pound and burning 120 grains an hour.

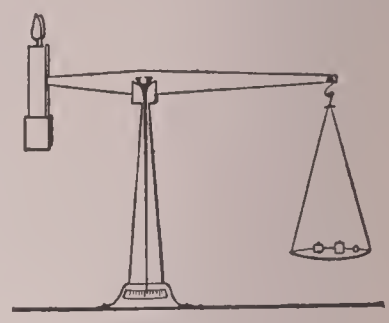


Fig. 1.

To test the rate at which the spermaceti wax of British candles is consumed, these are commonly weighed while burning upon a *candle-balance* (Fig. 1). Two such candles are lighted simultaneously, one at the large and one at the small end, so as to eliminate the effect of their conical form, and are placed in a holder at the end of the short arm of the balance. The ratio of the arms is 1 : 2, so that the two candles are equivalent to one candle suspended from a balance with equal arms. Weights not quite sufficient to counterbalance the candles are placed upon the scale-pan and the precise time is noted when, by the burning away of the latter, equilibrium occurs. A small known weight is now removed from the scale-pan, and the time when equilibrium is again restored by the further wasting away of the candles is noted. The intervening interval gives the rate of burning.

In Germany at least two standard candles have been extensively used. The first of these is the candle adopted by the German Association of Gas Manufacturers. It is known as the *Vereinskerze*. This is a paraffin candle which has a uniform diameter of 20 mm., differing in this respect from the British candle, which is cast in a conical mould. Its construction is defined to the minutest detail, even the number of strands of wick being given. Its performance is specified by designating the normal height of the flame (50 mm.), instead of attempting to prescribe the amount of fuel consumed in a unit of time.

The other German candle, which is known as the *Munich candle*, was devised for the purpose of specifying the unit of light in the negotiations between that city and the local gas-lighting company. It is a stearin candle slightly conical in form. The diameter is 20·5 mm. at the upper end and 23 mm. at the base. The wick is formed of 50 strands. This candle is designed to consume between 10·2 and 10·6 grams of stearin per hour and to burn without the necessity of snuffing. The normal height of the flame is 56 mm.

The French candle, *la bougie de l'étoile*, is less widely known. The standard of light in France had long been the Carcel lamp, to be described presently, and the candle has always been regarded as of minor importance. The flame of the French candle is supposed to consume 10 grammes of stearin per hour, with a flame-height of 52·4 mm.

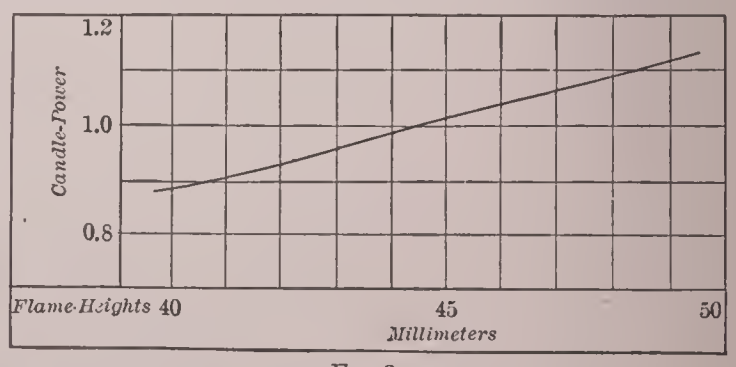


Fig. 2.

The *bougie décimale*, adopted by the International Congress of Electricians in Paris (1889), is a hypothetical standard merely, defined as one-twentieth of the light of the Violle platinum standard, which latter had been accepted by that body as the absolute standard of light. Its relation

to the various actual candles described above will be found in the table at the end of this article.

A comparison of the German method of specifying the performance of the candle by means of its flame-height with the British method, which defines only the amount of material consumed, is all in favor of the former procedure. A considerable number of experiments have been made in which flame-height and intensity are compared. The curve in Fig. 2 shows results of such measurements in the case of the British candle. It is from measurements by Sharp.* The curve agrees in character with those obtained by numerous other students of this subject, and likewise with curves taken by means of the galvanometer, in which the eye, and we owe our most precise knowledge of the behavior of the candle and of other sources of light to measurements made with the bolometer. Sharp and Turnbull* made an extended investigation by this method of the performance of various light standards. Curves representing their results were plotted with ordinates representing the relative brightness of the flame and abscissas corresponding to times measured from the instant when the flame was ignited. Three such charaeteristic life-curves are shown in greatly reduced size in Fig. 3. They represent the fluctuations in the flame of a British candle during sixty minutes after ignition. To avoid confusion, the base-line of the curve marked III is lowered two spaces, that of curve IV four

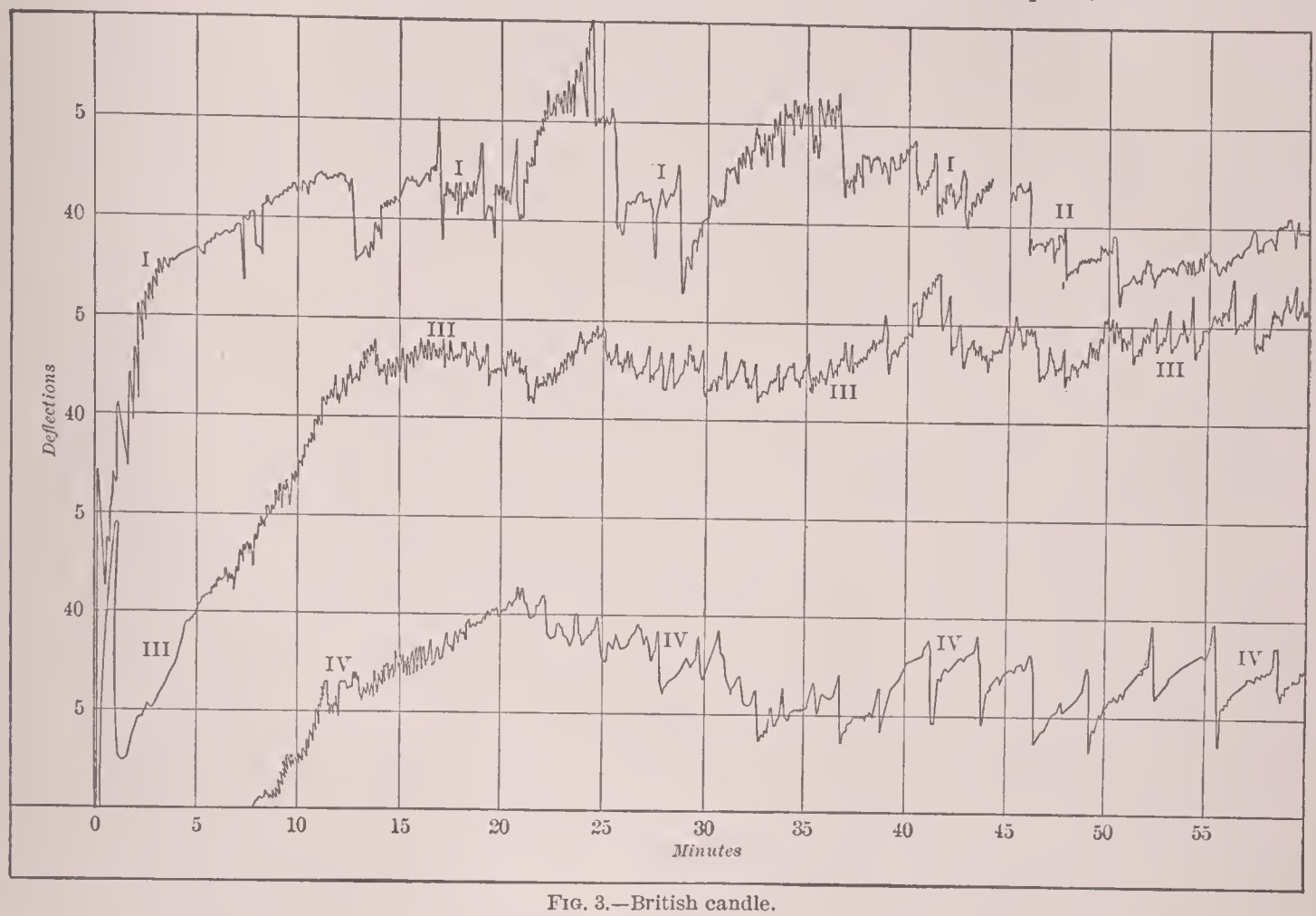


FIG. 3.—British candle.

total radiation was measured by means of the thermopile or bolometer and all uncertainty of the eye was eliminated.

Were the variation of intensity with the height of the flame the only difficulty with which the users of candles as standards of light have to contend, the matter would be a simple one. By means of a magnifying device, in which an image of the flame is thrown by a lens upon a small ground-glass screen provided with a vertical scale, flame-height can be readily measured. The investigations of practical photometry show, however, that the candle is subject to many other sources of variation than this. A committee appointed by the Board of Trade in Great Britain to investigate the performance of British candles found, for example, a difference of 15 per cent. in the average brightness. Another committee acting for the Council of the Gas Institute in London found the average difference between individual candles to be 7·05 per cent. Dibdin, working for the Metropolitan Board of Works, made extensive tests, as the result of which he reported that British candles showed a maximum variation of 14·9 per cent., and that the mean variation was 3·6 per cent. Variations of from 5 to 8 per cent. occurred frequently, while less than 14 per cent. of his measurements were within 1 per cent. of the mean of the entire set. A Dutch committee which made its report in 1894 confirmed these statements, and showed that every change in the length and shape of the wick, every difference in the height of the melted wax in the cup of the candle, affects the illuminating power. It has also been found that candles vary by more than 8 per cent. in intensity with the moisture of the atmosphere.

These fluctuations are difficult to follow by means of the spaces. It will be seen that the flame reaches approximately its normal height after twenty minutes, and that it is subject to many marked fluctuations, the most abrupt of which are downward, namely, in the direction of diminution of light. This sudden falling off of candle-power was found to be due to the burning away and breaking off of the wick, the light rising after each such crisis as the wick increased in length, until it was burned off anew.

The performance of the German candle (*Vereinskerze*) is shown in Fig. 4, which represents a portion of the life-curve

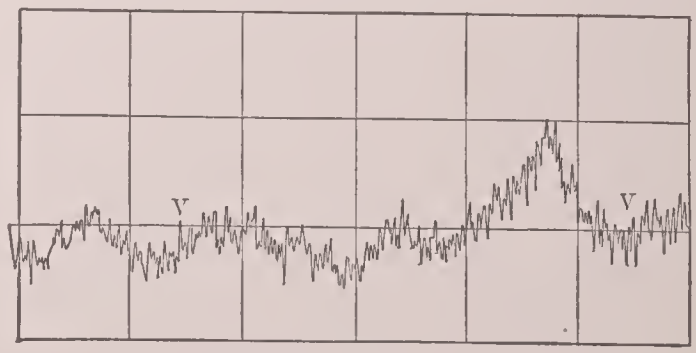


FIG. 4.—Vereinskerze.

of such a candle that had already been burning thirty minutes. The fluctuations in this case, although of a different character, are scarcely less marked than those of the British candle, and they are such in both cases as to suggest the abandonment of candles altogether as standards of light.

* Nichols, Sharp, and Matthews, *Transactions of the American Institute of Electrical Engineers*, vol. xiii. (1896).

* Sharp and Turnbull, *Physical Review*, vol. ii., p. 1 (1884).

The Carcel Lamp.—Substitutes for the candle as a light standard have been very numerous. One of these, the Carcel lamp, of which brief mention has already been made, has been in use in France since the beginning of the nine-

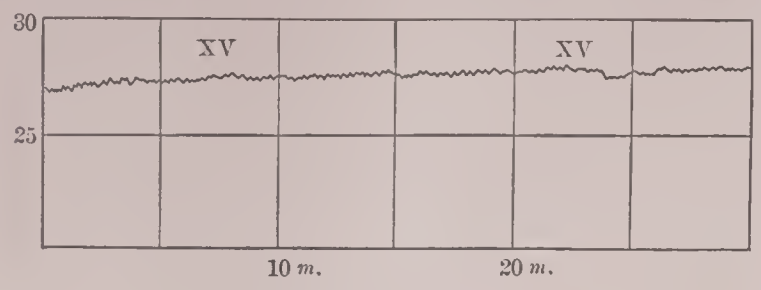


Fig. 5.—Carcel lamp.

teenth century. It is a modified form of the Argand burner supplied by clockwork with a mechanical central draught. The fuel burned in this lamp is colza oil. The flame of the Carcel lamp, which is protected by a chimney, is comparatively free from the fluctuations to which naked flames are subject. Fig. 5 shows a portion of its life-curve likewise taken by means of the bolometer. It will be seen that the flame was remarkably free from sudden disturbances, but that it showed a tendency to drift in total brightness during the half-hour covered by this portion of the curve. Dibdin found in thirty-two sets of observations a mean deviation of 1·33 per cent., with a maximum deviation from the mean of 4·1 per cent.

It has been held as an objection to the Carcel lamp that there are so many factors which it is necessary to control as to make it a satisfactory standard only in the hands of experienced and scrupulously careful observers. The height of the wick, the shape of the chimney, and the rate at which the central draught is supplied all affect the brilliancy of the flame. The determinations of Sharp and Turnbull upon this source show that unless these factors are carefully looked to very considerable deviations are to be expected. A lamp burning freely without attempt to control its performance showed total fluctuation of 18 per cent. By attending minutely to all adjustments and precautions, experienced photometricians have been nevertheless able to obtain excellent results from this lamp.

The Methven Standard.—Gas-flames are also widely used in photometric work. Methven (in 1878) provided a metal screen to be attached to the Argand burner, with a rectangular aperture so situated as to cut off all but the central and most highly luminous portion of the flame. With this device, which is known as the *Methven slit*, this burner may be regarded as a primary standard. The size of the opening in the Methven screen is varied according to the quality of the gas with which it is to be used. With a gas that has not been especially enriched the opening is 1 inch in height by 0·233 inch in width. These dimensions are intended to give a light through the opening of two candles. By running the gas through benzene or some such hydrocarbon, and thus enriching it, Methven found it possible to obtain better results. The size of the opening under these conditions was 0·585 inch in length by 0·310 inch in width. Fig. 6 shows the form of the screen applied to a standard London Argand burner. Studies of the behavior of this standard do not show a very satisfactory result. Dibdin found frequent fluctuations of from 2 to 5 per cent. when a gas of nearly uniform composition was used. With the varying richness of the gas much larger errors occurred. Indeed, the variations in the quality of ordinary illuminating gas are such as to throw the Methven standard out from serious consideration excepting as a secondary standard which needs to be repeatedly compared with some more staple source of light. Measurements with the bolometer fully corroborate the fluctuating character of the gas-flame even when provided with the screen.

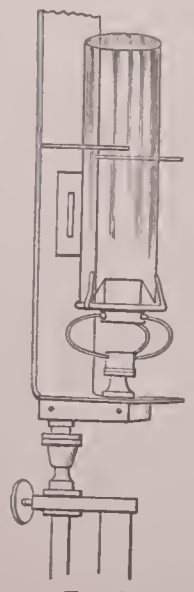


Fig. 6.

It has been shown by the study of these and other flames that the fluctuations in light standards are due to variations in the supply of fuel and consequently of flame-height, in the size and material of the lamp or burner, in the rate at which oxygen is supplied to the flame, and finally in the quality or composition of the fuel. Of these sources of variation the first can be corrected for by adjustment of the height of the flame or by the use of an intervening diaphragm. The second difficulty can be controlled by proper care in specifying the size and method of constructing the lamp, and the third by doing away with mechanical draughts. The fourth source of variation, which is the most serious of all —that due to differences in the quality of the fuel—can be met only by abandoning altogether the mixtures that serve ordinarily as burning oils, illuminating gases, and so forth.

The Pentane Lamp.—In England, Harcourt has attempted to supply a constant fuel by the use of pentane. The Harcourt lamp is shown in Fig. 7. It has a heavy metal chimney, within which the flame burns. The wick serves only to carry the volatile fuel up from the body of the lamp to the base of the chimney, where it volatilizes and feeds a flame at the top of an inner tube, as shown in Fig. 8. Only the central portion of the flame is visible, a second chimney, supported on two arms and adjustable as to height, serving to cut off the upper portions. In the hands of some observers this lamp has given excellent results. The flame is of a fine white color, and the measurement of its height is avoided by the use of the upper chimney, which is set once for all, so that the portion of the flame visible in the aperture will be the equivalent of two candles. The principal objection to this lamp lies in the fact that commercial pentane is by no means a fuel of constant composition. It is, in fact, simply a mixture of the lighter hydrocarbons, which is somewhat more uniform than the similar fluids known as benzene, gasoline, and petroleum ether.

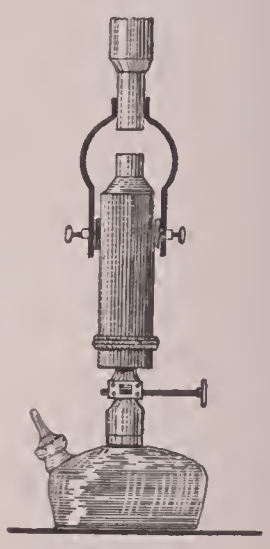


Fig. 7.

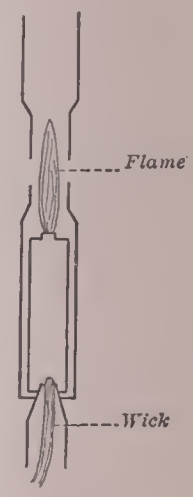


Fig. 8.

The Amyl Acetate Lamp.—In Germany the problem of providing a standard of light which should be supplied by a fuel of constant composition has been more successfully solved. Hefner-Alteneck * (1885) described a lamp in which amyl acetate ($C_7H_{14}O_2$), a volatile liquid of definite composition, is the fuel. This lamp, which has since been very carefully studied, has been found to give such uniform results that it has been adopted in Germany as the official standard in place of the candle. The entire lamp is of metal (Fig. 9), and the vapor of the volatile fuel burns at the end of a tube in free air. It is supplied by means of a wick which fills the tube, and the flame is adjusted to normal flame-height of 40 mm. by means of a magnifying eye-piece, which is permanently attached to the lamp itself. The materials of which the lamp is made and its dimensions are most carefully specified for the purpose of volatilizing the liquid at a fixed temperature, which depends upon the thickness of the walls and the conducting power of the metals of which they are composed. The wick-tube is of German silver 8 mm. of inner diameter, with walls 1·5 mm. in thickness. Its height is 25 mm. The advantage of this standard over all others thus far constructed consists in the ease and certainty with which the flame can be brought accurately to a fixed value. Liebenthal † found that with proper adjustment of the flame-height the mean error of an observation lay between 0·5 and 1·5 per cent. Dibdin found

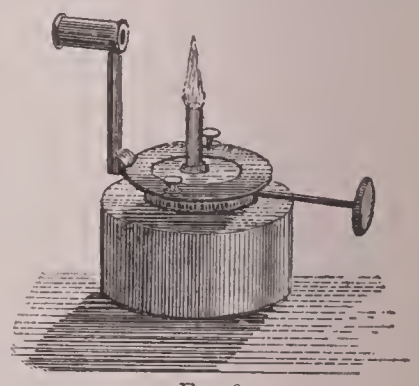


Fig. 9.

* Von Hefner-Alteneck, *Elektrotechnische Zeitschrift*, vol. iii., p. 445.

† Liebenthal, *Elektrotechnische Zeitschrift*, vol. viii., p. 504.

90 per cent. of his observations to lie within 1 per cent. of the mean of the entire series of 225 which he made.

The agreement among themselves of different specimens of the Hefner lamp depends upon the precision with which

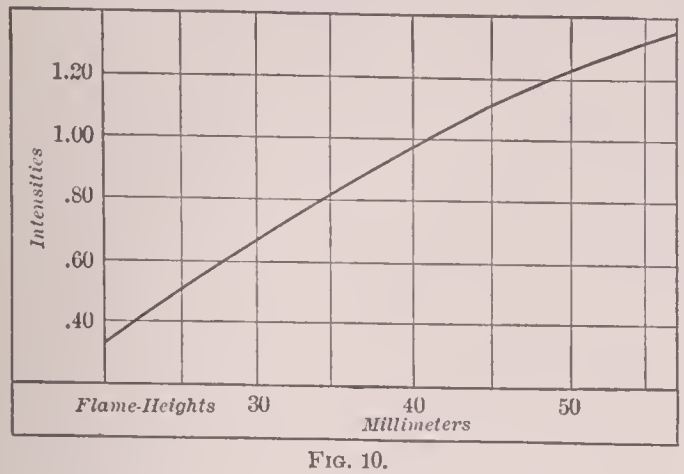


FIG. 10.

they are constructed. Until special attention had been called to this point it was found that the lamps produced by different makers varied through several per cent. They have, however, of recent years been much more closely standardized. Impurities in the amyl acetate affect the brightness of the flame only when present in considerable quantities. The addition of 20 per cent. of amyl alcohol, which is a frequent adulterant, was found to reduce the candle-power by 1·1 per cent. Ten per cent. of ethyl alcohol reduces the brightness of the flame by 3 per cent. The most serious of the uncontrolled errors to which the Hefner lamp is due is that which arises from the variation in the moisture of the atmosphere. Liebenthal,* who made observations running over more than a year, for the purpose of determining the relation between the hygrometric state pressure of the air and the amount of carbon dioxide which it contains, upon the brightness of the flame, found that the Hefner lamp was of normal intensity during March, April, and May, and again in October and November; that during the summer its intensity was on the average 2 per cent. too small, and during December, January, and February about 2 per cent. larger than the normal value. These fluctuations are traceable chiefly to the moisture of the air, the intensity decreasing uniformly as the moisture increases.

The variation in the candle-power of this lamp with the height of the flame is, as will be seen by a comparison of Fig. 10 with Fig. 2, very similar to that found in the case of the British candle. Bolometric observations show that, while the Hefner lamp is subject to marked disturbance from draughts, its average intensity fluctuates much less than that of the other naked light standards studied by this method. A compilation of the numerous comparisons of the candle-power of the Hefner lamp with that of the British candles, made by various observers, leads to the adoption of the value 0·88 as the proper candle-power of this source.

The Acetylene Flame.—Another fuel of constant composition which is available for use in photometry is acetylene (C_2H_2). The flame of this gas burning in air is white and of high illuminating power. Studies which have thus far been made upon it seem to indicate that when the proper method of constructing the standard burner has been specified a light standard will probably result which is superior to any hitherto produced. The details of this construction were in 1899 not yet completed.

Platinum Standards.—Violle † has proposed the use of the light emitted by melting platinum, one sq. cm. in surface, as a standard of illumination. The apparatus for producing the molten platinum is cumbersome, and the quantity sufficient for this purpose makes the process an expensive one. Moreover, the few attempts to repeat Violle's operation, as described to the Electrical Congress in Paris, and adopted by that body, have not led to a good result. Elaborate experiments at the Imperial Institute for Technical Research in Charlottenburg appear to have demonstrated the impracticability of the Violle standard. Various propositions to use glowing platinum at lower temperatures have been made, notably one by Lummer and Kurlbaum, ‡ in which the degree of incandescence is specified by means of the ratio of light-giving energy to total energy emitted by the foil. Their method has not been widely introduced.

Blondel's Arc Standard.—Blondel * has studied the use of the crater of the positive carbon of the arc lamp as a primary standard. The remarkable constancy of the temperature of the crater had long been known. It had been pointed out by Abney, and later by Violle and by S. P. Thompson, that the intrinsic brightness of this portion of the carbon surface under varying currents and lengths of arc shows no appreciable fluctuations. To isolate this portion of the surface, Blondel introduced a diaphragm containing an aperture of very small size (1 mm. in diameter). The crater of the arc, which is inclined to the vertical sufficiently to bring it into convenient view, is isolated by means of this diaphragm, which is placed close to it and is kept cool by a stream of water.

The study of the behavior of such a standard by means of the bolometer has shown that this source of light is not to be compared in constancy even with the worst of the ordinary flame standards used in photometry. Fig. 11 shows the character of a portion of the life-curve thus obtained. This standard has never come into practical use.

Many sources of light which at first sight might appear well adapted for standards are excluded because they owe their brightness in part to luminescence rather than to normal radiation. The behavior of such sources and the manner in which they fall off in intensity, with the time, is described in the article LUMINESCENCE (*q. v.*). The best practice in photometry at the present day consists in adopting as a primary standard the Hefner lamp or the pentane lamp,

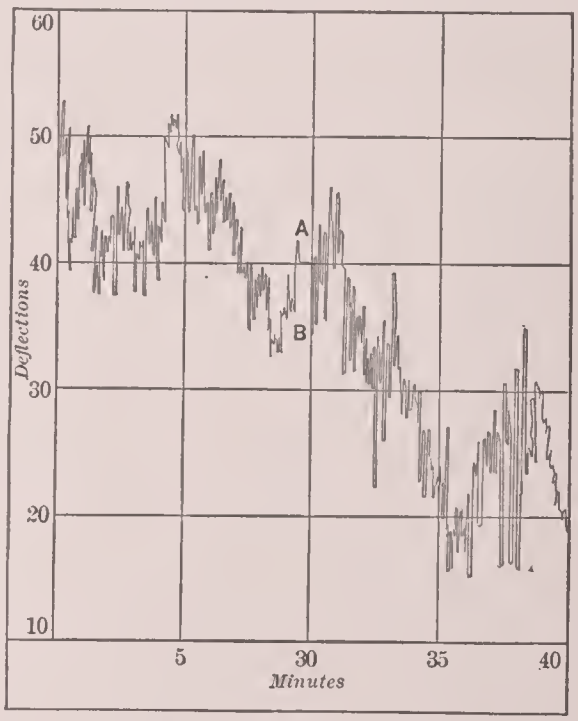


FIG. 11.—Blondel arc standard. (Between the points A and B there was a time-interval of 20·5 minutes.)

preferably the former, and comparing with this some definite secondary standard of greater candle-power. For this purpose incandescent electric lamps are frequently used to advantage. The flame of petroleum lamps properly handled likewise gives a satisfactory result, while for purposes of gas photometry the Methven slit is widely used. The ratio of the various sources of light already described, in so far as they have been accurately determined, is given in the following table. The data are compiled from the comparisons made by Violle † between his platinum standard and some of the others mentioned in this article.

VALUES OF VARIOUS LIGHT STANDARDS IN TERMS OF THE BRITISH CANDLE.

	Candle-power.
Violle standard	18·5
Carcel	8·91
Bougie de l'étoile	1·15
Vereinskerze	1·13
British candle	1·00
Hefner lamp	0·98
Bougie décimale	0·925

That considerable discrepancies are to be expected in such measurements is obvious. As has already been pointed out,

* Liebenthal, *l. c.*

† Violle, *Annales der Chimie et Physique*, 6th series, vol. iii., p. 373.

‡ Lummer and Kurlbaum, *Elektrotechnische Zeitschrift*, vol. xv., p. 474.

* Blondel, *Proceedings of the International Congress of Electricians at Chicago* (1893), p. 315.

† See Palaz, *Photometrie*, p. 155.

the most probable value for the candle-power of the Hefner lamp is 0·88, instead of 0·98. The latter is, for example, very nearly the value obtained by the German committee of gas and water engineers under the direction of Hugo Krüss.* They found for the Vereinskerze and the Hefner lamp in terms of the British candle:

$$\frac{\text{Vereinskerze}}{\text{British candle}} = 1{\cdot}07$$

$$\frac{\text{Hefner lamp}}{\text{British candle}} = 0{\cdot}885$$

These results were the mean in each case of nearly 2,000 measurements.

For further details, see Dibdin, *Photometry* (London, 1889); Palaz, *Photometrie Industrielle* (translated by Patterson, New York, 1894); also *Report on Standards of Light, Transactions of the American Institute of Electrical Engineers* (vol. xiii., 1896). E. L. Nichols.

Lily, or Lilly, William: English educator; b. in Odiham, Hampshire, England, 1466; educated at Oxford, traveled in the East, and studied in Greece and Rome, and also in Paris. Returning to London in 1509 with a high reputation for scholarship, he founded a grammar school, and was apparently the first who taught Greek in London. Dean Colet appointed him, in 1512, high master of Saint Paul's School, which Colet had just founded. In this position he labored until his death, in 1529. He was the author of several educational works, among them *Brevissima Institutio seu Ratio Grammatices Cognoscendæ*, commonly known as Lily's Grammar, one of the most celebrated of all textbooks. In the compilation of the work he had the assistance of Colet, Erasmus, and Cardinal Wolsey. King Henry VIII., who himself wrote an introduction to grammar, taking Lily's Grammar as a basis, caused a law to be enacted by which this grammar was prescribed for exclusive use in all the schools of the kingdom. It was the accepted grammar in the English schools for more than three centuries, and is still used in Saint Paul's School. Lily was a friend of Erasmus and of Sir Thomas More.

C. H. Thurber.

Lindley, Sir Nathaniel, LL. D.: English jurist; b. in Acton Green, Middlesex, 1828; son of John Lindley, the botanist; was educated at University College, London, and called to the bar at the Middle Temple in 1850; created queen's counsel in 1872; was appointed judge of the court of common pleas in 1875, and was lord chief justice of appeal 1881–97, in which last year he was appointed master of the rolls. He is well known for his *Introduction to the Study of Jurisprudence* (1855), and his treatise on *The Law of Partnership and Companies* (6th ed. 1893).

Lindsey, Charles: Canadian author and writer on public history; b. in Lincolnshire, England, in 1820, where he received his education; went to Canada in 1841 and was one of the editors of the *Toronto Examiner*; in 1853 became editor-in-chief of the *Toronto Leader*, the Conservative organ of Western Canada; in 1867 was made registrar of deeds for the city of Toronto; in 1882 fellow of the Royal Society of Canada, from which position he subsequently resigned; in 1890 became registrar for the western division of Toronto. He has written many articles on public questions for periodicals, and published among others the following works: *The Clergy Reserves: their History and Present Position* (1851); *Prohibitory Laws: their Practical Operation in the United States* (1855); *The Prairies of the Western States* (1860); *The Life and Times of William Lyon Mackenzie*, with an account of the Canadian rebellion of 1837 (2 vols., 1862); *Rome in Canada—The Ultramontane Struggle for Supremacy over the Civil Authority* (1878).

Lindsley, John Berrien, M. D., D. D.: educator; b. in Princeton, N. J., Oct. 24, 1822; graduated at the University of Nashville in 1839; studied medicine at the Universities of Louisville and Pennsylvania, receiving the degree of M. D. at the last-named institution in 1843; also studied theology and was ordained in 1846 by the Presbytery of Nashville. For some years he preached in the Nashville district and at the same time studied chemistry under Gerald Troost, whom he succeeded in 1850 as Professor of Chemistry in the University of Nashville. From 1853 to 1873 he was chancellor of that institution, also retaining the chair of Chemistry until 1870. The stone building that forms the main portion of the university owes its erection chiefly to his energy, and he gave more than $10,000 for its construction. Dr. Lindsley was active in the organization of the medical department of the university in 1850, and was its first dean. In 1867 he organized the Montgomery Bell Academy, and three years later had much to do with the founding of the Tennessee College of Pharmacy, in which he held the chair of Materia Medica from 1896 until his death, Dec. 7, 1897. He was also Professor of Chemistry and State Medicine in the University of Tennessee 1880–97. He was a member of the Nashville board of education 1856–60, superintendent of city schools in 1860, and secretary of the State board of education from its inception in 1875. Dr. Lindsley was also health officer of Nashville 1876–80. From 1877 until his death he was secretary and executive officer of the State board of health. The degree of D. D. was conferred on him by Princeton in 1856. He was a member of many medical and scientific societies. For many years he edited the *Nashville Journal of Medicine and Surgery*, for the support of which he contributed his salary from the medical department of the University of Nashville. He was a large contributor to scientific and popular journals, and was the author of *Our Ruin: its Causes and Cure* (Nashville, 1868) and *The Military Annals of Tennessee* (1886). Marcus Benjamin.

Liquid Air: Air was first liquefied in 1878, in which year Cailletet in Paris and Pictet in Geneva, by means of a combination of pressure and cooling, succeeded in converting both nitrogen and oxygen into the liquid form. In order to cool the gases of which air is made up to temperatures below their critical temperatures (−118° for oxygen, −146° for nitrogen), it was necessary to add to the effect produced by the liquid ethylene or the carbon dioxide which were the refrigerants used respectively by Cailletet and Pictet, by allowing the compressed gas to cool by its own expansion.

The principle of the early processes for the liquefaction of air and other gases may be stated briefly to consist in bringing gases to a high pressure, 100 to 300 atmospheres, in a vessel surrounded by a liquid refrigerant, which is reduced to the lowest possible temperature by being compelled to boil *in vacuo*, and in suddenly releasing the compressed gas thus cooled from pressure. This third operation suffices to lower the temperature beyond the critical point, with the result of liquefying a portion of the gas. This method with various modifications was developed and perfected independently by Wroblewski and Olszewski in Russia and by Dewar in England. Olszewski began his experiments in 1883, and in 1890 he constructed a machine by means of which it was possible to obtain liquid air in considerable quantities.

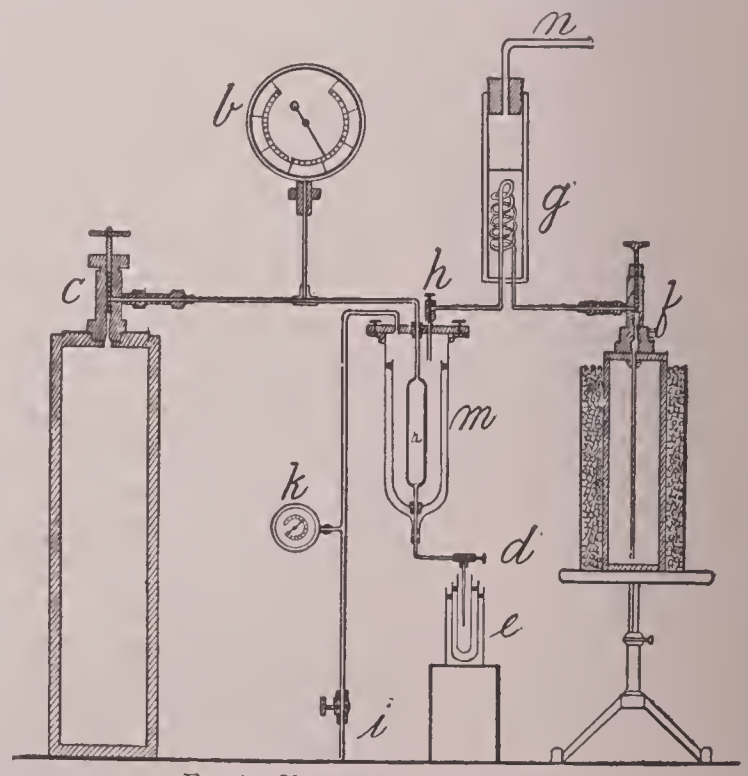


Fig. 1.—Olszewski's machine (1890).

The essential features of Olszewski's apparatus are shown in Fig. 1. A small steel cylinder, *a*, with a capacity of 200 cubic cm., is connected by means of a copper tube of fine

* Krüss, *Bericht der Lichtness-Commission des Deutschen Vereins von Gas- und Wasserfachmanner*, München, 1897.

bore with a pressure-gauge, *b*, and an iron flask which contains the gas to be liquefied (oxygen or air) at a pressure of 100 atmospheres. The hole in the bottom of the cylinder *a* is fitted with a similar copper tube, through which, by opening the small valve *d*, the liquid air can be drawn out into a glass vessel with three walls (*e*). In order to obtain in the *a* a temperature below the critical point of the gas, the cylinder is placed in a glass vessel with double walls, which is filled with liquid ethylene. This refrigerating substance is drawn from the iron flask *f*, which contains about one kilogramme of the liquid. The flask is cooled by a packing of salt and ice, and its contents before entering the refrigerating vessel *m* passes through a worm within the vessel *g*. This vessel is filled with a mixture of ether and solid carbon dioxide, the temperature of which when boiling in the open air is −78° C. By means of a small air-pump attached at *n*, the pressure in this vessel is reduced to 50 mm., and in this partial vacuum the temperature of the liquid falls to −100° C. The vessel *m*, within which *a* is situated, is then allowed, by opening the valve *h*, to receive the cold ethylene. The pressure in *m* is likewise reduced by the action of a second air-pump working through the tube *i*, which removes the evaporated ethylene and forces it into a gasometer, where it is stored for further use. As soon as the gauge *k* indicates that the pressure in the receiver *m* has fallen to a point such as to insure the necessary lowering of temperature, air or oxygen is allowed to enter from the cylinder *c* and becomes liquefied in *a*, after which *c* is closed and the stop-cock *d* is opened. The liquefied gas thereupon flows into the glass vessel *e* already described.

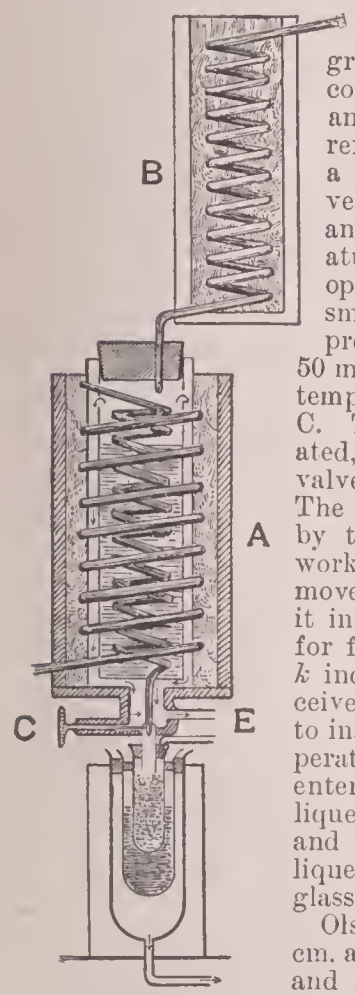


FIG. 2.—Dewar's apparatus (1886).

Olszewski was able to obtain 200 cubic cm. at one operation with this apparatus, and he states that when the machinery was once started it was possible to repeat the operation every fifteen minutes. The pressure to which it is necessary to reduce the liquid ethylene in order to carry the temperature below the critical point was found to be as follows:

TEMPERATURE OF LIQUID ETHYLENE AT VARIOUS PRESSURES.

Pressures.	Temperatures.	Pressures.	Temperatures.
146 mm.	−122° C.	31 mm.	−139° C.
107 "	−126	12 "	−148
72 "	−129·7	9·8 "	−150·4
56 "	−132		

To liquefy oxygen alone the pressure must be lowered, therefore, to about 100 mm., while to liquefy air the exhaustion must be carried to 20 mm.

Prof. Dewar, at the Royal Institution in London, whose long-continued investigations are better known to the English-speaking public than are those of the Continental experimenters, had as early as 1886 constructed an apparatus by means of which small quantities of liquid oxygen or air could be produced, and could be drawn off into an open vessel for use in scientific work. This apparatus, a diagram of which is shown in Fig. 2, consisted of a series of worms each surrounded with a refrigerating bath. Air or oxygen at a pressure of 75 atmospheres entered the outer of the two spiral coils in the lower vessel (A) at 0° C., and after passing upward through a bath of solid carbonic acid and downward through the inner worm, which is submerged in liquid ethylene, made its exit in the liquefied form through the valve C. In order to bring this inner worm below the critical temperature, the evaporation of the liquid ethylene was hastened by means of an exhaust-pump attached at E. A supply of liquid ethylene was obtained by means of a worm contained in a refrigerating bath, B, above the part of the apparatus already described as shown in the illustration. This apparatus was capable of delivering 22 cubic cm. of liquid oxygen at a time. This gas seems to have been employed rather than air for the reason that it has a higher critical temperature, and is therefore more easily converted into the liquid state.

In 1892 the Royal Institution possessed an apparatus by means of which a pint of liquid oxygen could be produced at a time. It was first exhibited in a lecture by Dewar on June 10 of that year. The machine consisted of a gas-engine which drove two compressing pumps. The oxygen to be liquefied was pumped into a chamber surrounded by two refrigerating agents; one of these was ethylene, the other nitrous oxide. A certain amount of liquid ethylene was admitted to the refrigerating chamber intended for that liquid and there evaporated. It was then returned in the form of gas to the compressing pump and liquefied, after which it again entered the refrigerating chamber. Alternate liquefaction and evaporation of the nitrous oxide was carried on simultaneously by means of the other pump. In these experiments a hundredweight of ethylene was used. The cycle of operations was essentially the same as that common in refrigerating machinery in which ether or ammonia is employed.

In 1895 Linde, of Munich, who had long been employed in the construction of refrigerating apparatus by the ammonia process, and who recognized the great value of liquid air for the production of extreme cold, brought out an apparatus for the production of that material in large quantities. Linde made use of one only of the cooling processes employed in the previous machines, that, namely, which has its source in the sudden expansion of the compressed gas. By means of a throttle-valve, air previously compressed to about 2,500 lb. to the square inch was allowed to expand, passing into a worm or spiral coil. This sudden reduction of pressure was accompanied, as is always the case, by a lowering of the temperature. The worm just mentioned consists of a double coil, one tube within the other, and it is to the inner tube that the throttle-valve is attached. The air, released from pressure and grown cold, is returned to the pump through the outer of these two tubes, and thus completely surrounds the oncoming air in the inner tube of the coil. The latter, therefore, when it reaches the valve, has the same temperature as the air previously released from pressure, and in turn its temperature is reduced to a still lower point. Returning through the outer tube, it chills the oncoming air still further, and thus a continuous process of refrigeration occurs, which finally reduces the

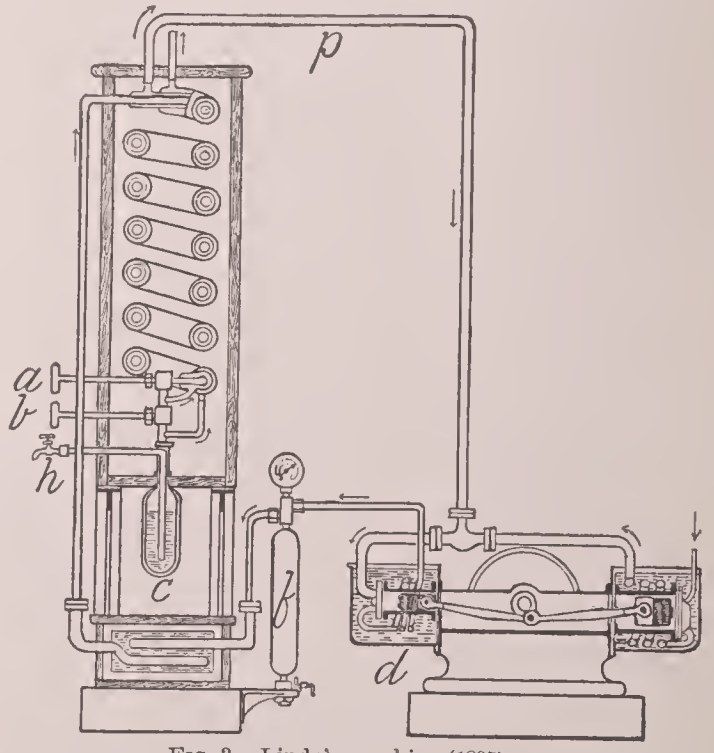


FIG. 3.—Linde's machine (1895).

temperature to a point below the critical temperature of air without the aid of an extraneous refrigerant. When this stage is reached a portion of the air is liquefied and may be drawn off.

In a later apparatus Linde makes use of a triple tube in his cooling worm. The arrangement is shown in Fig. 3. In this machine the compressing pump has two cylinders, the first of which receives air from the outer atmosphere and compresses it to 16 atmospheres, in which condition it is delivered to the second cylinder, *d*, to be further compressed to 200 atmospheres. After each of these com-

pressions the air passes through a coil of pipe shown in cross-section in the diagram, surrounded, as is the whole of each cylinder, by a water-jacket. In this way the heat developed in the process of compression is removed. In order to free the compressed air from moisture it is passed through a separator, *f*, then through a coil surrounded by a freezing bath of brine, the temperature of which is low enough to congeal entirely the remaining moisture. The compressed air thus cooled enters the innermost of three concentric coiled tubes, which constitute the refrigerating worm. At the lower end of this worm it reaches the first of two throttle-valves (*a*). In passing through the valve *a* the air is reduced to a pressure of 16 atmospheres, and returns, traversing the middle of the three tubes of the coil, through the pipe *p* to the pump, where it is recompressed to its original pressure of 200 atmospheres. About one-fifth of the air thus reduced in pressure is allowed to escape through the second throttle-valve, *b*, and to fall to a pressure of 1 atmosphere. This portion of the air passes through the outermost of the three tubes of the coil and escapes. The object of this double throttling is not only to utilize the complete expansion of a portion of the air for the sake of its cooling effect, but to maintain the larger part at the pressure of 16 atmospheres, by which means the work to be done by the compressing pump is materially reduced. In a short time after the apparatus has been put into operation liquid air begins to drop from the throttle-valve *b*. This is allowed to collect in the jacketed receiver *c*, and is drawn off through the tube *h*.

With Linde's machines nine-tenths of a liter of liquid air is produced, with the expenditure of three horse-power. In 1898 a large machine to be used in an improved process for the manufacture of chlorine was under construction. It will produce 50 liters of liquid air per hour, with an expenditure of 120 horse-power.

Numerous machines requiring from five to seven horse-power were at that time (1898) already in use on the continent of Europe.

In the U. S. investigations looking to the production of liquid air on a large scale have been carried on for several years. Mr. C. E. Tripler, of New York, began to experiment, indeed, according to his own statement,* as early as 1890. Mr. Tripler, like Linde, employs the method of expansion, and takes advantage of the cooling of the gas by its release from a pressure of 2,000 lb. per square inch to reduce the gas to a point below the critical temperature. In Tripler's apparatus compressed air, after having been cooled by contact with water from the city mains, passes into the inner portion of a double tube; the outer portion is supplied with expanded and consequently extremely cold air by means of the valve through which a portion of the air from the compressor passes, and in this way the temperature of the air within the inner tube is reduced to the point necessary to liquefaction.

The machine used by Tripler (1898) produces from 6 to 7 liters of liquid per hour, with an expenditure of 30 to 40 horse-power. Liquefaction is said to begin within fifteen minutes after the compressor is started.

Properties of Liquid Air.—Liquid air, like air in the gaseous state, is a mixture of nitrogen, oxygen, carbonic acid, and argon. There is usually present a certain amount of aqueous vapor and of other gases which may be regarded as impurities. At the extremely low temperatures at which air can be obtained as a liquid the aqueous vapor is frozen, and it thus appears as a solid suspended within the liquid. Carbon dioxide is likewise frozen, and the quantity of this gas usually present is sufficient to fill the otherwise clear liquid with white particles which give it a milky appearance. This can be removed by filtration, and the liquid air thus filtered is found to be clear, limpid, and of a slightly bluish color. The physical constants of the three gases of which this liquid may be considered a mixture are given in the following table:

GAS.	Critical temperature.	Critical pressure (atm.).	Boiling-point (760 mm.).	Freezing-point.
Nitrogen	−146° C.	35·0 atm.	−194·4° C.	−208·0° C.
Argon	−121	50·6	−187·0	−189·6
Oxygen	−118·8	50·8	−182·7	−184·0

The three components of liquid air differ greatly in specific gravity. Nitrogen has a density of 0·885, oxygen of 1·24, and argon of 1·5. These values are taken at a pressure of 1 atmosphere and at the respective boiling-points of the liquids.

The mixture which we call liquid air can scarcely be said to have physical constants, for the reason that, owing to the different boiling-points, the gases evaporate at very different rates. The result is that the mixture changes from the moment of its production, growing steadily richer in oxygen. This fact gives the process of liquefying air one of its chief commercial values, in that it affords a ready means of securing comparatively pure oxygen. When liquefied air evaporates, according to Linde's experiments, quoted by Ewing, the percentage of oxygen in the liquid increases during evaporation, as shown in the following table:

EFFECT OF EVAPORATION UPON THE COMPOSITION OF LIQUID AIR.

Amount of liquid not evaporated.		Amount of oxygen in the remaining liquid.	
100	per cent.	23·1	per cent.
50	"	37·5	"
40	"	50·0	"
30	"	60·0	"
20	"	67·5	"
10	"	77·0	"
5	"	88·0	"

Thus Linde found that in practice, after four-fifths of the liquid air had been allowed to evaporate, the residue would contain about 50 per cent. of oxygen. In order to secure a product rich in oxygen, he modified his liquefier in such a way as to utilize for cooling purposes the gas given off from the surface of the liquid already formed. This liquid contains chiefly nitrogen, and the unevaporated remainder consequently grows steadily richer and richer in oxygen.

Of the two principal components of liquid air, nitrogen is slightly diamagnetic. Oxygen, however, is very strongly magnetic, its magnetic moment being about one thousandth that of iron. When brought between the pole-pieces of an electro-magnet the liquid is strongly attracted and is held in the field against the action of gravity. Fig. 4 shows the

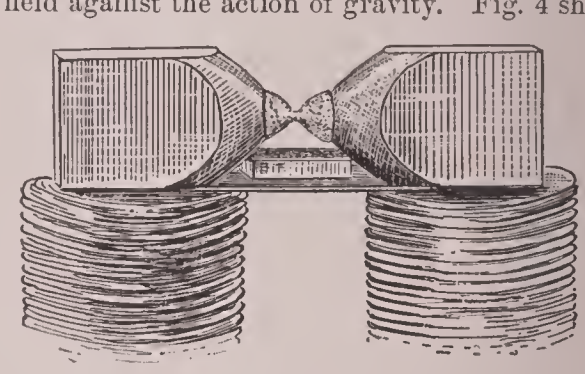


FIG. 4.—Liquid oxygen between the poles of an electro-magnet (Dewar).

appearance of the liquid thus suspended between the poles. Liquid air, on account of the large proportion of oxygen which it contains, behaves in the magnetic field much in the same way. Liquid air is an excellent insulator, and the effect of the very low temperature at which it exists at atmospheric pressure is to increase the conductivity of copper to about ten times its value at ordinary temperatures. The suggestion has been made to surround such conductors for the transmission of heavy currents with a layer of liquid air, for the double purpose of providing a high-class liquid insulator and of increasing in the above proportion the carrying capacity of the wires.

The effect upon the electric resistance of various metals which results from cooling them to the temperature of liquid air is shown in Fig. 5, in which ordinates are resistances and abscissas are temperatures from −273° C. (the absolute zero) to +100° C. It will be seen that the resistance is in every case rapidly diminished with falling temperatures, and it seems probable that if the absolute zero could be reached in such experiments all metallic resistances would become indefinitely small. The data are from measurements by Fleming and Dewar.

The scientific uses of liquid air are numerous. By the use of it as a refrigerant it has been found possible to reduce the last of the so-called permanent gases—namely, hydrogen and helium—to the liquid and even to the solid form, and likewise to study the physical properties of matter at temperatures in the neighborhood of − 200°. When apparatus for the production of liquid hydrogen shall have been developed to a point such as to permit the making of large quantities of this substance, it is probable that the range of

* *Scientific American*, vol. lxxviii., p. 214 (1898).

temperatures will be extended downward by the process of boiling this element *in vacuo* to temperatures extremely near the absolnte zero.

The time has already come when a machine for the liquefaction of air is felt to be an almost necessary portion of the equipment of physical laboratories.

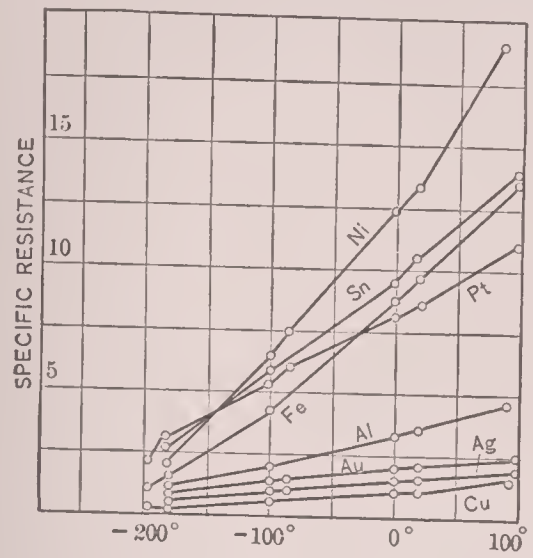


FIG. 5.—Resistance of metals at low temperatures. (Fleming and Dewar.)

The University of Leyden has had a completely equipped cryogenic laboratory in operation for several years under the direction of Prof. Onnes,* and several German laboratories have been provided with machines of the Linde type. The range of investigation which it is possible to make by means of this new refrigerant is a very wide and very important one. At the Royal Institution in London alone researches have been already carried on, on radiation at low pressures, on refraetive indices, on spectroscopy of the liquefied gases, on electric conductivity and thermo-eleetric properties of various metals, on latent and speeific heats of various substances at — 200°, on capillarity, on chemical action, on magnetic properties, on tensile strengths of metals, on phosphorescence and the photographie activity of sensitive plates, on dielectric constants of iee and aleohol and of oxygen and air in the liquid states, on permeability and hysteresis of iron and of oxygen and air, on the separation of helium from other gases in mineral waters, and in 1898, when for the first time hydrogen was made in considerable quantities, on the properties of that element in the liquid and solid forms.

In the domain of chemistry much has been achieved. Fluorin, for example, a substance chemically so universally active that it was for a long time found impossible to obtain it save in combination with other materials, has been isolated and its properties studied by produeing it at the temperature of liquid air. At this temperature it was found to be a comparatively inert substance. Argon, the very existenee of whieh in considerable quantities as a constituent of the air had been totally unsuspeeted, has been separated from the nitrogen with which it is eommonly mixed and its properties studied as one of the results of these researches. We owe to Prof. Dewar an ingeniously eonstructed vessel for the keeping of liquid air. Where large quantities are to be handled it is customary to pour the liquid into a large can containing several gallons and to jacket this with felt or other substances such as are commonly used for heat insulation. Under these cireumstances the liquid continues to boil with great activity and the loss by evaporation is considerable. Smaller quantities of the liquid can be much more completely prevented from gaining heat from outside by means of Dewar's flask (Fig. 6). This consists of an inner tube containing 100 or 200 cubie cm., which is sealed into the neck of a larger vessel of glass. The outer vessel is attached to a mercury-pump and its contents exhausted until a very high degree of vacuum is reached. Under these conditions all loss of heat by convection disappears. The liquid air contained in the inner tube ean then gain heat from outside only by the very slow process of conduction along and through the thin walls of the vessel and by direet radiation. The exchange of temperature by radiation is further reduced by the device of placing in the outer elosed vessel a small amount of mercury. This liquid evaporates, and its vapor freezes upon the wall of the inner tube, forming a very perfeet mirror. Such a mirror refleets a large proportion of the radiant heat reaching it from without, and in this way the liquid air is further shielded from the heating effects of its environment. The air when plaeed in such a flask boils very slowly, and the volume diminishes by evaporation so gradually that a considerable portion remains even after an interval of twenty-four hours. The good performanee of such tubes has been found to depend, however, upon the excellence of the vacuum. Hempel* found that a layer of eider-down, or even of wool previously dried at 100° C., was decidedly superior as a means of preserving freezing-mixtures to many of the Dewar tubes obtained from dealers.

FIG. 6.—Vacuum tube for liquid air.

Many industrial uses for liquid air have been suggested, among the most obvious of which are its use as a high explosive, as a substitute for the ordinary receivers of compressed air in the driving of air-engines, as a refrigerant to be used in increasing the thermal range of steam-engines (by which means it is plain that the theoretical efficiency of the engine can be somewhat inereased), and as an ordinary cooling material to take the place of those produced by the refrigerating machinery in which ammonia and other vapors are used at the present day. Its use in the manufaeture of ehlorine has already been mentioned. There are doubtless many technological proeesses in which it will be employed.

The following is a list of some of the more important memoirs on the liquefaction of air and other gases which have appeared since the beginning of Olszewski's experiments in 1883: 1884, Cailletet, *Comptes Rendus*, 98, p. 1565; 1885, Olszewski, *Comptes Rendus*, 100, p. 350; Wroblewski, *Wiedemann's Annalen*, 25, p. 371; 26, p. 134; 1887, Olszewski, *Wiedemann's Annalen*, 31, p. 58; Olszewski, *Monatshefte der Chemie*, 8, p. 69; 1888, Dewar, *Philosophical Magazine* (5), 26, p. 286; 1889, Dewar, *Proc. Royal Inst.*, May; Olszewski, *Wiedemann's Annalen*, 37, p. 337; 1890, Olszewski, *Bulletin de l'Acad. de Cracovie*, June, p. 176; 1892, Olszewski, *Wiedemann's Annalen*, 42, p. 633; Dewar, *Electrician*, 29, p. 169; Dewar and Fleming, *Philosophical Magazine* (5), 34, p. 326 (1892), and 36, p. 271 (1893); 1893, Dewar, *Proc. Royal Inst.*, January; 1894, Liveing and Dewar, *Philosophical Magazine* (5), 38, p. 235; Dewar, *Proceedings of the Royal Institution*, January; Dewar, *Chemical News*, 70, p. 252; Onnes, *Verslagen Kon. Akad. van Wet. Amsterdam*, p. 164; 1895, Dewar, *Philosophical Magazine* (5), 39, p. 298; Liveing and Dewar, *Philosophical Magazine* (5), 40, p. 268; 1896, Linde, *Wiedemann's Annalen*, 57, p. 328; Dewar, *Proceedings of the Royal Institution*, Mareh; Olszewski, *Wiedemann's Annalen*, 59, p. 184; Onnes, *Communications from the Lab. of Physics, Leyden*, No. 23; Dewar and Fleming, *Proceedings Royal Society*, 60, p. 358; 1897, Dewar and Fleming, *Proceedings Royal Society*, 61, p. 316; Dewar and Fleming, *Proceedings Royal Society*, 62, p. 2; Dewar, *Proceedings of the Chemical Society*, 71, p. 186; Moissan and Dewar, *Comptes Rendus*, 124, p. 1202; 125, p. 505; Ewing, *Journal of the Society of Arts;* 1898, Dewar, *Proceedings of Royal Society*, 63, p. 256. E. L. NICHOLS.

Liquid Assets: cash assets or such other assets as can be at once converted into cash. The term is most frequently employed in connection with the banking business or other forms of business that require large capital which it may be necessary at any time to convert into cash for use at once or on very short notiee. Strictly speaking, cash alone is a liquid asset; but the term liquid assets is usually applied in the case of bankers to cash, money at call, and government seeurities; and these, with bills of exchange, loans and advanees, and the real estate of the bank, constitute the general divisions into which a banker's assets are divided. The ease or readiness with which assets not strictly liquid assets can be converted into eash depends largely upon the extent to which it is neeessary to convert them, and the conditions under which the conversion has to be made. For example, call loans are loans made to other bankers or brokers or individuals, to be paid on demand, and are secured by bills of exchange or other securities, each borrower depending upon his being able to realize on his securities in order to pay his

* See *Beiblätter zu dem Annalen der Physik*, vol. xix., p. 554 (1895).

* W. Hempel, *Berliner Berichte* (1898).

loan if necessary, that is, if it is called; hence, in the time of panic, when the amount of money that can be borrowed on such assets is insufficient to meet the demand for money to pay such loans, these assets, which in ordinary times would be perfectly liquid assets, can not be realized upon or converted into cash when needed, and perhaps not for so long a time afterward as practically to rob them of their value as liquid assets. F. STURGES ALLEN.

Liquidator: in Great Britain, an officer appointed to conduct the winding up of a company. In case of a voluntary winding up, the liquidator is appointed by the company; in the case of a compulsory winding up, by the court; and if no other person is appointed as liquidator in the compulsory winding up, the official receiver acts in this capacity. His acts are subject to the control of the committee of inspection of the shareholders, the board of trade, and the court. He may carry on the business of the company and bring or defend actions and settle all claims with the consent of the committee; he can sell the property of the company or collect its assets, and distribute dividends without their consent. In the matter of the administration of the affairs of his office he is under the control of the board of trade, and his legal powers are subject to the order of the court. Prior to 1890 the court could, at any time after the presentation of a petition for winding up a company, appoint a provisional liquidator to protect the assets of the company, pending the appointment of the official liquidator. See Lindley's *Treatise on the Law of Companies*; Buckley on *The Companies Acts*; and Hamilton's *Manual of Company Law for the Use of Promoters and Directors*. F. STURGES ALLEN.

Liquor Laws: a general term designating the laws passed by a state or government regulating the use and sale of intoxicating liquors, and fixing the rights of individuals directly or indirectly injured by their illegal sale.

The term *liquor* alone when used in the statutes prohibiting its sale is construed to mean an intoxicating or spirituous liquor, and under this heading are included alcohol, ale, beer, whisky, brandy (including blackberry brandy), rum and gin, champagne, and vinous liquors generally. The question as to whether a liquor is intoxicating or not is usually a question of fact to be decided in accordance with the nature of the effects of the liquor when drunk by man; but a liquor such as alcohol, which is intoxicating, does not become any the less an intoxicating liquor by dilution. Hard cider is also usually construed to be an intoxicating liquor. Liquors are frequently divided into vinous, spirituous, malt, and brewed liquors. Where liquors are used as a basis for medicated bitters the question as to whether they continue to be regarded as intoxicating liquors or as medicines usually depends upon whether their use as a beverage is rendered practically impossible by the use of the medical ingredients.

History of Liquor Laws.—In Great Britain liquor legislation practically begins with the act 9 George IV., which with modifications has been extended down to the present time; but legislation on this subject is more advanced in the U. S. and the British colonies than it is in Great Britain. Sunday closing is only partially required in Great Britain, but is very general in the U. S. and in the British colonies; and the principle of local option, which is recognized in many of the colonies and largely in the U. S., and that of prohibition, which has gained considerable foothold in some parts of the U. S., are practically not recognized in Great Britain. As a result of the many amendments and modifications of the statutes in Great Britain without any general repealing act, the full scope and detail of many existing enactments are difficult to understand distinctly. In Great Britain the principal act regulating the subject at present is that introduced in 1872 by Henry Austin Bruce, afterward Lord Aberdare, and this act does not apply to Scotland, and applies to a part only of Ireland. In Scotland the matter of licensing the sale of liquors is in general regulated by the Home Drummond Act of 1828. In Ireland the licensing laws are similar to those in England, with some modifications favoring keepers of public houses.

In the British colonies the liquor regulations are very diverse. In New Zealand licenses are granted by elective licensing committees, but new licenses can be granted only after a poll of the ratepayers. In Australia, Victoria recognizes the principle of local option, combined with compensation to heirs or relatives of a person who meets his death through the use of intoxicating liquors. In Queensland a majority of two-thirds of the ratepayers have the power to prohibit the sale of liquor in any locality, and a majority can limit the number of licenses and prevent the issuing of new ones. In New South Wales a form of local option exists. In South Africa there are stringent regulations against the sale of intoxicants to the natives, but they are not well enforced. In India the sale of liquor to the natives is so great that the Government has been accused of endeavoring to increase it for the purpose of adding to the revenue. In Canada a local-option law exists known as the Scott Act of 1878, under which a majority of voters in a locality can close all license permits without compensation. In the U. S. some States have laws prohibiting the sale of liquor except as drugs, and others have what is known as the high-license system; local option also is very generally recognized. See LOCAL OPTION and PROHIBITION.

General Provisions and Regulations in the U. S. and in Great Britain.—In the U. S. each State has full power to license and control traffic in intoxicating liquors, and it may at its own discretion fix the terms on which the license shall be granted. The power may be in effect delegated to local governments under the system of local option, which authorizes the locality in question to control for itself traffic in intoxicating liquors; but where this local control is not expressly created by a statute the power rests solely in the State, except for the police powers granted to municipal corporations.

A license to sell liquor is decided to be a privilege and not to be a species of property, and therefore the depriving a person of a license by forfeiture does not constitute taking away of property without due process of law, and neither can the license be levied upon or sold by the sheriff, nor can it be transferred by the licensee except by the approval or permission of the authority by whom the license was granted. The regulation of the subject of traffic in intoxicating liquors, so far as it concerns the preservation of the public morals, is a part of the police power of the State, and so far as it concerns the raising of funds for public revenue is a part of the taxing power of the State. See POLICE POWER and TAXATION.

A *bona-fide* social *club* is not held to come within the meaning of the word person in acts prescribing the qualifications required in persons who may be licensed to sell liquors. An incorporated club or a *bona-fide* social club, whose membership is limited and whose property is actually owned by the members so that the public at large are not admissible, is not prohibited from the sale of liquors to its own members; and, generally speaking, such clubs are not subject to the license laws. It is held that the furnishing of liquors to the members of a club, or to their friends at the club, is the same as if this were done at the private house of an individual. The Legislature, however, has the power to control the use and sale of liquors even in incorporated or unincorporated social clubs; and such club may be required to pay a license tax in the same manner as any person licensed to sell liquors; and a sale of liquor by a club to its members in violation of a prohibition or local-option law is as illegal as the sale by a merchant, and the club may be subject to the annulment of its charter in consequence.

Throughout the larger part of the U. S., as well as in the larger part of Canada and the Australian colonies of Great Britain, it is provided by law that the relatives of a person who comes to his death through the use of intoxicating liquor may sue the liquor-seller responsible for the drunkard's condition for damages; and it is also provided that the relatives of any intemperate person may notify the seller of liquor not to supply it to such person, and magistrates also may notify liquor-sellers that drink can not be sold to such a person except under penalty of the law. Some of these laws make the sale of intoxicating liquor to a habitual drunkard after such notification a misdemeanor, and in this case a sale after the notification of the wife of the drunkard or other relative having authority to give the notification is such negligence as enables the relative to maintain an action for damages for injuries to him resulting from such sale. In the statutes of Illinois, where it is provided that all who furnish intoxicating liquors which contribute to the habitual drunkenness of a person are liable for injuries resulting from habitual intoxication, it has been held that a parent had a right to bring action against both a liquor-seller and his bondsman for the death of a minor son resulting from the sale of liquor to him, and also for the loss of his services. In the State of New York, a mother injured in her means of support by the death of her son, caused by intoxication, has been held to have a right of action against the owner of the

premises on which the liquor was sold, the premises having been leased for the sale of the liquor.

In the absence of statutory enactment there is no more legal restriction of the sale of liquor to minors than of that to any other individual. Where there are laws prohibiting the sale of liquor to minors, the vendor is not generally excused for the sale to a minor by his ignorance of the fact that the buyer is a minor. It has been held that where a minor brings a written order from an adult by whom he is employed or sent, the sale is to the adult, but not so where the order is oral; but no single decision can be taken as universally applying to the application of the law.

Although a State in the exercise of its police power may prohibit the sale and even the manufacture of liquors within its territory, it can not interfere with commerce between the States, in violation of Article 2, section 8, of the Constitution of the U. S. (see INTERSTATE COMMERCE); so that, except under authority of Federal statutes, no State can impose a tax or duty on persons engaged in the business of selling liquors within the State, but not having their principal place of business therein. It is also held that, in the absence of Federal statutes providing for such prohibition, no State may prohibit or interfere with the original packages in which the liquor may be sent, it being held that this is in contravention of Article 2, section 8, of the U. S. Constitution, vesting the power of controlling such traffic in the Federal Government. This fact led to the practical nullification of the State laws regulating the purchase and sale of liquor in any individual State; and, in order to remedy this, an act of Congress (known as the Wilson Act) was passed Aug. 8, 1890, which provides that all fermented, distilled, or intoxicating liquors transported into any State for use therein, regardless of whether they are in the original packages or not, shall be subject to the police laws of such State, and this act was held constitutional as being valid exercise of the police powers vested in Congress. In furtherance of the regulation of the sale of liquors, the State of South Carolina by the so-called Dispensary Act undertook to engage in the business of importing liquors for the purpose of profit to the State, and regulating the sale of liquors; but it was held that so much of the act was unconstitutional and void as attempted to interfere with or burden commerce between the citizens of South Carolina and other States, or to prevent the bringing into the State of any liquor in the original package. In its general provisions the act was held to be constitutional, but only so far as its provisions did not conflict with the Interstate Commerce Act.

The decisions affecting the question of what constitutes an *original package* have held that the original package is the casing in which the imported merchandise is kept and handled in the course of transportation, whether a hogshead, bottle, bale, or box. In the case of liquors, the original package is the hogshead, barrel, or bottle in which the liquor is shipped, and each such hogshead, barrel, or bottle constitutes an original package; but if a number of them are fastened or joined together and marked as a whole, or placed together in a box, crating, or the like, such box, crating, etc., with the contents, constitutes the original package. The act of Congress of Aug. 8, 1890 (above mentioned), does not authorize any State to prohibit the importation of liquors in the original package, but subjects the liquor when once delivered in the State to all the laws regulating the use and traffic in the State in question; and the liquor can not be given away or sold by its recipient or by any one else except in accordance with the laws of the State into which it is received.

In England the general subject of licensing the sale of intoxicating liquors is regulated principally by the above-mentioned act of 1872, introduced by Henry Austin Bruce, Home Secretary. This act provides severe penalties for the illicit sale of liquor, and also for drunkenness in any public place or highway, and for permitting drunkenness on licensed premises, or harboring constables upon such premises during their hours of duty. The act fixes the hours of closing, but authorizes the local authorities to grant exemptions from the closing requirements when this is a convenience to many persons engaged in lawful business. A licensed person forfeits his license upon a third conviction for offenses against the act, and is disqualified thereby from receiving another for five years; and the premises upon which he conducted his business can not be licensed again for two years. After the expiration of the five years, his previous conviction is not to be taken into account for the purpose of increasing any penalty. A register of licenses is required to be kept in every district, showing the particulars of all licenses, which registration must be open to the inspection of ratepayers, holders of licenses, and the owners of licensed premises. It provides for the appointment annually by the justices in counties and boroughs of a licensing committee of not less than three members; but borough licenses must be confirmed by the body of justices, who would not have been authorized to grant licenses except for the act. It fixes the annual value of all licensed premises according to their situation.

Penalties are recoverable under the act by summary conviction, subject to an appeal to the quarter sessions; but any justice who has a beneficial interest in the manufacture or sale of intoxicating liquors is disqualified from taking part in the administration of the act. In respect to the times of closing and some other points this act was modified by the act of 1874, which mitigated the character of many of the penalties imposed.

The first general scheme of excise taxes on liquor was introduced in 1784 by Pitt, and this was embodied in the Consolidation Act of 1826, which constitutes the basis of the present law. The duty on malt was abolished in 1880, but brewers and distillers are still required to take out an excise license, and to pay duty on their manufacture. Wholesale and retail dealers in beers, spirits, or wine are also required to take out a license. With regard to the civil damages to the wife or relatives of habitual drunkards, the laws of Great Britain are not as far in advance as those of the U. S.

In the U. S. in 1895 and subsequently, acts have been passed in a number of States, including New Hampshire, Vermont, New York, New Jersey, South Carolina, Tennessee, and Indiana, providing for the instruction of children in the public schools in the subject of the physiological effects of alcohol and intoxicants, and statutes have been passed prohibiting the employment of women where liquor is sold in New York, Washington, and Louisiana, and some of the other States. These acts are held to be constitutional.

Laws prohibiting the sale of liquors within a specified number of feet of schoolhouses or charitable institutions or churches are general in most parts of all the States, and in the State of New York police officers are forbidden to be interested in the manufacture or sale of liquors.

F. STURGES ALLEN.

Literature of Education: The growth in importance of any human interest is well measured by the literature by which it is represented. The nineteenth century has witnessed a vast increase in the quantity and quality of pedagogical literature, an increase that has been especially noticeable in the last quarter of the century. It has not been confined to any one country, nor to any one branch of the subject. Some works of certain great educators previous to this time may be regarded as educational classics. No two people would agree as to what constitutes the educational classics of the world, but the following list will probably meet with as wide acceptance as any: Plato's *Republic*, Aristotle's *Politics*, Plutarch's *Morals*, Quintilian's *Institutes*, the *Didactica Magna* of Comenius, Richter's *Levana*, Pestalozzi's *How Gertrude Teaches her Children*, Froebel's *Education of Man*, Rosenkranz's *Philosophy of Education*, Rabelais's *Gargantua*, Montaigne's *Essays*, Rousseau's *Émile*, Mulcaster's *Positions*, Ascham's *Schoolmaster*, Locke's *Thoughts on Education*, and Spencer's *Education*.

In Germany the production of pedagogical literature is enormous. Among the indispensable annuals issued is *Minerva*, the year-book of the learned world, which contains accounts of the world's universities, libraries, and museums. A recent work of great importance is Baumeister's *Handbuch der Erziehungs- und Unterrichtslehre für höhere Schulen*. Another monumental work is Schmid's *Geschichte der Erziehung*. Every possible phase and aspect of education is treated in extensive volumes, exhibiting wide research, or in monographs and fugitive brochures. Periodical literature also covers almost every field. Among the more prominent journals devoted to special fields are *Deutsche Zeitschrift für Ausländisches Unterrichtswesen*, which gives information in regard to current educational activity in all civilized countries; *Zeitschrift für Schulgesundheitspflege*, which is the one periodical in the world especially devoted to the subject of school hygiene; *Lehrproben und Lehrgänge*; *Centralblatt für die Gesammte Unterrichts-Verwaltung in Preussen*, the official organ of the

Ministry of Education; *Zeitschrift für Philosophie und Pädagogik*; *Das Humanistische Gymnasium*; *Pädagogische Studien*; *Zeitschrift für das Gymnasialwesen*; *Zeitschrift für die Östereichischen Gymnasien.* Several standard works of reference are published. Of the cyclopædias the most recent, and one that is indispensable for scientific students of education, is Rein's *Encyklopädisches Handbuch der Pädagogik.* Euler's *Handbuch des gesammten Turnwesens* is an encyclopædia of everything relating to physical culture and gymnastics. German literature on school hygiene is particularly valuable. Eulenberg and Bach's *Schulgesundsheitlehre* is one of the most valuable works on the subject, and is encyclopædic in its character.

In no way is the activity and interest now taken in France in educational matters better shown than by the pedagogical literature. The great *Dictionnaire de Pédagogie* by Buisson is, taken all in all, the most comprehensive work of the kind ever published. It was begun and completed since 1878. The *Statistics of Primary Education in France*, probably the most remarkable series of educational statistics in the history of education, began with the issue of 1876–77, and has been printed every five years since. The *Recueil des Monographes Pédagogiques* was issued in six volumes in 1889, and is a mine of gold for French primary education. The *Revue Internationale de l'Enseignement*, a monthly journal begun in 1881, is one of the best existing educational journals in the world.

England is not so rich in pedagogical literature, though recently there has been quite a development in that direction. The *Educational Review*, published in London, and edited by William K. Hill, has the highest literary and scientific standard of any periodical. The *Journal of Education* is one of the best educational newspapers in the world. With the exception of the *Educational Review*, the English school periodicals are very largely newspapers. The Government has recently established a department of special reports on educational subjects, under the direction of M. E. Sadler. Three volumes of these reports have been issued up to 1898. They contain much valuable material, not only on English schools, but on foreign schools, and on many special branches of educational work.

The U. S. has much that is creditable in the line of educational literature. Barnard's *American Journal of Education* takes rank as the foremost work of its kind in any language. When it is considered that the publication of it was begun in the early part of the century, and carried on under peculiar difficulties, and at a pecuniary loss to the editor, the greatness of the work becomes still more admirable. It remains to-day a great storehouse for educational history. It contains not only original articles, but also translations of many of the most important works of European scholars. The ten volumes of Horace Mann's *Common School Journal* are to-day among the choicest treasures of the pedagogical library that is so fortunate as to possess them. The series of St. Louis school reports published while W. T. Harris was superintendent at St. Louis may also be counted among educational classics. The annual reports of the U. S. Commissioner of Education, with their wealth of information on almost every phase of educational work, form a storehouse whose riches are all too little appreciated by the teaching fraternity of the country. The National Educational Association publishes an annual report of its meetings, in which are printed all the papers and addresses presented. These volumes now constitute a library in themselves. Special books on education have, within the last few years, appeared in large numbers. There are three important series: The *International Education Series*, edited by W. T. Harris, which in 1899 has reached 44 volumes; the *Great Educators Series*, edited by Nicholas Murray Butler, of which about 10 volumes have been published; and *Heath's Pedagogical Library*, which now numbers some 25 volumes. The several works in these series are of various degrees of importance; many of them are reprints of educational classics, and most of them have a high value. The *Cyclopædia of Education*, published in 1876, edited by Henry Kiddle and Alexander J. Schem, though limited in its scope and now out of date, is still valuable as a book of reference. Educational journalism has had an extensive development. Nearly every State has its State school journal, many of which are useful publications. There are several weekly papers published, mainly for primary and grammar school teachers, devoted largely to news and methods. Among the papers devoted to special fields are the *Kindergarten Magazine*, the *Kindergarten Monthly*, the *Child-Study Monthly*, the *Quarterly Transactions of the Illinois Society for Child-Study*, *Home and School*, and the *Northwestern Monthly.* Secondary education is represented by the *School Review*, scientific pedagogy by the *Pedagogical Seminary* and the *Year-Book of the National Herbart Society*, and the larger aspects of all educational fields are ably considered by the *Educational Review.* As yet the more scientific educational journals receive rather meager support, but that all of them have been founded within the last ten years, and have received sufficient support to continue their existence, is evidence of a growing demand for a better class of educational literature, indicating a growth in professional spirit and intellectual ideals among the teachers of the country.

C. H. Thurber.

Location: of land, the selection and designation of land by a person who has legal authority to select and designate. The term is specifically applied to the act of surveyors who are authorized by public authority to lay out lands by particular warrant. The act of selecting the land mentioned in the warrant and surveying it is called its location. The term is mostly used in the Western States of the U. S., where it also has the specific sense, in the mining law, of a piece or plot of land appropriated according to certain established rules, such as fixing in a conspicuous place a notice stating the fact that the land has been taken or "located," and setting forth the name of the locator, and appropriately describing the extent and boundaries of the plot of land according to custom.

In the Scotch law the term is applied to a contract for the hire of a movable object, or a contract by which a person hires out his work or services, the person who lets out his work or the use of the property being called the *lessor* or *locator*, and the hirer the *conductor* or *lessee.* See Bailments.

F. Sturges Allen.

Lockout: literally, in the general sense of the word, the locking out of any person from an inclosed place; specifically, in law, the refusal of an employer to continue or receive in his employ a body of men as such, usually intended as a means of coercing them into a certain course of conduct. A lockout is the natural accompaniment or complement to a strike, and is the means employed by the capitalist, or employer of labor, to oppose and meet the influences and coercion brought to bear upon him by the striking of organized labor, whether in his employ or so as to affect his interests. The term is sometimes applied to the act of employees who, by assembling in large bodies or by threats or other coercion, prevent other employees from access to or departure from their place of employment; but this is not the usual sense of the word.

The Rights of an Employer as to Lockouts.—As the law will not compel any man to continue in the employment of any private individual against his will, so neither will it compel any man to continue to employ another against his will, although it may award damages by way of breach of contract should this arise. Every individual has the right of absolute control over his own property so far as it does not conflict with the equal rights of others in the same community; and the conduct of others, whether in his employ or not, who attempt to control or to hinder or to annoy or interfere with the individual in the conduct and management of his property or business is unlawful, and furnishes a sufficient legal reason for the employer to discharge from his employ any parties concerned in the combination, notwithstanding that their period of service as per contract may not have expired. Participation in a combination to effect such a purpose unlawfully constitutes a criminal conspiracy for which the employer not only has his remedy at the criminal law, but also a civil remedy in damages. It follows, therefore, that every employer has the right to choose his own employees, and that he has the right to refuse to employ members of any confederation or combination which he deems it undesirable to have in his employ, and to refuse to employ workmen for any other reason, such as their unwillingness to work overtime when desired, their refusal to employ more or less than the number of apprentices desired by him, their refusal to work with members of other organizations or with parties not belonging to any organization, etc.

Right of Employers to Combine in Lockouts.—So far as concerns the act of a single employer in establishing or giving up a lockout, or in the refusal to employ any one person or class of persons for any reason whatever, the law is comparatively simple; but the laws relating to the right

of employers to combine in a refusal to employ men because they belong to certain organizations or for other reasons, and their liabilities when so combining, are much more complicated, and they are largely analogous to the law governing strikes by employees. Employers have the same right to combine in order to aid and assist each other—whether for their own improvement or the improvement of their business methods. or the determination of the rate of wages they will pay or the elass of employees they will hire—that employees or workmen have to combine for similar purposes. In general, they have the right to combine or associate for any lawful purpose; but where their combination or confederation is so made as to cause injury or oppression to others in their legal rights, and compel them by force or violence or intimidation not to do what they have a right to do, or to do what they are under no legal obligation to do, they are guilty of a criminal conspiracy in the same manner as workmen guilty of eonspiracy in a strike.

The most frequent instance in which this occurs is in the blacklisting of employees by employers—that is, the placing of the names of undesirable employees in a list and furnishing the same to other employers who are not in a position which entitles them to such information. In some States combinations of employers for this and other purposes have been made criminal by statute.

In some instances combinations of employers for purposes which are not criminal are considered by law to be in restraint of trade, and contracts entered into between the parties to enforce them will be deelared void. Thus in England a bond was made between eighteen manufacturers, with a penalty of £500, whereby the manufacturers agreed to carry on their work for twelve months in regard to the amount of wages, the time of engagement of workpeople, the hours of work, the suspending of work, and general discipline of the works, in conformity with the resolutions of a majority of the obligors present at any meeting to be convened, for the purpose of opposing and overcoming the influence of combinations of workmen which they considered injurious because they were supposed to hinder workmen from taking employment for fear of social perseeution or injury to their property, or other reasons; but in an action brought against one of the obligors it was held that the bond was void as in restraint of trade, and the obligor under no obligation by reason of having signed it.

In the U. S. such combinations may be affected by the provisions of the Interstate Commerce Act, which declares certain contracts, combinations, or eonspiracies to be in restraint of trade and illegal when there is a conspiracy to engross or monopolize the market. A eombination intended only to drive certain competitors out of the field of eompetition by violenee, annoyance, or otherwise is not included under the purpose of this act. See INTERSTATE COMMERCE. See also Cooley on *Torts*; Cogley on *Strikes and Lockouts*; the Interstate Commerce Act; and the various State digests.

F. STURGES ALLEN.

Lomax, LINDSAY LUNSFORD: soldier; b. in Newport, R. I., Nov. 4, 1835; after graduation at the Military Academy was assigned to the Seeond Cavalry Regiment. He resigned from the U. S. army and became a eaptain in the Virginia State forces at the time of secession; on Apr. 29, 1861, entered the Confederate army as captain and assistant adjutant-general to Gen. Joseph E. Johnston; was promoted major and assigned to duty with Gen. B. McCulloch, and in July, 1862, was made lieutenant-colonel and inspector-general under Gen. Earl Van Dorn. He beeame colonel of the Eleventh Virginia Cavalry in Feb., 1863; brigadier-general July, 1863; major-general Aug. 10, 1864. He took command of a brigade of cavalry under Gen. Fitzhugh Lee in Jan., 1864, of a division of cavalry under Gen. Early in Aug., 1864, of a eavalry division in the Army of the Valley District in Oct., 1864, and was assigned to the command of the district. After the surrender of Richmond he went to Lynchburg to intercept Stoneman, and surrendered with Gen. Joseph E. Johnston at Greensboro, N. C. Later he was for a long time employed in the War Records Office, Washington, D. C.

Lombard, LOUIS: violinist and conductor; b. in France, Dec. 15, 1861; studied in the Marseilles conservatory; went to the U. S. in 1876; returned to Paris for further study in 1878; went to the U. S. again in 1879 and traveled as a violin soloist and conductor; founded the Utica Conservatory of Music in 1890 and has since remained at its head. He has produced some worthy works, including the opera *Bounced*, to a text supplied by Julian Magnus and Henry C. Bunner.

D. E. HERVEY.

Lome, ENRIQUE DUPUY, de: diplomatist; b. in Valencia, Spain, Aug. 23, 1851; was an *attaché* of the Spanish department of foreign affairs at Madrid at the age of eighteen, soon afterward graduating from the law department of the University of Madrid; became third secretary to the legation in Japan in 1873, was transferred to Brussels in 1875, and was sent to Montevideo in 1877; in 1878, in a book of travel ealled *Madrid à Madrid*, reflected severely upon the U. S. and American women; was diplomatic representative to the Argentine Republic in 1880, later being transferred to Paris as second seeretary of legation; was sent to Washington as first seeretary in 1882, afterward serving in Berlin and Madrid; represented his country at the international sugar conference in London in 1887; became minister resident at Montevideo in 1888; was placed at the head of the commereial section of the Spanish foreign office in 1891; was elected to the Cortes in 1892, and became commissioner-general for the revision of commercial treaties the same year; was commissioner-general to the Columbian Exposition at Chicago in 1893, in which year he was appointed minister to the U. S., continuing to hold his post under the ministry of Sagasta after the assassination of Canovas, and favoring Canovas's schemes of autonomy for Cuba; on aceount of disrespectful criticism of President McKinley, in a letter to Don José Canalegas, proprietor of the Madrid *Heraldo*, was compelled to resign his post in 1898.

Long, JOHN DAVIS: statesman; b. in Buckfield, Me., Oct. 27, 1838; graduated at Harvard College in 1857. After teaching school for two years he began the study of law, and was admitted to the bar in 1861. He made his home in Hingham, Mass., and was eleeted a member of the State House of Representatives of 1875. For the next three years he was Speaker of the House. In 1878 he became Lieutenant-Governor, and was Governor during the following three years. He was eleeted in 1882 as a Representative in the Forty-eighth Congress, and was returned for the two sueeeeding Congresses. In Mar., 1897, he was appointed Seeretary of the Navy. He has published a translation of the *Æneid of Vergil* (1879).

Loofs, (ARMIN) FRIEDRICH, D. D.: Lutheran German theologian; b. in Hildesheim, Hanover, Germany, June 19, 1858; studied at Leipzig, Tübingen, and Göttingen; became tutor in church history at Leipzig 1882, professor extraordinary there 1886; the same at Halle 1887; Professor Ordinary of Church History 1888. His separate publications inelude *Leontius von Byzanz und die gleichnamigen Schriftstellen der griechischen Kirche* (Leipzig, 1887); *Leitfaden zum Studium der Dogmengeschichte* (Halle, 1889; 3d ed. 1893); *Predigten* (1892); *Studien über die dem Johannes von Damaskus zugeschriebenen Parallelen* (1892); *Das Apostolicum in drei Predigten ausgelegt* (Halle, 1895); *Eustathius von Sebaste und die Chronologie des Basilius-Briefe: Eine patristische Studie* (1898).

S. M. J.

Loomis, SILAS LAURENCE: scientist; b. in Coventry, Conn., May 22, 1822; after teaching mathematies and natural science at Holliston Academy, Mass., graduated at Wesleyan University in 1844; became prineipal of Western Academy, Washington, D. C., in 1855, graduated from the medical department of Georgetown College in 1856, and was Professor of Physiology there 1859–60; meantime aeted as astronomer to the U. S. Coast Survey, and was instruetor in mathematies to eruising naval cadets; was Professor of Chemistry and Toxicology in Georgetown College, surgeon on Gen. McClellan's staff 1862–63, and assistant surgeon on the steamer State of Maine and in various hospitals 1863–65; took the chair of Practiee of Medicine in Howard University in 1867, and was dean and Professor of Chemistry and Toxieology there until 1872, soon afterward returning to the practiee of his profession; invented a process for making a textile fabric from palmetto, and another for utilizing the ores of chromium; improved varions instruments of precision; was president of the Washington Seientific Association in 1862, and of the American Union Aeademy of Literature, Seience, and Art in 1872. Among his principal publications are *Normal Arithmetic* (1859); *Analytical Arithmetic* (1860); and *Key to the Normal Course* (1867).

Lord, JOHN, LL. D.: lecturer and author; b. in Berwick, Me., Sept. 10, 1812; graduated at Dartmouth College in 1833, and at Andover Theological Seminary in 1837; was

agent of the American Peace Society 1837–39; preached for a time in New Marlborough and in Stockbridge, Mass., but was never ordained; and in 1840 devoted himself to historical study and lecturing. He was in Europe 1843–46, and delivered lectures on the Middle Ages in the principal cities of England. In 1855 he settled in Stamford, Conn. The University of New York gave him the degree of LL. D. in 1864. He was lecturer on history at Dartmouth 1866–76. His lectures were published in five volumes, beginning in 1883, under the title *Beacon-lights of History*. He wrote also *Modern History for Schools* (Philadelphia, 1850); *The Old Roman World* (1867); and *Ancient States and Empires* (1869). D. in Stamford, Conn., Dec. 15, 1894.

Lorenz, Julius: conductor; b. in Hanover, Germany, Oct. 1, 1862; entered the Leipzig conservatory in 1880, where he won several first prizes, and during his student period several of his compositions were performed at the Gewandhaus. In Oct., 1884, he was appointed musical director of the singing academy in Golgan, Silesia. In July, 1895, he was called by the New York Arion Society to succeed Frank van der Stucken. He accepted the call and arrived in New York on Sept. 2. He also took charge of the Newark (N. J.) Arion Society, which had also been directed by Mr. van der Stucken. He has composed a few piano pieces and some vocal music. D. E. Hervey.

Lorimer, James: lawyer and jurist; b. in Aberdalgie, Perthshire, Scotland, Nov. 4, 1818; educated at Perth grammar school, at Edinburgh University, and spent three years (1840–42) in study at the Academy of Geneva and University of Berlin; returned to Edinburgh and took up the study of law, and was called to the bar in 1845; took up the practice of law, but, meeting with little success, devoted himself to a study of the theory of law and to writing for the reviews. He was appointed Professor of Public Law in the University of Edinburgh in 1862, which position he held until his death, in Edinburgh, Feb. 13, 1890. The most important of his publications are the *Institutes of Law* and the *Institutes of the Law of Nations*—the first treating of the law of nature and of positive law in general, and of the sources of the two and their relations to each other, that is, of the universal principles of jurisprudence; the second treating of the law of nature as it exists in different political communities, and setting forth international law as derived from the natural law. Together they exhibit a comprehensive view of jurisprudence and a very philosophical and minute examination of the Scotch law. He was opposed to the general ethical and juridical schools of Bentham and Austin, tracing law back, not to enactment, but to the laws of nature, or of God, whom he postulates to be the author of all existence, and from whom he derives all of the true rules of society, politics, and history. His theory of jurisprudence, however, is not based on *a priori* knowledge of divine nature or special revelation, but on what he believed to be rationally and inductively established. He was an active advocate of political and educational reform, one of the founders and supporters of the Institute of International Law, and a frequent contributor to the *Edinburgh Review*, the *North British Review*, the *Journal of Agriculture*, and the *Journal of Jurisprudence*. He is the most prominent exponent of the philosophy of law in Scotland in the nineteenth century. His works include *Handbook of the Law of Scotland* (6th ed. Edinburgh, 1894); *Institutes of Law: a Treatise on the Principles of Jurisprudence as determined by Nature* (2d ed. Edinburgh, 1880); *Institutes of the Law of Nations* (Edinburgh, 1883–84).—His son, John Henry Lorimer, b. in Edinburgh in 1856, is known as a painter. He was educated at the Edinburgh Academy and the University of Edinburgh, and at the Royal Scottish Academy, and made his first exhibit at the age of nineteen years. His picture entitled *Benedicite* was purchased by the French Government in 1894, and in the Luxembourg Gallery are that entitled *Children Saying Grace* and a portrait of Col. Anstruther Thomson, also purchased by the French Government. He has been a constant exhibitor, and received many second and third class medals.

F. Sturges Allen.

Lothrop, Harriett Mulford (*Stone*): author (*Margaret Sidney*); b. in New Haven, Conn., June 22, 1844; received academic education. Among her publications are *So as by Fire* (1881); *Five Little Peppers, and how they Grew*, a juvenile story (1882); *The Pettibone Name*, a novel of New England life (1883); *Ballad of the Lost Hare* (1884); *The Golden West* (1885); *The Minute-Man* (1886); *Two Modern Little Princes* (1887); *Dilly and the Captain* (1887).

Louisa: Queen of Prussia; b. in Hanover, Mar. 10, 1776; was a princess of the ducal house of Mecklenburg-Strelitz. In 1793 she married the Crown Prince of Prussia, who ascended the throne in 1797 as Frederick William III. The grace, beauty, and nobility of character of the young queen won the general affection of the Prussian people. This esteem was deepened by the circumstances of the unfortunate war with France. After the fatal defeat at Jena in 1806, the queen accompanied the king to Königsberg, and bore with dignity the humiliations attending the country's overthrow. In the negotiations of the Treaty of Tilsit in 1807 she endeavored by a personal interview with Napoleon to mitigate the peace conditions, but without effect. Napoleon's insulting conduct toward the queen only increased the regard in which she was held by her subjects. She took part in state matters thereafter, and supported Stein and the other administrative reformers. She died near Neustrelitz, July 19, 1810. Her younger son was the famous Emperor William I. Edmund K. Alden.

Luckey, George W. A., A. B.: educator; b. near Decatur, Ind., in 1855; teacher, county superintendent, city superintendent, and institute lecturer in Indiana 1873–87; supervising principal, Ontario, Cal., 1889–92; non-resident student, University of the City of New York, 1889–92; student in psychology and pedagogy, Leland Stanford Junior University, 1892–94; A. B., same, 1894; student of biology, Hopkins Seaside Laboratory, Pacific Grove, Cal., summers of 1893 and 1894; fellow in psychology, Clark University, 1894–95; called to organize department of pedagogy in the University of Nebraska as assistant professor in 1895, and became Professor of Pedagogy there in 1896. He is editor of the child-study department of the *Northwestern Monthly*; author of *Observations on the Indirect Color Range of Children and Adults* and *Some Recent Studies on Pain* (both in *American Journal of Psychology*), and of contributions to the *Proceedings of the National Educational Association*, *Child-study Monthly*, and *Northwestern Monthly*.

Ludlow, William: soldier; b. in Oakdale, N. Y., Nov. 27, 1843; graduated at the Military Academy in 1864; was appointed chief engineer of the Twentieth Army-corps under Gen. Joseph Hooker; took part in the battles of Peach Tree Creek, Atlanta, and Allatoona Heights; served on Gen. Slocum's staff as chief engineer of the left wing of Sherman's army, participating in all important operations until the close of the war; was breveted captain, major, and lieutenant-colonel for gallant conduct; was stationed at Jefferson barracks, Mo., in 1865; was assistant to Gen. Q. A. Gillmore, in charge of fortifications and harbor improvements on Staten Island and the South Atlantic coast 1868–73; accompanied the Black Hills and Yellowstone expeditions as engineer officer 1873–76; had charge of river and harbor improvements and fortifications 1876–82, and was engineer secretary of the lighthouse board in 1882; served as chief engineer of the water department of Philadelphia 1883–86, and afterward as engineer commissioner of the District of Columbia and on various duties until the outbreak of the Spanish-American war, when he was made brigadier-general of volunteers, afterward being promoted to major-general for conspicuous services at Santiago; was assigned to duty in Washington on his return from Cuba, and was appointed military governor of Havana in 1898.

Lukens, Herman T., Ph. D.: educator; b. in Philadelphia, Pa., Jan. 29, 1865; A. B., University of Pennsylvania, 1885, and A. M. 1888; studied in Europe, 1887, 1888–91, 1897–98, at Universities of Berlin, Halle, Leipzig, Paris, and Jena; Ph. D., Jena, 1891; teacher of biology, northwest division high school, Chicago, 1891–94; fellow in psychology, Clark University, 1894–95, and docent in pedagogy, 1895; lecturer on education, Bryn Mawr College, 1896–97; head training teacher, State Normal School, California, Pa., 1898–99. Author of *The Connection between Thought and Memory* (1895) and of numerous contributions to educational periodicals.

Luminescence: the emission of light at temperatures below that of ordinary incandescence, or the emission of light at any temperature which is not wholly due to the effect of that temperature alone. Luminescence embraces a variety of phenomena which have been known and described under the names of *fluorescence*, *phosphorescence*, and so forth. The name is due to Eilhard Wiedemann, who

recognized the kinship of these phenomena and grouped them together under a single head. Wiedemann distinguishes the following eight kinds of luminescence, and classifies the phenomena according to the nature of the stimulus which causes the body to glow:

1. *Chemie-luminescence.*—This name is given to the production of light as the result of chemical reactions such as the slow oxidation or decomposition of organic materials at ordinary temperatures. The shining of phosphorus which is slowly oxidized in moist air is an example; likewise the light emitted by decaying wood and decaying fish. The light of the firefly and the glowworm, and that of the various marine animals to which the so-called phosphorescence of the sea is due, are probably cases of chemie-luminescence.

There are many obscure chemical reactions which appear to be the ultimate cause of luminescence, even when this is directly excited or set up by other causes. The action of light, or of the kathode rays, or of moderate heating, may start these chemical processes going, and these once started are capable of maintaining sometimes for a very long time the emission of light. All luminescence may indeed be said to have its origin either in chemical or in purely physical changes. It is not always possible to distinguish between these two classes, but a number of criteria have been proposed by means of which chemical luminescence is to be distinguished. Whenever a body glows for a long time after the exciting cause has ceased it may be put down to chemie-luminescence. The shining of self-luminous paints and the green glow of glass under the action of strong kathode rays have both been ascribed to chemie-luminescence on account of the long duration of the effect. In some cases the existence of chemical reactions can be detected by the changes of color which the body undergoes.

2. *Photo-luminescence* (two types).—(*a*) *Fluorescence.*—The emission of light by a body in consequence of the impact of other light-waves upon it, in so far as it is transient, lasting only during the period of illumination, is called *fluorescence.* Many substances show this property. Fluor-spar, the first substance in which it was noted, and from which the name comes, is a good example. Uranium glass, solutions of sulphate of quinine, the double cyanides of platinum and of various metals, such as potassium, magnesium, barium, etc., which have come into prominence recently on account of their availability for the making of X-ray screens, afford familiar examples. Many products of distillation of coal-tar, especially eosin, likewise crude and refined petroleum, show the same phenomenon in varying degrees. A decoction made by soaking the bark and leaves of the horse-chestnut in water is very powerfully fluorescent.

If the light given off by fluorescent bodies were identical with the impinging light which forms the stimulus, it would be difficult indeed to distinguish between fluorescence and light reflected from the surface of the body in question. Photo-luminescent bodies, however, both as regards fluorescence (the effect produced during the time of exposure) and as regards phosphorescence (the after-effect), emit rays differing in color (i. e. wave-length) from those which are the exciting cause of the luminescence. Stokes pointed out that the emitted color of fluorescent bodies is of wave-lengths longer than those to which the body is exposed. Becquerel has shown Stokes's law to hold true for phosphorescence of many solid bodies, and Wiedemann and Schmidt have so greatly extended the list of substances examined that it is safe to say that for solids this law is universally true.

Many bodies are most strongly fluorescent when placed in the path of the ultra-violet rays, which themselves are incapable of affecting the retina. Thus uranium glass, fluor-spar, and the solution of horse-chestnut bark shine most brilliantly when placed just beyond the visible limit at the violet end of the spectrum. Quinine in solution, on the other hand, possesses the power of converting the long waves of the infra-red into wave-lengths which are visible to the eye. It was by the use of an eyepiece containing such a solution that Becquerel was able to explore the infra-red spectrum, and to discover very many dark lines corresponding to the Fraunhofer lines of the visible spectrum, and even to determine their wave-lengths. This and a few other aqueous solutions are exceptions to Stokes's law.

The phenomena of fluorescence were very thoroughly studied by Becquerel,* who devotes a considerable portion of his treatise on light to this subject. The reader is also referred to the article FLUORESCENCE, where many references will be found.

(*b*) *Phosphorescence.*—In many cases the exciting effect of light upon luminous bodies persists for a greater or less time after the stimulus has been removed. Bodies which continue to shine after excitation has ceased are said to be phosphorescent. Diamonds sometimes possess this property, but it is chiefly notable in the case of sulphides of the alkaline earths. Of these the sulphite of calcium, which forms the basis of so-called luminous paint, exhibits phosphorescence which lasts for so long a period that the excitation received from sunlight during the day serves to cause the body to glow throughout the entire night. How long this after-effect persists in such cases has not been definitely determined. The writer recalls a case in which a clock with luminescent face—namely, coated with self-luminous paint—was placed in a photographic dark room. In this position it continued for many months to give off light enough to fog a sensitive plate.

The instrument used for the study of phosphorescence is called a *phosphoroscope.* The essential features of the original form given to it by Becquerel are shown in Fig. 1. It consists of two revolving disks, between which the body to be observed is placed. Through an open sector in one of these, the width of which can be varied, the substance is illuminated. Through a corresponding opening in the second disk the observations are made. By shifting the position of these disks with reference to each other the second opening permits of observation at any desired time-interval after the exciting cause has ceased. The duration of excitation and the time between excitation and observation are also subject to control and may be changed at will.

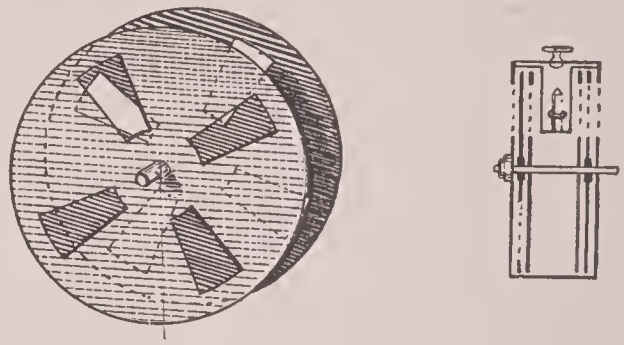


FIG. 1.—Becquerel's phosphoroscope.

E. Wiedemann (1888) used a phosphoroscope based upon the same principles. F. E. Kester (1899), in the course of his spectro-photometric studies of phosphorescent surfaces, employed a cylinder, the face of which was coated with the luminescent material. This cylinder (*l*, Fig. 2) was mounted upon a vertical axis and driven by means of an electric motor. The source of light—an arc lamp (*a*)—illuminated the surface of the cylinder through an interposed slit (*s*), and the observations were made at a point 180° distant, as shown in the figure. By varying the width of the slit and the rate of rotation it was possible to secure the desired range in the time of exposure and in the subsequent interval of darkness before observation.

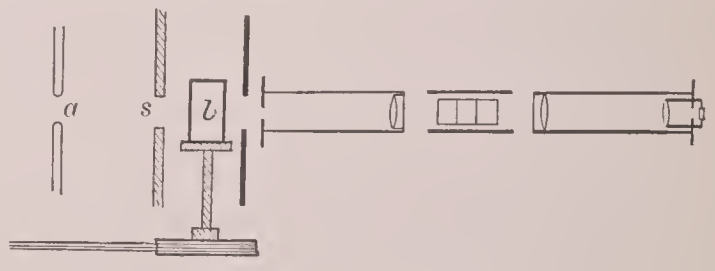


FIG. 2.—Kester's apparatus.

Phosphorescence continues to show itself at quite low temperatures. Dewar* found that calcium sulphite ceased to be luminescent when cooled to — 80°, but that if it was illuminated at that temperature it would show the luminescent glow afterward when warmed to ordinary temperatures. Very many substances, even those which are weakly phosphorescent at ordinary temperatures, are, on the other hand, strongly so when cooled in liquid air to — 200° C.

* Becquerel, *La Lumière*, tome i., livre vi.

* Dewar, *Chemical News*, vol. lxx., p. 259.

3. *Thermo-luminescence.*—This term is applied to substances which when heated are found to glow, although the temperature reached is below that of ordinary incandescence. This property was first noticed in green fluor-spar, the crystals of which shine in the dark when warmed. This property is possessed by many crystalline substances, and it has been shown by Wiedemann that certain salts and mixtures become thermo-luminescent after exposure to the action of the kathode rays. The most important of these are (1) the sulphides of calcium, barium, strontium, etc., which maintain the property for a very long time—certainly for several months; (2) sulphide of zinc, a substance which had been shown by Becquerel to be slightly thermo-luminescent under ordinary conditions, but which becomes increasingly so when previously exposed to kathodic action; (3) the haloid salts of the sodium group, which take on brilliant coloring under the action of the kathode rays, and when subsequently heated become strongly luminescent. The color of the emitted light differs from that which these materials show in the phosphoroscope.

An interesting case of thermo-luminescence is that of calcium sulphide, already described, which ceases to be photo-luminescent at low temperatures, but which after being subjected to light at these temperatures and restored to temperatures above the freezing-point of water emits light. In this variety of luminescence heating is a process which unlocks or sets free energy, capable of producing luminescence, that has been stored in the body by previous action.

4. *Tribo-luminescence* (luminescence by friction).—This property, which is particularly prominent in certain diamonds, is found likewise in sugar, in quartz, and in a variety of organic substances. Flashes of light noticed in the dark when quartz crystals are rubbed together come under this head; likewise the glowing of loaf sugar when lumps are broken in a perfectly dark room or when the crystals are ground in a mortar. The haloid salts, which after exposure to kathode rays become thermo-luminescent, likewise glow brilliantly when crushed. We have here another instance of a primary and secondary action necessary to the production of the light. Kathode rays store energy within the substance, probably by bringing about certain chemical changes, and this energy is subsequently set free by friction.

5. *Lyo-luminescence* (luminescence by solution).—Certain salts, when thrown into water in a beaker and shaken, give off light in the process of solution. The haloid salts mentioned in the previous paragraph (i. e. NaCl, KCl, etc.) which have been under the action of the kathode rays show this effect in a striking manner.

6. *Crystallo-luminescence.*—This name is given to emission of light shown by certain substances during the process of crystallization. Arsenious acid is the best known example.

7. *X-luminescence* (luminescence under the action of the Röntgen rays).—Many substances show luminescence when placed in the path of the X-rays. The most notable examples are those substances which are used in the preparation of the screens for fluoroscopes—i. e. platino-cyanide of potassium, platino-cyanide of barium, calcium tungstate, etc. See X-Rays, in the Appendix.

8. *Kathodo-luminescence* (luminescence under the action of the kathode rays).—The number of substances which emit light when subjected to the kathode rays is very large. Some of the most remarkable effects are obtained with the following materials:* Lead sulphate, violet; zinc sulphate, white; zinc sulphide, white; cadmium sulphate, yellow; calcium sulphate + manganese sulphate, green; magnesium sulphate + manganese sulphate, red; zinc sulphate + manganese sulphate, red; quinine (bisulphate), dark blue; anthracene, green. For the methods of producing kathode rays and of exciting kathodo-luminescence, see Kathode Rays, in the Appendix.

Substances which show strong kathodo-luminescence exhibit, as a rule, photo-luminescenee also. Those that are faintly luminescent or non-luminescent under the action of the kathode rays do not respond to the action of light. The colors produced by light-rays are in nearly every case the same as those of kathodo-luminescence.

Spectra of Luminescent Bodies.—The light emitted by fluorescent and phosphorescent surfaces shows a continuous spectrum consisting of one or more bright bands. The usual case is that of a single broad band, but Becquerel, who has reproduced in colors many such spectra in his *Treatise on Light*,* has depicted eight narrow bands in the spectrum of luminescent uranium nitrate.

For the study of the spectra in kathodo-luminescence Wiedemann exposed the substance in the form of a pastile (F, Fig. 3) to the action of kathode rays, from K, in a vacuum tube. He found the spectrum, as in photo-luminescence, to be a continuous band, usually of considerable width.

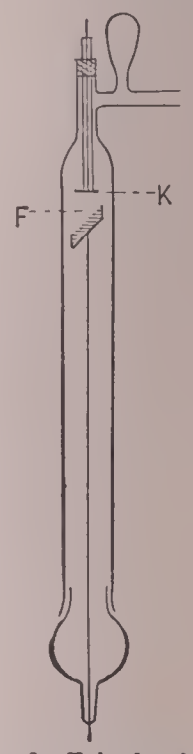


Fig. 3.—Tube for the study of luminescent bodies.

Luminescence of Incandescent Bodies.—Although luminescence shows itself chiefly at ordinary temperatures, and nearly all the existing studies of it have been made below the red heat, there are many cases in which the light emitted by incandescent bodies appears to be due in part to other causes besides temperature. Substances in the flame of the blowpipe, for instance, shine with characteristic colors altogether different from the glow of carbon at the same temperature, doubtless because they are thermo-luminescent. The extraordinary whiteness of the magnesium flame, which surpasses all other artificial sources of light in brilliancy, is probably due to luminescence of the newly formed magnesium oxide which is the product of the chemical reactions within the flame. W. H. Pickering† estimated the light, assuming it to be due to ordinary incandescence, to be that corresponding to a temperature of 4,900° C. Rogers,‡ however, has shown the actual temperature of the flame to be lower than that of the ordinary air-blast lamp.

The glowing surface of the lime-light affords another example of luminescence at high temperatures. It is well known that the lime cylinders used in this source of light are much brighter when first subjected to the oxyhydrogen flame, so that to get the best results the cylinder must be turned every few minutes in order to bring a fresh portion of the surface into the flame. The decadence of the lime-light is shown graphically in Fig. 4, which is drawn from measurements made by Miss Mary L. Crehore§ (Mrs. Bedell). The ordinates of the curves are intensities, abscissas are times, in minutes. Readings were made in three parts of the spectrum, the red (wave-length 0·662μ), green (wave-

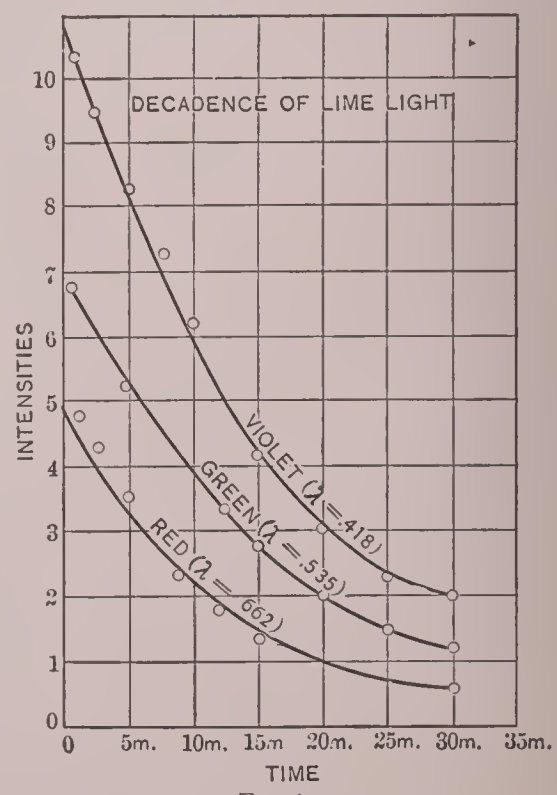


Fig. 4.

* Wiedemann's *Annalen*, vol. lvi., p. 240.

* *La Lumière*, tome i., pp. 304, 336, etc.
† Pickering, *American Academy of Arts and Sciences*, 1879, p. 236.
‡ Rogers, *American Journal of Science*, vol. xliii., p. 301.
§ Nichols and Crehore, *Physical Review*, vol. ii., p. 161.

length 0·535μ), and violet (wave-length 0·418μ). It will be seen that the brightness fell off in each case, at first rapidly, then more and more slowly, until after half an hour the light from the cylinder was less than one-fifth of that originally emitted. Cylinders of magnesium oxide and of zircon showed a similar but less marked decadence.

The behavior of zinc oxide is even more strongly suggestive of luminescence at high temperatures. Nichols and Snow,* who compared the light given off by this substance with that from platinum at the same temperatures at various stages of incandescence, found that below 700° C. it was a poorer radiator than that metal. The spectrum of the zinc oxide was the weaker throughout. At 1,013° C., however, the oxide was much brighter and especially rich in blue rays. When first heated the brightness of the violet end of the spectrum was more than twenty times greater than that of a platinum surface at the same temperature. The decadence, which was very rapid, is shown graphically in Fig. 5. Ordinates are intensities in terms of corre-

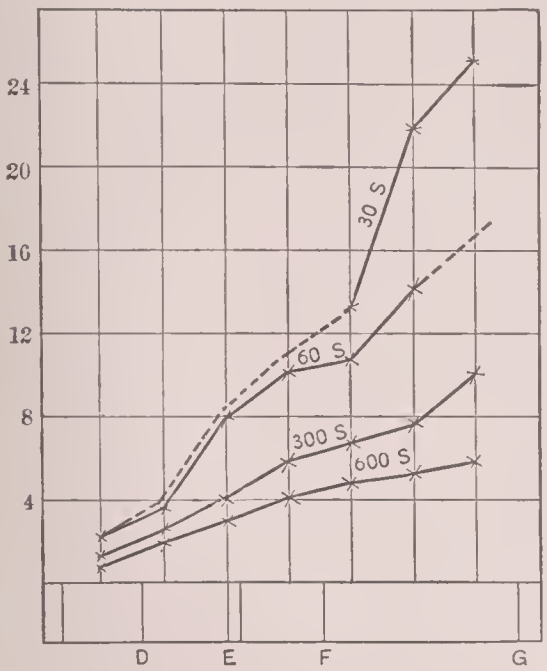


Fig. 5.—Radiation from ZnO, at 1,013° C.

sponding regions of the spectrum of the light from platinum. Abscissas are wave-lengths. The four curves show the relative brightness of the zinc oxide, 30 seconds, 60 seconds, 300 seconds, and 600 seconds after the surface had been brought to the required temperature. The experiments were performed by coating a strip of platinum foil with the oxide by holding it in a flame of burning zinc. An electric current sufficient to heat it to incandescence was then sent through the metal. The temperature was determined by noting the expansion of the strip. The light from the coated surface and that from the naked foil were studied by means of a spectro-photometer.

There is reason to believe that luminescence at temperatures of incandescence is a property common to many metallic oxides, and that the extraordinary amount of light which they emit when heated—as, for instance, in the case of incandescent mantel burners—is to be ascribed only in part to the ordinary influence of temperature. See, further, Stokes, *Lectures on Light*; S. P. Thompson, *Light, Visible and Invisible*; Hyndman, *Radiation*.

E. L. Nichols.

Lummis, Charles Fletcher: author; b. in Boston, Mass., Jan. 2, 1859; graduated at Harvard, and soon removed to the Pacific coast, where he has edited *The Land of Sunshine*, a California monthly, and has depicted life in various phases. His chief works are *A New Mexico David* (1891); *A Tramp across the Continent* (1892); *Some Strange Corners of our Country* (1892); *The Land of Poco Tiempo* (1893); *The Spanish Pioneers* (1894); *The Man who Married the Moon* (1894); *Indian Folk Lore Stories* (1894); *The Goldfish of Grand Chimú* (1896); *The Enchanted Burro* (1897); *The King of the Broncos* (1897); and *The Awakening of a Nation* (1898).

Lunacy Laws: laws regulating the rights of lunaties and their treatment. These laws for the sake of convenient treatment may be divided into those affecting the criminal liability of lunatics, properties of lunatics, and the rights of lunatics to personal freedom.

The question of what constitutes lunacy in the law, or such a degree of lunacy as to invoke the action of the law for the regulation of the affairs of a person as a lunatic, can not be definitely answered; and the importance of a strict definition is now less than it formerly was, because of the radical change which has taken place during recent years as to the criteria of capacity and responsibility in mental diseases. Numerous terms are used or have been used, implying either a greater or less degree of mental unsoundness or some specific phase of mental unsoundness, such as insanity, lunacy, idiocy, mania, imbecility, etc., all implied or covered by the meaning of the general term *non compos mentis*, which is now used generically to cover all the phases and degrees of mental unsoundness. The term *idiot* was defined by Coke as "one who from his nativity, by a perpetual infirmity, is *non compos mentis*." Hale defined idiocy as "fatuity *a nativitate, vel dementia naturalis*." The term *lunatic*, which alluded to the notion that the moon had an influence upon mental disorders, is defined by Coke as a "person who has sometimes his understanding and sometimes not, *qui gaudet lucidi intervallis*, and therefore he is called *non compos mentis* as long as he has not understanding." *Imbecility* was defined by Sir John Nichol (in 1828) as weakness of mind "between the limits of absolute idiocy on the one hand and of perfect capacity on the other." The term *unsound mind* Lord Eldon considered to be "contradistinguished both from idiocy and from lunacy, and yet such as to justify a commission."

At present, however, neither the term *lunacy* nor *unsoundness of mind* necessarily imports incapacity on the part of the person of unsound mind, and *idiocy*, although it imports incapacity, has not the fixed definition which it originally had when tests of idiocy, lunacy, or unsoundness of mind were to a certain extent arbitrary and fixed. Thus the test applied by Fitzherbert was the capacity of the alleged idiot to count twenty pence, or tell his age, or tell who his father and mother were; and another writer suggested as a test of capacity that the individual be required to measure a yard of cloth or rightly name the days in the week. Now, however, generally speaking, the question of whether a man is an idiot or not, or a lunatic or not, or unsound or sound in mind, is a question of fact triable by a jury, and determinable wholly, or to a considerable extent at least, by the capacity of the alleged unsound person with reference to the particular matter or the particular class of matters which makes his mental condition a subject of investigation. In each individual case, therefore, the general question is, Has the individual the mental capacity or comprehension to perform or do the act or acts in question in such a manner as to appreciate the nature of the act and its consequences? A person may be a lunatic or *non compos mentis* with reference to a particular act, such as entering into the marriage relation, or the purchasing or sale of certain species of property, or the making of a will, and still not be a lunatic or *non compos mentis* as regards certain other acts, such as the commission of crimes against the person or property of others. Or he may even be a lunatic so far as concerns the commission of certain crimes, such as stealing, and not be a lunatic with regard to certain other crimes, such as crimes involving acts of violence against the person of others.

The common law as to the capacity of the unsound to enter into the contract of marriage and as to their testamentary capacity has passed through three phases of development. In the first the capacity of the alleged unsound person was decided according to the ordinary rules of evidence as a fact to be proved by testimony as to the acts and conduct of the person in question, and a person might be held incompetent with regard to either of these matters in question without being necessarily considered as generally incompetent. But later the idea obtained that the mind was indivisible, and that any derangement of the faculties or any disease of the mind was fatal to all civil capacity. The courts, however, have again in recent years returned to the first method of deciding the question of disputed capacity by evidence as to the capacity to perform the particular act in question.

As to criminal responsibility, the legal test of what constitutes such insanity or mental unsoundness as to render a person legally responsible for criminal conduct is not at all settled. The general tendency is here to apply the same test which is applied in civil matters, which is, Was the

* Nichols and Snow, *Philosophical Magazine* (5), vol. xxxii., p. 401.

person able to understand the nature of his act and its consequences, and was he a free agent so far as that act was concerned? The decision as to this question, however, is more or less hindered and its accuracy destroyed by the bringing in of the idea of moral responsibility involving the idea of moral insanity, and also by the consideration of the circumstances under which the criminal act was committed.

The first rule as to the capacity of lunatics to contract was based on the civil-law rule that "an unsound person can not enter into a contract because he does not understand what he is doing." This rule, however, was subject to certain exceptions in favor of certain matters of record, such as fines and recoveries, statutes, recognizances, etc., which exceptions, however, were subject to equitable relief. The original doctrine was also subject to a second exception having special reference to deeds, feoffments, and grants, expressed in the rule that no man should be allowed to stultify himself by setting up his own incapacity.

Since the first quarter of the nineteenth century the laws in England regulating the personal liberty and the property of the unsound in mind or those whose mental unsoundness incapacitates them from taking charge of their own affairs have been subject to many statutory modifications, and they were all consolidated under the Lunacy Act of 1890, which, with the amendatory acts, constitutes the law of Great Britain to-day (1899) with regard to the treatment of the persons and property of lunatics. This law provides for (1) a competent body having supervision in all matters concerning persons of unsound mind; (2) proper establishments for the reception of lunatics; (3) a thorough investigation of the condition of an alleged lunatic prior to his confinement as such; (4) humane treatment during detention, and proper opportunities for discharge on recovery; (5) protection of the property of persons incompetent to manage their own affairs.

The principal control of lunacy matters is vested in a commission constituting a governing department and consisting of four unpaid commissioners, three salaried local commissioners, and three salaried medical commissioners, who are charged with the duty of supervising all establishments in which lunatics are received, and of enforcing the carrying out of all regulations for the welfare of the inmates. They have authority to investigate complaints made by the inmates detained as lunatics, and are vested with wide powers for the discharge of patients. The lay chancellor and the lay justices of appeal are vested with the jurisdiction over inquisitions and the management of the property of lunatics, their functions being mostly delegated, however, to two ministers in lunacy, who are required to be barristers of at least ten years' standing.

The establishments for the reception of lunatics are asylums or workhouses, registered hospitals, and licensed houses. The asylum is under the supervision of a visiting committee, and is intended for the reception of pauper patients. The registered hospitals are charitable establishments, intended, however, generally for patients who are not paupers, but are able to make a small annual payment. The number of patients which such a hospital may receive, and the regulations for its management and control, are subject to the approval of the Home Secretary, and their accounts must be submitted to the charity commissioners in lunacy. The licensed houses are private establishments whose licenses antedate the Lunacy Act of 1889, and they practically have a monopoly, since no new licenses are granted except to them or to their successors. These houses are subject to strict examination and regulation by the commissioners in lunacy and legal and medical visitors. Lunatics may be received in unlicensed houses as single patients; but even in this case in various ways they are subject to the control of the commissioners in lunacy.

The proper treatment of the inmates of these establishments, and of persons detained as single patients, is provided for by compulsory visitation by the commissioners and by chancery visitors, visitors of licensed houses, and asylum visiting committees; and every hospital and licensed house may be visited at any time whatever by any one or more of the commissioners in lunacy. The law also provides means for insuring to every person detained as a lunatic opportunity to communicate with the lunacy authorities and receive visits from his friends; regular medical attendance; proper regulation of the use of mechanical means of restraint; and facility for obtaining his discharge upon recovery.

The property of a person legally declared to be a lunatic is placed under the care and management of a committee of his estate, and is not controlled by the lunacy authorities.

In the U. S. the laws upon the subject of lunacy are in general analogous to those of Great Britain, but the special provisions obtaining in the different States for carrying out the laws vary widely in their details. They now in general provide for the establishment of proper places for the detention of lunatics, for the detention of lunatics in private establishments, the proper treatment of inmates during detention, and means of securing their release upon recovery. They provide for the appointment of a committee or conservator of the person, and a committee or conservator for the proper care and preservation of the property of the lunatic, who may or may not be the same person as the committee of the person.

See INSANITY; local statutes; Wood-Renton's *The Law and Practice in Lunacy* (London, 1896); Pitt-Lewis's *The Insane and the Law*; Mann's *Medical Jurisprudence*; Taylor's *Medical Jurisprudence*; Hamilton and Godkin's *Legal Medicine*; Harrison's *Legislation on Insanity, a Collection of all the Lunacy Laws of the U. S. to 1883 inclusive, also the Laws of England, etc.* F. STURGES ALLEN.

Luther League of America: an organization first effected in 1888 by delegates from six Lutheran societies in New York city. The various societies of the different Lutheran churches in the U. S., chiefly composed of young people who are working for the interests of the Church, are brought together in the league, the constitution of which declares that its objects are "to encourage the formation of the young people's societies in all Lutheran congregations in America, to urge their affiliation with their respective State or Territorial leagues, and with this league to stimulate the various young people's societies to greater Christian activity and to foster the spirit of loyalty to the Church." The first national convention of the league was held in Pittsburg, Pa., in 1895. At a national convention held in New York in 1898 400 delegates were present, representing a membership of 80,000 in 15 States.

Lyall, Sir CHARLES JAMES, K. C. S. L., C. I. E., LL. D.: English civil service officer and author; b. Mar. 9, 1845; educated at King's College School and King's College and at Baliol College, Oxford; entered the British civil service in 1867, since which time he has held many important civil offices in the Indian Government, including that of judge and commissioner of Assam Valley districts 1883–84, secretary to Government of India in revenue and agricultural department 1886–87, and secretary to Government of India, home department, 1889–95, and chief commissioner of Central Provinces of India 1895–98. He is best known, however, for his studies and writings in Arabic, and has published *Translations of Ancient Arabic Poetry* (1885); *Ten Ancient Arabic Poems* (1894); and articles in the *Encyclopædia Britannica* (9th ed.). F. STURGES ALLEN.

Lyte, ELIPHALET ORAM, Ph. D.: educator; b. near Bird-in-Hand, Lancaster co., Pa., June 29, 1842; while preparing for college, left school during the early part of the civil war to join the Federal army, where he served with distinction for nearly three years; graduated at the State Normal School, Millersville, Pa., 1868; A. M. and Ph. D., Franklin and Marshall College; Professor of English and Pedagogics, State Normal School, Millersville, Pa., 1868–87, and principal since 1887; president of the National Educational Association 1898–99; author of several text-books.

Maas, JOSEPH: tenor singer; b. in Dartford, England, Jan. 30, 1847, and began as a choir-boy in Rochester Cathedral. In 1869, having developed a fine tenor voice, he went to Milan for study. In 1871 he made a tour of the U. S. with the Kellogg Opera Company, returning to London in 1877, and joined the Carl Rosa Opera Company. D. Jan. 17, 1886. D. E. HERVEY.

Maas, LOUIS: pianist; b. in Wiesbaden, Germany, June 21, 1852, the son of a music-teacher. Early in life his parents went to London, where he graduated at the age of fifteen years, at King's College. In 1867 he entered the conservatory of Leipzig. In 1868 his first overture was performed at the Gewandhaus, and his second the following year. In Apr., 1872, he produced his first symphony. In 1873–74 he taught in Kullak's academy, and spent the summers of those years at Weimar with Liszt. He made a concert tour of Germany in 1874 with great success, and in 1875 was chosen professor in the Leipzig conservatory. In 1881 he went to the U. S. with the violinist Wilhelmj, and

at the close of the concert tour remained there, settling in Boston, devoting himself to teaching, playing, and composing. D. in Jamaica Plain, near Boston, in Sept., 1889.

D. E. Hervey.

Mabie, Hamilton Wright: author: b. in Cold Spring, N. Y., Dec. 22, 1845; was educated at Williams College and at Columbia University; became associate editor of the *Outlook*. His more important publications are *Norse Stories Retold from the Eddas* (1890); *My Study-Fire* (1891); *Under the Trees and Elsewhere* (1891); *Essays in Literary Interpretation* (1892): *Essays on Nature and Culture* (1895); *Short Studies in Literature* (1896); *Essays on Books and Culture* (1897); *Essays on Work and Culture* (1898); and *The Forest of Arden* (1899).

McAdoo, William Gibbs: jurist; b. near Knoxville, Tenn., Apr. 4, 1820; graduated at East Tennessee University, Knoxville, 1845; was a member of the Tennessee Legislature 1845–46; an officer in the Mexican war 1847; was admitted to the bar, and was attorney-general of the Knoxville judicial district 1851–60; removed to Georgia in 1862; was a captain in the Confederate service; appointed judge of the twentieth judicial district of Georgia 1871; is author of published addresses, etc., and, with Prof. H. C. White of Georgia, of *Elementary Geology of Tennessee*.

Macareo River: a branch of the Orinoco delta entering the Gulf of Paria (Serpent's Mouth), not far from Port of Spain, Trinidad, and the only practical inland route for steamboats from Port of Spain to the Orinoco. The stream is of much commercial importance, and steamers ply on it between Trinidad and Ciudad Bolivar, on the Orinoco.

McBurney, Robert Raikes: general secretary of the New York Y. M. C. A.; b. in Castleblaney, Ireland, Mar. 31, 1837. His father was a physician. He landed in New York city in the summer of 1854, and, in unconscious prophecy of his career, on the very evening of his arrival went to the rooms of the Young Men's Christian Association, then in the Stuyvesant Institute, No. 659 Broadway. He obtained a clerkship in the city, but his interest in the association, which had been organized in 1852, was so manifest and intelligent that in 1862 he was chosen as its first paid employee, and given charge of the rooms and general oversight of the work in all branches. The wisdom of the choice was immediately apparent. He made it his meat and drink to serve the association, and he and it became synonymous. He was its life and soul. He drew young men of all grades toward him, for he genuinely loved them, and in a spirit of kindness and self-sacrifice befriended them. His appeal to their better nature in their times of uncertainty and temptation saved many of them from folly and moral death. He saw the association expand and grow in public confidence, move into better quarters, and in 1869 erect the first building specially adapted to its needs. In 1896 he was called upon to plan the ninth of its buildings in the city. Its membership was then 7,300, and in carrying on educational and physical work in addition to the spiritual and social it had greatly broadened its scope and somewhat changed its character. He had the wisdom to see the necessity of adopting these new currents of influence, and the tact to keep them in proper subordination to the great ends of the association. It was, however, in the spiritual and personal work of the association that he excelled. When the Y. M. C. A. became a feature of every city in Protestant lands national and international conferences were held, and in them he was always so much sought after for counsel that his position as the leading Y. M. C. A. officer in the world was universally conceded. He never married, had no social ties, but lived entirely for young men. He died after long illness from a complication of diseases, in Clifton Springs, N. Y., Dec. 27, 1898.

S. M. J.

McCabe, James Dabney: author; b. in Richmond, Va., July 30, 1842; educated at the Virginia Military Institute; wrote in early youth for the Abingdon *Virginian*; resided in Richmond during the war, writing in favor of the Confederate cause. He published a war story entitled *The Aide-de-Camp* in 1863, and wrote three plays on war topics. In the winter of 1863 he published a Christmas book, *The Bohemian*, in preparing which he was assisted by his wife and Charles P. Dimitry. In 1863–64 he was editor of the *Magnolia Weekly*. He wrote many popular war poems and several hundred short stories, essays, poems, and translations. After the war he lived chiefly in Brooklyn, N. Y. Among his works are *Life of Gen. Thomas J. Jackson* (1863; enlarged ed. 1864); *Memoir of Gen. Albert S. Johnston* (1866); *Life and Campaigns of Gen. Robert E. Lee* (1867); *The Gray-Jackets* (1867); *Planting the Wilderness* (1869); *History of the Late War between Germany and France* (1871); *Lights and Shadows of New York Life* (1872); *The Great Republic* (1872); *Paris by Sunlight and Gaslight* (1875); *Centennial History of the United States* (1875); *Pathways of the Holy Land* (1877); *History of the Turko-Russian War* (1879); *Our Young Folks Abroad* (1881); *Our Young Folks in Africa* (1882). D. in Germantown, Pa., Jan. 27, 1883.

McCall, George Archibald: soldier; b. in Philadelphia, Pa., Mar. 16, 1802; graduated from the Military Academy, West Point, and entered the army as second lieutenant of infantry in 1822; became first lieutenant in 1829, captain in 1836, and major in 1847. In addition to the routine of garrison life, he served for five years (1831–36) on the staff of Gen. Gaines, and in 1836 and 1841–42 was actively engaged in Florida against the Seminoles. In the war with Mexico he won the brevets of major and lieutenant-colonel for gallantry in the battles of Palo Alto and Resaca de la Palma; subsequently he served as chief of staff to Gen. Patterson. He was appointed inspector-general, with the rank of colonel, in 1850, and resigned from the army in 1853. In the civil war he organized the Pennsylvania Reserve Corps, and was commissioned, May 15, 1861, by the State a major-general of Pennsylvania volunteers. Two days later he was appointed brigadier-general of U. S. volunteers, but retained command of the reserve corps, which as a division of the Army of the Potomac held the right of the line of that army before Washington 1861–62, and a part of which was engaged in the action and occupation of Dranesville, Va., Dec. 20, 1861. In the Virginia Peninsular campaign of 1862 he was engaged with his command at Mechanicsville, Gaines's Mill, and Frazier's Farm, being taken prisoner in the battle at the last-named place and held until August, when he was exchanged; but his impaired health did not permit him to return to the army, and he resigned, Mar. 31, 1863, and retired to his farm near West Chester, Pa., where he died, Feb. 25, 1868. He was the author of *Letters from the Frontier* (1868).

McCallum, Daniel Craig: engineer; b. in Johnstown, Renfrewshire, Scotland, Jan. 21, 1815. His parents settled in Rochester, N. Y., while he was young, and he became an architect and builder there. In 1851 he invented the "inflexible arch truss bridge." In 1855–56 he was general superintendent of the Erie Railway. On Feb. 11, 1862, he was appointed military director and superintendent of railroads in the U. S., with the rank of colonel, and "for faithful and meritorious services" was breveted brigadier-general and major-general of volunteers. In July, 1866, he was mustered out of the service, and in the same year he published a valuable report on the military railroads during the war. D. in Brooklyn, N. Y., Dec. 27, 1878.

McClellan, Ely: physician; b. in Philadelphia, Pa., Aug. 23, 1834; studied at the University of Pennsylvania and at Williams College, and graduated at Jefferson Medical College in 1856. He became a surgeon in the U. S. army in Aug., 1861, and on June 1, 1876, was promoted major, and in Sept., 1891, deputy surgeon-general, with the rank of lieutenant-colonel. Among his writings are *Obstetrical Procedures among the Aborigines of North America* (Louisville, Ky., 1873); *Fibroid Tumors of the Uterus* (1874); *Cholera Hygiene* (1874); *Common Carriers, or the Porters of Disease* (1874); *A History of the Cholera Epidemic in 1873 in the United States* (Washington, 1875); *Battey's Operation* (Louisville, 1875); *A Note of Warning: Lessons to be Learned from Cholera Facts of the Past Year, and from Recent Cholera Literature* (1876); *On the Relation of Health Boards and other Sanitary Organizations with Civic Authorities* (Atlanta, Ga., 1876); and *A Review of Von Pettenkofer's Outbreak of Cholera among Convicts* (1877).

McClenachan, Charles Thomson: lawyer; b. in Washington, D. C., Apr. 13, 1829; was instructor in the Institute for the Blind, New York, 1845–50; was clerk of the board of councilmen 1850–61; served in the civil war as quartermaster of the Seventh Regiment of New York; was admitted to the bar in 1867; was general accountant in the street department and afterward in the department of public works for twenty-six years. He has published *The Laws of the Fire Department* (New York, 1855); *Compilation of the Opinions of Counsels to the Corporation* (1859); *New York Ferry Leases and Railroad Grants from 1750 to 1860* (1860);

The Atlantic Telegraph Cable of 1858 (1863); *The Book of the Ancient Accepted Scottish Rite of Freemasonry* (1867); an addendum to Dr. Albert G. Mackey's *Masonic Encyclopædia* (Philadelphia, 1884); and *The History of Freemasonry in the State of New York* (1888).

McClernand, John Alexander: lawyer and soldier; b. in Breckenridge co., Ky., May 30, 1812; admitted to the bar in Shawneetown, Ill., in 1832. In the Black Hawk war he served as a private, resuming his profession on his return, and in 1835 founded a newspaper called the *Democrat*; was elected to the Legislature in 1836, also in 1840 and 1842, and was a member of Congress 1843–51, and was again sent to Congress from Jacksonville in 1859, but resigned on the outbreak of the civil war and engaged actively in raising the brigade which bore his name, and which he commanded at Belmont, having been appointed brigadier-general of volunteers May 17, 1861. At Fort Donelson he commanded the right of the Union lines. He was promoted major-general Mar. 21, 1862, and commanded a division at the battle of Shiloh. In Jan., 1863, he relieved Gen. Sherman in command of the expedition for the capture of Vicksburg. He commanded the expedition that stormed and carried Arkansas Post, and was engaged in the Vicksburg campaign, including the assault on that place, in command of the Thirteenth Corps, until relieved in July, 1863. He resigned Nov. 30, 1864. D. Sept. 20, 1900.

McCrary, George Washington, LL. D.: statesman; b. in Evansville, Ind., Aug. 29, 1835; removed very early to the part of Wisconsin Territory which afterward became the State of Iowa; was educated in a public school and an academy, studied law in Keokuk, Ia., and was admitted to the bar in 1856; was elected to the State Legislature in 1857, and served in the State Senate 1861–63, holding the position of chairman of the committee on military affairs; devoted himself chiefly to his profession from 1863 to 1868, when he was elected to Congress, and was re-elected four times in succession, serving on the naval committee, on the committee on the revision of the laws, and as chairman of the committee on elections. He became Secretary of War Mar. 12, 1877, and U. S. circuit judge in Dec., 1879. In Mar., 1880, he resigned his judgeship and resumed the practice of law in Kansas City, Mo. He was the author of *The American Law of Elections* (Chicago, 1875). D. in St. Joseph, Mo., June 23, 1895.

McCulloch, Ben: soldier; b. in Rutherford co., Tenn., Nov. 11, 1811; left school when fourteen years old and became an expert hunter and boatman; went to Texas to join the expedition of Davy Crockett, but arrived after the death of the latter at the Alamo; served as a private in the battle of San Jacinto, and subsequently in the Mexican war commanded a company of Texan rangers, and was greatly distinguished at Monterey and Buena Vista, and at the final capture of the city of Mexico; appointed U. S. marshal in 1853, and commissioner to Utah in 1857. In 1861 he returned to Texas, and, in command of a temporary force of State troops, received the surrender of Twiggs at San Antonio. Appointed brigadier-general in the Confederate army May 14, 1861, he commanded in Missouri at Dug Springs and at Wilson's Creek, and was killed in the battle of Pea Ridge, while in command of a division, Sept. 7, 1862.

MacCunn, Hamish: composer; b. in Greenock, Scotland, the son of a shipowner, and educated in the schools of his native town till 1883, when he went to London, winning a scholarship at the Royal College of Music. This he resigned in 1886, and has since devoted himself to composition. Although still very young, he has produced a number of important works in the highest forms, including orchestral overtures and other works, several cantatas, an opera, *Jeannie Deans*, libretto by Joseph Bennett, and an opera to a libretto by the Marquis of Lorne, many songs and part songs, and several works for solo instruments and orchestra.

D. E. Hervey.

MacDonald, Arthur, A. M.: specialist in education; b. in Caledonia, N. Y., July 4, 1856: A. B., University of Rochester, 1879, and A. M. 1883; student of law 1879–80; graduated at the Union Theological Seminary, New York, 1883; graduate student, Harvard University, 1883–85; studied at Universities of Berlin, Leipzig, Paris, Zurich, and Vienna 1885–89; docent in criminology, Clark University, 1889–91; U. S. Bureau of Education specialist as related to the abnormal and weakling classes since 1892; author of *Abnormal Man* (1893); *Criminology* (1894); *Le Criminel Type* (1895); *Education and Patho-Social Studies* (1896); *Emil Zola* (1898); *Experimental Study of Children* (1898); *Abnormal Woman* (1897).

McDowell, William Fraser, S. T. D.: educator; b. in Millersburg, O., Feb. 4, 1858: A. B. 1879, A. M. 1882, Ph. D. 1891, S. T. D. 1894, all from Ohio Wesleyan University; S. T. B. 1882, Boston University; pastor, Lodi, O., 1882–83, Oberlin, O., 1883–85, Tiffin, O., 1885–90; chancellor of the University of Denver 1890–99; became general secretary of the Methodist Missionary Union in 1899; author of *The College Student and the Christian Confession*.

McEvoy, John Millar, LL. B: Canadian lawyer and essayist; b. in Caradoc, Ontario, in 1864; received the degree of B. A. at Toronto University in 1890; read law, and was called to the bar in 1893. He took up the practice of his profession in London, Ontario, where he still resides; in 1892 was appointed fellow in political science in Toronto University, and taught Canadian constitutional history; subsequently was appointed lecturer in the department of political science. Besides numerous other essays and pamphlets, he has contributed to the magazines an essay on *Canadian Currency and Banking*; *Karl Marx's Theory of Value*; and is the author of *The Ontario Township*, a study of the history of the municipal institutions of the Province of Ontario.

F. Sturges Allen.

McGee, Anita Newcomb: surgeon; b. in Washington, D. C., Nov. 4, 1864; daughter of Simon Newcomb, the astronomer, and wife of W J McGee, the ethnologist; educated in private schools, after which she spent three years in travel and study in Europe. In order to acquire a knowledge of medicine, she entered the medical department of Columbian University in Washington, where she was graduated in 1892, and then took a post-graduate course at the Johns Hopkins Hospital in Baltimore, after which she practiced for some years in Washington, and was an attending physician at the Woman's Hospital. For many years Dr. McGee has been active in the national society of the Daughters of the American Revolution, holding the offices of surgeon-general, librarian-general, and vice-president-general at various times. In connection with the war with Spain in 1898 she became director of the Daughters of the American Revolution Hospital Corps, a body which was formed at her suggestion, and was accepted by both the surgeons-general of the army and navy as an official examining board for women nurses. Under her influence the standard for army nurses was established, compelling them to be graduates from training-schools. On Aug. 29, 1898, she was appointed acting assistant surgeon in the U. S. army, and after short duty at Montauk Point was given charge, immediately under the surgeon-general, of all matters relating to women nurses. She examined more than 6,000 applications, and 1,500 women nurses were appointed to the army on her recommendation. Dr. McGee is the only woman who is an officer in the U. S. army. She is a member of many medical and scientific societies, and in 1897 was secretary of the section on anthropology of the American Association for the Advancement of Science. She is the author of a number of papers, chiefly relating to the communistic societies of the U. S., and has also contributed genealogical and medical papers to the journals of the societies of which she is a member.

Marcus Benjamin.

McGiffin, Philo Norton: naval officer; b. in Washington co., Pa., Dec. 30, 1860; graduated at the Naval Academy, passing the final examination after a two years' cruise, and was honorably discharged with a year's pay, because of an act of Congress reducing the navy. In 1883 he went to China and became Professor of Mathematics and Naval Matters in the naval college at Tientsin. In 1887 he and Lieut. Bourchier of the British navy assumed charge of the new naval college at Wei-hai-wei. At the beginning of the war between China and Japan, in 1894, he volunteered for service, and was appointed to command the ironclad Chen-Yuen, built in England under his superintendence, which was the flagship of the fleet in the battle of the Yalu river, Sept. 17, 1894. Capt. McGiffin and many of the crew were injured by the shock of the premature discharge of a gun, and he was so wounded during the fight that he partly lost both sight and hearing. After the fight he had to leave China, suicide being demanded of him, according to the custom of the country, because of his defeat, and he went to New York, where he died in hospital, Feb. 11, 1897. He

was the only American officer who had commanded a modern war-ship in actual battle before the fight in Manila Bay in May, 1898.

McGoun, ARCHIBALD: Canadian lawyer and law-writer; b. in Montreal, Dec., 1853; educated at the Montreal high school and subsequently at McGill University; was called to the bar in 1878, and took up his practice in Montreal, where he still (1899) resides; was appointed Professor of Civil Procedure and later of Legal Bibliography in McGill University, and in 1896 lecturer on constitutional law. He has published *Federation of the Empire*, an address (1884); *Commercial Union with the United States, with a Word on Imperial Reciprocity* (1887); *A Federal Parliament of the British People* (1890); and other essays and pamphlets on the question of the federal unity of Great Britain and her colonies. F. STURGES ALLEN.

McIlvaine, JOSHUA HALL, D. D.: educator; b. in Lewis, Del., Mar. 4, 1815; graduated at Prineeton College in 1837, and at the Theological Seminary in 1840; pastor in Little Falls, Utica, and Rochester, N. Y., till 1860; Professor of Belles-lettres at Princeton 1860–70; was founder (1887) of Evelyn College for young women in Princeton, and its president until his death, Jan. 30, 1897. In 1859 he leetured before the Smithsonian Institution on comparative philology in relation to ethnology, and in 1869 before the University of Pennsylvania on social science. He published *The Tree of Knowledge of Good and Evil* (1854); *Elocution: the Sources and Elements of Power* (1870); *The Wisdom of Holy Scriptures* (1883); *The Wisdom of the Apocalypse* (1886). The University of Rochester gave him the degree of D. D. in 1854.

Mackaye, JAMES STEELE: dramatist; b. in Buffalo, N. Y., in 1842. He went to Paris in 1868 to study painting, but, being impressed with François Delsarte's theories of dramatic expression, he studied with Delsarte until the beginning of the Franco-Prussian war. He then returned to the U. S., lectured in New York city, in Boston, and in Harvard University on dramatie art and expression, and produced two plays, *Monaldi* and *Marriage*, in the St. James theater, New York. In 1872 he played *Hamlet* at the Crystal Palace in London, and began a tour of the provinees, whieh was cut short beeause of ill health. It is said that while in London at this time he was associated with Tom Taylor in writing *Arkwright's Wife* and *Clancarty*, with Charles Reade in writing *Jealousy*, and with George Eliot in dramatizing her *Silas Marner*. In 1875 he produeed in New York an original adaptation of Blum's *Rose Michel*, in 1876 *The Twins*, in 1877 the comedy *Won at Last*, and in 1878 the melodrama *Through the Dark*, the last being afterward changed to *Money Mad*, with change of its seenes from England to the U. S. In 1879, with a new eompany under his management, he revived his play *Won at Last*, and introdueed some stage innovations, for the better applieation of whieh the Madison Square theater was built and opened in 1880 with his play *Hazel Kirke*. In 1885 he built the Lyceum theater. In 1887 he produeed in Buffalo, N. Y., a play ealled *Anarchy*, which was afterward successful in New York under the title *Paul Kauvar*. D. in Timpas, Col., Feb. 25, 1894.

McKenna, JOSEPH: jurist; b. in Philadelphia, Aug. 10, 1843, and taken to California when twelve years old, where the family settled in Benicia; educated at a collegiate institute in Benicia; admitted to the bar in 1865; elected district attorney of Sonoma County in 1865 and again in 1867; member of the California Legislature 1875–76; twiee defeated as a candidate for Congress, in 1876 and 1878, but elected in 1884, and was a member of three Congresses; was the only member of the ways and means committee from a State W. of the Rocky Mountains; appointed in Feb., 1892, a U. S. circuit judge for the Pacific slope circuit; appointed U. S. Attorney-General Mar., 1897; beeame U. S. Supreme Court justice Jan., 1898, on the retirement of Justiee Field.

Mackenzie, JAMES CAMERON, Ph. D.: educator; b. in Aberdeen, Scotland, Aug. 15, 1852; studied at Bloomsburg (Pa.) State Normal School and Phillips Exeter Academy; A. B., Lafayette College, 1878; studied in Princeton Theologieal Seminary; Ph. D. 1882; assistant principal Wilkesbarre (Pa.) Institute 1873–74; founder and principal Wilkesbarre Academy (now Harry Hillman Academy) 1878–82; first head master Lawrenceville School, Lawrenceville, N. J., 1882–99; in 1899 beeame a professor in the State Normal School at De Kalb, Ill.; author of numerous contributions to educational magazines.

McKibbin, CHAMBERS: soldier; b. in Chambersburg, Pa., Nov. 2, 1841; enlisted as a private in the regular army soon after the outbreak of the civil war; beeame second lieutenant in the Fourteenth Infantry in 1862, first lieutenant in 1864, was transferred to the Thirty-second Infantry in 1866, promoted to eaptain in the Thirty-fifth Infantry in 1867, transferred to the Fifteenth Infantry in 1869, beeame major of the Twenty-fifth Infantry in 1892, and lieutenant-colonel of that regiment in 1896; took part in the invasion of Cuba under Gen. Shafter, and was honorably mentioned in official reports for gallantry at the battle of Santiago; was advanced to brigadier-general of volunteers, and on the fall of Santiago was made military governor of that city, but was soon succeeded by Gen. Leonard Wood.

Maclaren, JOHN JAMES, LL. D.: Canadian lawyer and law-writer; b. in Lachute, province of Quebee, July 1, 1842; edueated at Huntington Academy, and at Vietoria University, Cobourg, and McGill University; read law and was called to the Quebec bar in 1868, and took up the practiee of his profession in Montreal; in 1884 removed to Toronto and was called to the Ontario bar; was made queen's counsel of Quebec in 1878, of Ontario and the Dominion in 1890; was secretary of the British and Ameriean joint commission on Hudson Bay claims 1867–69; member of the committee on the eode of civil procedure of Quebec 1887. He is now (1899) a senator of Toronto University, and of the Wesleyan Theologieal College, Montreal; member of the board of regents of Vietoria University, and an honorary member of the law faculty of Toronto University. Among his writings are *Roman Law in English Jurisprudence* (1887); *Bills, Notes, and Cheques* (2d ed. 1894); *Banks and Banking* (1894). In addition to his work as a lawyer he has been active in religious, educational, and temperance work, and is a member of many publie institutions and associations for the furtheranee of these ends. F. STURGES ALLEN.

McLaws, LAFAYETTE: soldier; b. in Augusta, Ga., Jan. 15, 1821; graduated at the U. S. Military Aeademy in 1842, and appointed brevet second lieutenant of infantry; served (1845–48) in the war with Mexieo; subsequently on frontier duty until 1860, having meanwhile attained the rank of eaptain; resigned Mar. 23, 1861, to join the Southern Confederaey, being soon appointed major-general in that serviee, and throughout the war served as division commander, mainly in Longstreet's corps. He was appointed in 1875 collector of internal revenue in Savannah, Ga., and in 1876 postmaster there. D. in Savannah, July 24, 1897.

MacLean, GEORGE EDWIN, Ph. D., LL. D.: educator; b. in Roekville, Conn., Aug. 31, 1850: prepared for eollege at Westfield Aeademy and Williston Seminary; A. B., Williams College, 1871; graduated at Yale Theological Sehool 1874; pastor of the Presbyterian and Congregational Soeiety, New Lebanon, N. Y., 1874–77; pastor Memorial Presbyterian chureh, Troy, N. Y., 1877–81; studied at the Universities of Leipzig and Berlin 1881–83; Ph. D., Leipzig, 1883; after an extended tour through Europe, he returned to the U. S., and soon thereafter aeeepted the chair of English Language and Literature in the University of Minnesota, a position he held until 1895, with two intermissions for European study, in England 1891–92, and in Paris 1894. Williams College eonferred on him the degree of LL. D. in 1895, and in the same year he was elected chaneellor of the University of Nebraska. In 1899 he accepted the presidency of the State University of Iowa. He is a member of many learned soeieties, and author, in addition to numerous shorter articles and reviews, of *Ælfric's Anglo-Saxon Version of Alcuini Interrogationes Sigewulfi Presbyteri in Genesin* (Halle, 1883); *An Old and Middle English Reader* (Boston, 1886); *An Introductory Course in Old English* (Minneapolis, 1891); *A Chart of English Literature, with References* (several editions); *An Old and Middle English Reader* (New York and London, 1893). C. H. THURBER.

Maclean, Rev. JOHN, M. A., Ph. D.: author (*Robin Rusiler*); b. in Kilmarnock, Ayrshire, Scotland, Oet. 30, 1851; went to Canada in 1873. He took the degree of M. A. at Vietoria University, Cobourg, in 1887, and that of Ph. D. at the Wesleyan University, Illinois, in 1888. Among his published works are *Our Savage Folk* (1895) and *The Warden of the Plains and other Stories of Adventure* (1897).

McLellan, ISAAC: poet; b. in Portland, Me., May 21, 1806; graduated at Bowdoin College in 1826, and practiced

law in Boston for several years. He wrote during his residence in Boston, for *Willis's Monthly Magazine*, the *New England Magazine*, and the *Knickerbocker*, both prose articles and poems; was associate editor of the Boston *Daily Patriot*, and afterward published a monthly magazine, which was eventually consolidated with the *Weekly Pearl*. In 1851 he removed to New York city and left the practice of law, devoting his whole time to literature. Through his passion for hunting and fishing and his many poems on field sports he became known as "the poet-sportsman." In 1898, when ninety-two years old, he lived in Greenport, Long Island, and spent much of his time fishing, continuing also his literary work. Two of his best-known early poems are *The Death of Napoleon* and *New England's Dead*. Among his published works are *The Fall of the Indian* (Boston, 1830); *The Year* (1832); *Journal of a Residence in Scotland*, from the manuscripts of H. B. McLellan (1834); *Mount Auburn* (1843); *Poems of the Rod and Gun*, edited, with a sketch of the author, by Frederick E. Pond (New York, 1886); and *New Poems* (1898). D. Aug. 20, 1899.

McMillan, Samuel James Renwick: jurist and U. S. Senator; b. in Brownsville, Pa., Feb. 22, 1826; graduated at Duquesne College, Pittsburg, in 1846; studied law with Edwin M. Stanton; was admitted to the bar in 1849, and opened practice in Stillwater, Minn., in 1852; was elected judge of the first judicial circuit of Minnesota in 1857; became associate justice of the State Supreme Court in 1864, and chief justice in 1874; was elected U. S. Senator in 1875, and again in 1881. In 1890 he served on the Presbyterian General Assembly's committee for revision of the Confession of Faith. His judicial opinions are given in vols. ix.–xxi. of *Minnesota Reports* (1864–75). D. in St. Paul, Minn., Oct. 3, 1897.

McMurry, Charles Alexander, Ph. D.: educator; b. in Crawfordsville, Ind., Feb. 18, 1857; graduated at the Illinois Normal University in 1876; studied for two years at the University of Michigan, and for four years at the Universities of Halle and Jena, Germany; Ph. D., Halle, 1887; taught in Illinois, Colorado, and Minnesota; principal of practice school, Illinois State Normal University, and lecturer in Teachers' College, University of Chicago, 1899. He is the author of *The General Method of the Recitation* (with F. M. McMurry); *Special Method in Reading*; *Special Method in Literature and History*; *Special Method in Geography*; *Special Method in Natural Science*; *Pioneer History Stories*; *Course of Study in the Eighth Grades*; editor of *Year-Books of the National Herbart Society*.

C. H. Thurber.

McMurry, Frank Morton, Ph. D.: educator; b. near Crawfordsville, Ind., July 12, 1862; graduate of Illinois State Normal School 1879; student at the University of Michigan 1881–82; student at Universities of Halle and Jena 1886–89; Ph. D., Jena, 1889; student at Universities of Geneva and Paris 1892–93; principal of schools in Illinois 1883–86; principal of grammar schools in Chicago 1889–90; Professor of Pedagogics and training teacher in Illinois State Normal University 1891–92; Professor of Pedagogy in University of Illinois 1893–94; principal of Franklin School, Buffalo, 1894–95; dean of Teachers' College, University of Buffalo, 1895–98; Professor of Theory and Practice of Teaching, Teachers' College, Columbia University, since 1898; author of *Concentration* (in *First Year-Book of the Herbart Society*) and (with C. A. McMurry) of *The General Method of the Recitation*.

C. H. Thurber.

McNair, Frederick Vallette: naval officer; b. in Pennsylvania, Jan. 13, 1839; graduated at the Naval Academy in 1857; became a lieutenant in 1861, lieutenant-commander in 1864, commander in 1872, captain in 1883, commodore in 1896, rear-admiral in 1898. He served on the Iroquois in the passage of Forts Jackson and St. Philip and the capture of New Orleans, and in most of the engagements on the Mississippi in 1862. Later he was executive officer of the Juniata in the South Atlantic blockading squadron, and participated in both the attacks on Fort Fisher. He was on duty in the Brazil squadron 1865–66, and in the South Atlantic squadron 1866–67. In 1868 he was stationed at the Naval Academy, and afterward served on the flag-ship of the European squadron. In 1872 he commanded the Kearsarge and the Portsmouth, and in 1879 he became commandant of cadets at the Naval Academy. He was afterward captain at the navy-yard at Mare island, Cal., commanded the Omaha, of the Asiatic squadron, and later, as commodore, the squadron itself. He was succeeded in this command by Commodore (afterward Admiral) George Dewey early in 1898, and as rear-admiral became superintendent of the Naval Academy.

Macnaughton, Edward Macnaughton, first Baron: English lawyer and jurist; b. in 1830; received his education at Trinity College, Cambridge, and studied for the bar at Lincoln's Inn, of which he is a barrister and bencher; was Conservative member of Parliament for Antrim 1880–85, and for the northern division of Antrim 1885–87. In 1887 he was appointed lord of appeal in ordinary, and in 1895 chairman of legal council of education. He was created a baron and a life peer in 1887.

Macneill, John Gordon Swift: Irish lawyer and publicist; b. in Dublin, Mar. 11, 1849; was educated at Trinity College, Dublin, and at Christ Church College, Oxford, receiving his degree of M. A. at Oxford in 1875; was called to the Irish bar in 1875, and was Professor of Constitutional and Criminal Law at King's Inns, Dublin, 1882–88; has been a Nationalist member of Parliament for Donegal since 1887; was made queen's counsel in 1893. His publications include *The Irish Parliament, What it Was and What it Did* (1885); *English Interference with Irish Industries* (1886); *How the Union was Carried* (1887); *Titled Corruption* (1894).

Madagascar: After the French army captured the capital, Antananarivo, and particularly after the queen was exiled to Réunion, in Feb., 1897, many far-reaching reforms were introduced under the administration of Gov.-Gen. Gallieni, which tended to maintain peace, improve the condition of the people, and reconcile most of the Malagasy to the new *régime*. Slavery was abolished by law, and slaves were declared to be the equals of their former masters. Slaves captured in intertribal wars were returned to their tribes. Thus a prolific source of internal warfare was removed, but the evil of slavery is not yet wholly eradicated. A taxation system distributing tax burdens more equally upon all was introduced. Non-interference with religious beliefs has been rigidly enforced, but French Catholic missionaries have been encouraged to extend their operations and in particular to spread the use of the French language among the people. Protestant missionaries assert that the Catholic propaganda has been pushed at the expense of the Protestant missions. Occasional local revolts against the French control have been severely repressed. Numerous primary schools have been established, and also a medical school, a school for the training of native teachers, and a French technical school at the capital, with workshops in which practical instruction is given in many trades. The old Hova system of forced labor in the public service is still continued, on the ground that many are otherwise unable to pay their taxes. Able-bodied male adults are required to give the Government fifty days' service a year, and in this way a large part of the road-making and other public works is carried out. A road has been opened for cart traffic from the northwest coast to the capital, and other roads are building, so that wagon transport is gradually supplanting porterage on the backs of men. French enterprises are in every way favored to the disadvantage and often the exclusion of enterprises in the hands of the non-French foreigners. The people are specially encouraged to wear French clothes and buy French products. Still France, in spite of favoring tariffs, does not control the trade. The value of imports in 1896 was $2,862,975, of which $656,140 came from France, $1,349,964 from England, $495,352 from the U. S., and $137,572 from Germany. The largest imports were cotton goods from England, and almost the entire imports from the U. S. were cotton cloths, chiefly sheetings. In 1899 the imports were valued at $5,492,842; the exports, $1,552,878. The series of lakes and lagoons south of the east coast port Tamatave and on the road to the capital are being connected in 1901 by canals to afford water transport part of the way, and a railroad between these points is also under negotiation. The ex-queen, in Feb., 1899, was removed from Réunion to Algeria, as it was believed that her proximity to the island would encourage malcontents to plot for her restoration.

C. C. Adams.

Main, Hubert Platt: musical editor; b. in Ridgefield, Conn., Aug. 17, 1839, and received his education there till 1854, when he went to New York city. His first experience in compiling music-books was in 1855, when he helped his father edit *The Sunday-School Lute*, by I. B. Woodbury. Since then he has been constantly busy editing, compiling, and assisting others in compiling music-books, both sacred and secular. He entered the publishing house of W. B.

Bradbury, and later went with Biglow & Main, with whom he has since remained. He has composed more than a thousand separate pieces, hymn tunes, secular songs and choruses, organ pieces, anthems, etc. D. E. Hervey.

Maisch, John Michael: pharmacist; b. in Hanau, Germany, Jan. 30, 1831; educated in the scientific schools of Hanau; participated in the attempted revolution of 1848, and in 1849 emigrated to the U. S. In 1861, having meantime been employed as a clerk in Baltimore, Washington, Philadelphia, and New York, he became Professor of Materia Medica and Pharmacy in the New York College of Pharmacy, and in 1863 chief chemist of the U. S. army laboratory in Philadelphia. In 1866 he was made Professor of Pharmacy in the Philadelphia College of Pharmacy, and in 1867 Professor of Materia Medica. He had charge of the chemical laboratory of that college 1870–81. He received the degrees of Phar. M. and Phar. D. from the Maryland College of Pharmacy in 1871. He is a member of the American Pharmaceutical Association, and was made its permanent secretary in 1865, as such having editorial charge of the annual reports of proceedings of the association. He was a member of the committee of revision of the *U. S. Pharmacopœia*. He has written many papers on improved processes of analysis, botanical methods, and chemical research, mostly published in the *American Journal of Pharmacy*, of which he became editor in 1870. He has edited *Griffith's Universal Formulary* (3d ed. Philadelphia, 1874); *The National Dispensatory*, with Alfred M. Stillé (1879); and *Manual of Organic Materia Medica* (1882).

Maize: The section of foreign markets of the U. S. Department of Agriculture is investigating (in 1898–99) the possibility of bringing about a larger foreign demand for American corn, the results of the inquiry to be published later. The investigation is chiefly directed to the prospects of a more general introduction of this grain into Europe as an article of human food. Less than 10 per cent. of the total product is at present marketed abroad, where it is purchased as food for domestic animals. The U. S. produces a yearly average of about 2,000,000,000 bush., or four-fifths of the world's crop. In the largest crop seasons it is difficult to dispose of the surplus corn at a profit. If through a larger export demand the price per bushel might be raised, the addition of every cent would mean an increased profit to the producers of $20,000,000. C. C. A.

Malcolm, Sir George: soldier; b. in Bombay in 1818; entered the Bombay army in 1836. He served in the Afghan campaign of 1838, and was present at the capture of Ghuzni and the occupation of Cabul; commanded a detachment of Sindh horse in Eastern Kutchi, fighting the Beluchis, 1840–42; served against Mir Shah Mohammed in 1843, and again in Kutchi 1844–45, in Sir Charles Napier's campaign against the hill tribes; participated in the defeat of the Sikhs and the occupation of Peshawar after the Punjaub campaigns of 1848 and 1849, and was breveted major. He commanded Mahratta horse in Persia in 1857, and the force that reduced the fortress of Sherapur in 1858, and was at the head of a division in the Abyssinian war of 1868. He became a colonel in 1860, major-general in 1857, lieutenant-general in 1875, and general in 1877. D. in Leamington, England, Apr. 6, 1897.

Mancinelli, măăn-chĕĕ-nel'lĕĕ, Luigi: opera conductor and composer; b. in Orvieto, near Rome, Italy, Feb. 5, 1848; studied at Florence, and in 1868 was second violoncellist in the orchestra of the Pergola theater, Florence, and in 1871 occupied a similar position in Rome, where he began, in 1874, as *maestro al piano* and occasional conductor, becoming full conductor in 1875. Here he remained six years. In 1881 he was elected director of the conservatory in Bologna; in 1887 was engaged as principal conductor at Drury Lane, London, going the next year to Covent Garden, conducting opera in London during the season, and in the winter seasons from 1887 to 1893 at the Teatro Real, Madrid. The Abbey and Grau Company engaged him as principal conductor at the Metropolitan Opera-house, New York, and re-engaged him year after year. His compositions include *Isaias*, oratorio for the Norwich Festival, England; an opera, *Isora de Provenza* (1884); an opera, *Ero e Leandro*, first performed as an oratorio at the Norwich Festival, and as an opera twice in New York in 1899; overture and *entr'actes* for *Cléopatra*, prelude and *entr'acte* for *Messalina* —both dramas by Pietro Cossa; an orchestral suite, *Scenes Veneziane*; two masses, and a number of songs and smaller pieces. D. E. Hervey.

Manhattan, Borough of: one of the boroughs of the city of New York as constituted under the charter of Jan. 1, 1898. It comprises the old city of New York exclusive of the present borough of the Bronx, including Manhattan island (see New York, the city), Governor's island, Bedloe's island, Ellis island, the Oyster islands, Blackwell's island, Randall's island, and Ward's island. Pop. (1900) 1,850,093. For the new government, see New York, City of, in the Appendix.

Manzanillo, măăn-zaă-neel'yō: a port on the south coast of Cuba, Santiago de Cuba province, and the outlet for all the products of the Cauto river basin, including tobacco, sugar, wax, honey, and other agricultural commodities. It is situated on a fine bay, and produces annually more than 25,000 tons of sugar. Pop. (1899) 14,464.

Marchand, Jean Baptiste: officer in the French army; b. in Thoissey, department of Aisne, in 1863; entered the army in 1883, and was sent with French forces to Senegambia; served in 1890 on an expedition to the sources of the Niger, and acquitted himself so well in later responsible positions that the French Government intrusted largely to him the carrying out of a secret political mission in Africa, undertaken in 1896 and not concluded until more than two years later. The mission in effect was to lead a large force through the French Congo territory to the old Bahr-el-Ghazal province of Egypt, long abandoned on account of the Mahdist revolt, take possession of it in the name of France, descend the Bahr-el-Ghazal to the Nile and the Nile to Fashoda, occupy that place, hold it against the Mahdists, and claim territorial rights for France on the upper Nile. He was to have the co-operation of the French Congo forces and also of two strong expeditions which were to advance on Fashoda from the Obock protectorate near the Red Sea. The contingent from Obock was not sent to him, but Col. Liotard, the governor of the Mobangi district of the French Congo, was of the greatest assistance. On July 23, 1896, Marchand, with 19 officers of the French army and navy and 150 native soldiers of Senegal, reached West Africa, and about seven months later started from Brazzaville, Stanley Pool, with a very large equipment and ascended the Mobangi river to the Mbomu affluent. From this point most of the native contingent, numbering some thousands of men, was supplied by Col. Liotard.

As a *tour de force*, the later proceedings of Marchand has scarcely been equaled in Africa. The advantages, if any, offered by the country for the transportation of material weighing several hundred thousand pounds, and including two steel gunboats, to the Nile were wholly unknown. Exploration was the essential forerunner of farther advance toward Fashoda. In a twenty days' survey of the lower Mbomu, begun on May 1, 1897, a series of 5 high falls and 30 smaller ones were discovered extending far up the river. Marchand decided that the Mbomu must be the route used. Around each of the falls he built roads 30 feet wide on which he laid timbers, trimmed and smoothed, so that the boats might be hauled over them. When one of the falls was reached the river-craft were hauled up the bank and past the obstruction with 1,700 to 1,800 men at the tow-ropes. Meanwhile 2,000 men, with expeditionary stores on their backs, were sent around the cataracts to the upper river, which was explored and declared to be navigable by the time the boats had been carried around the falls. On the upper Mbomu, and its tributary the Boku, the expedition advanced to within 45 miles of the Nile basin, having utilized Congo waterways for 2,064 miles from Stanley Pool.

Marchand set out in advance to determine the nearest point of navigation in the Nile basin in order to connect this point with his camp by the shortest overland route. He found this point on the Sueh river, which he descended about 200 miles. His boats, barges, and baggage were then transported through the scrub 99 miles to the Such, piece by piece on the backs of some thousands of porters. Meanwhile four forts had been established by Marchand and Liotard in the Bahr-el-Ghazal province as bases of operations on the Nile. Marchand started down the Sueh with the first detachment on June 4, 1898, and after meeting great difficulties on the Bahr-el-Ghazal, which was almost choked with sudd, he arrived at Fashoda on July 10, where he was well received by the natives. The Mahdists appeared once in small force, but retired when he fired at them. High water overcame the obstructions to navigation, the gunboat Faidherbe kept Fashoda connected with the posts in the Bahr-el-Ghazal, and Marchand was about to

bring up other detachments and supplies, when late in September the British, who had occupied Omdurman, demanded that he retire from Fashoda. He declined to do so unless ordered to retire by his Government. Negotiations between Great Britain and France resulted in the adoption of satisfactory bases for the settlement of the controversy as to the rights of France on the Nile in view of Marchand's occupation of a large territory in the Nile basin. France thereupon ordered Marchand to evacuate Fashoda, which he did on Dec. 11, 1898, taking his expedition up the Sobat river, and through Abyssinia to the Obock colony, arriving at the French port of Jibouti on May 16, 1899. France received as the price of her relinquishment of territorial claims in the Nile basin the right to use the Nile as a commercial highway and outlet from the French Congo, and the consent of Great Britain to the extension of the French sphere of influence over the central Sudan states of Wadai, Kanem, and Bagirmi and a vast region N. in the Sahara, including the mountainous inhabited region of Tibesti. C. C. Adams.

Marchesi, maăr-kā'see, Mathilde de Castrone (*Graumann*): singer and vocal teacher; b. in Frankfort-on-the-Main, Mar. 26, 1826, of wealthy parents, by whom she was highly educated; adopted the musical profession in 1843; studied in Vienna and in Paris; sang in London in 1849 and elsewhere with much success; married Salvatore Marchesi, Cavaliere de Castrone, Marchese della Rajata, in 1852, and in 1854 began teaching in Vienna, where she turned out some famous singers, among them Ilma di Murska; went to Paris in 1861, and since then many famous pupils have received instruction from her. Her daughter, Blanche Marchesi, is also a fine singer, and made a tour of the U. S. during the season of 1898–99. D. E. Hervey.

Marchetti, maăr-ket'tee, Filippo: composer; b. in Bolognola, in the Central Appenines, in 1834 (1831 according to some authorities). His father sent him to the conservatory in Naples. He began composing at once, and each year of his studies produced something. His first opera was composed to a libretto by his brother, Raffaele Marchetti, for the carnival of 1856 in Turin. His second, *La Demente*, was given in Turin in 1857. Then followed *Il Paria*, which was laid aside. His greatest work, *Giulietta e Romeo*, was produced in Trieste in 1865; then *Ruy Blas* (1869), which also had some success in New York at the Academy of Music (1874). *Don Giovanni d'Austria* followed, and some other works of lesser fame. D. E. Hervey.

Mariel, maă-ree'el: a small town with a fine harbor on the north coast of Cuba, W. of Havana, province of Pinar del Rio. It stands at the north end of the trocha or fortified line which the Spaniards stretched across the island during the last Cuban insurrection (1896). Pop. (1899) 3,631.

Marked Check: in England, a check presented by a banker after the closing of the clearing-house, in accordance with a custom by which the bankers present at various offices checks which have been shut out of the clearing, the cashier at each bank waiting to "mark" or "answer" such checks. These checks are payable at the first clearing of the next day, and, generally speaking, payment can not be refused for any reason. In some cases the mark which is so put upon checks is "Good for —— £." Marked checks correspond closely to the certified checks used in the U.S., which term, however, is applied to checks presented at any time during business hours to the bank for certification as good. The national bank acts of the U. S. prohibit, under severe penalties, the certifying of checks for any amount beyond that which the drawer has to his credit at the time of their presentation for certification. The State banks of New York are not so limited. By the judicial decisions it is generally held that the certification of a check is an acceptance, and renders the bank liable whenever the check is presented. F. Sturges Allen.

Markell, Charles Frederick: author; b. in Frederick, Md., Oct. 16, 1855; received classical education; graduated at the law department of Columbian University 1876; after traveling in Europe, practiced law in his native town; was a member of the House of Delegates 1884–85 and 1896–97; was appointed by President Harrison secretary of legation to Brazil in 1892, and while acting as *chargé d'affaires* caused the Brazilian Government to remove the *expediente* tax on flour from the U. S. His publications are *Chamodine, and other Poems* (1886); *The Chaskell Papers* (1894); and *Ypiranga: a Love-Tale of the Brazils* (1897).

Markham, Charles Edwin: poet and educator; b. in Oregon City, Ore., Apr. 23, 1852; youngest son of pioneer parents who crossed the plains a short time before his birth; after the death of his father, settled with his mother and brothers in a valley of Central California, where he helped to conduct a cattle-ranch and attended country schools: entered the State Normal School at San José in 1871, afterward taking the classical course at Christian College, Santa Rosa, Cal.; studied law for a time after leaving college, but has never practiced; has rendered important service in the educational field of California as superintendent and principal of schools in various places, and became head master of the Tompkins Observation School at Oakland, connected with the University of California. He has contributed poems to the leading American magazines, but attracted no marked attention until the publication of *The Man with the Hoe*, a poem inspired by Millet's celebrated painting with that title—a poem that has excited much comment on the condition of the laboring class.

Marriage Settlement, or **Antenuptial Settlement**: a contract, made in contemplation of marriage, by virtue of which property contributed by or on behalf of the parties to the intended marriage is settled upon those parties in accordance with the terms of a conveyance or trust deed then entered into. Such settlements usually provide for the payment of the income of the property contributed by or on behalf of the husband to him for life, and the income of the property contributed by or on behalf of the wife to her for life; and after the death of either of them for the payment of the income of the entire property to the survivor for life or until remarriage, and in case of the remarriage or death of the surviving party, for the division of the funds among the children or issue of the marriage, according to the terms specified. A marriage settlement is not defeasible by the bankruptcy of either party, and can not be defeated by the voluntary act of either party. The custom of marriage settlements arose largely out of the unequal rights of the husband over the wife's property by the common law, but has continued notwithstanding that the Married Women's Property Act of 1882 in Great Britain, and acts amendatory thereof, have largely removed these inequalities. In the U. S. marriage settlements are comparatively rare. See Marriage and Married Women.
F. Sturges Allen.

Marsh, Alfred Henry: Canadian lawyer and law-writer; b. near Brighton, Ontario, May 30, 1851; educated at Brighton grammar school and the University of Toronto, graduating in 1874; read law, and was called to the bar in 1877; was appointed lecturer on equity in the law school, Osgoode Hall, 1883, and reappointed in 1889, in which year he was also created a queen's counsel; he is a well-known writer on legal topics connected with Canadian local matters, and international law affecting Canadian questions, in the *Canada Law Times*, the *American Law Review*, etc. He has published a *History of the Court of Chancery and of the Rise and Development of the Doctrines of Equity* (1888).

Marteau, Henri: violinist; b. in Rheims, France, in 1874, his father being an amateur violinist, and his mother a pianist, a pupil of Madame Clara Schumann. When five years old he attracted the notice of Sivori, the violinist, who presented to him a little violin. He then began his studies, continuing them in Paris, and in Apr., 1884, he first appeared in public in Rheims. Since then he has performed in Paris, London, Vienna, Berlin, and Dresden, and afterward he went to New York. D. E. Hervey.

Marti, mar-tee', José Julian: Cuban patriot; b. in Havana, Jan. 28, 1853; forced to work in the quarries as a convict in 1868, and afterward sent to Spain; studied in Madrid and Saragossa, and became a lawyer in 1876. He was a close student of American history, and enthusiastically asserted that Spanish America could independently become so prosperous as to secure the permanent friendship and respect of all other countries. He demanded absolute independence for Cuba, and was twice imprisoned in Spain as a rebel, but escaped each time, and finally was considered by the Cubans as the creator of the latest Cuban revolt. He was noted also as a teacher, journalist, and poet. He was for a short time Professor of Philosophy and Literature in the University of Guatemala, and was consul in New York for Uruguay, Paraguay, and the Argentine Republic, and a member of the Pan-American Congress held in Washington. He was a regular contributor to a number of journals. He translated into Spanish Helen Hunt Jackson's novel *Ramona*

(1888), published *Ismaelillo*, a small volume of poems, and a book on Guatemala, and wrote several plays. He founded in New York the newspaper *La Patria*. Killed in battle at Dos Rios, Cuba, May 19, 1895.

Martin, Henry Newell: biologist; b. in Newry, Ireland, July 1, 1848; was educated at University College, London; received the degrees of B. S., M. B., and D. Sc. 1870–72, and was appointed university scholar in zoölogy and physiology; took the degree of B. A. at Christ College, Cambridge, 1874, where he became a fellow and lecturer on natural history; removing to the U. S., became Professor of Biology at Johns Hopkins University in 1876, and was made director of the biological laboratory; demonstrated that the heart of a warm-blooded animal can be kept beating normally long after death, that alterations in arterial or venous pressure do not directly cause any change in the pulse-rate, and that the rate of the heart-beat may be greatly influenced by slight changes of temperature in the blood supplied to the heart, thus proving that the rapid pulse in fever is not a nervous phenomenon; was appointed Croonian lecturer of the Royal Society of London for 1883; received the honorary degree of M. D. from the University of Georgia in 1881; is a member of many scientific societies in the U. S., and a fellow of the Royal Society of London. He edits the *Studies from the Biological Laboratory* of Johns Hopkins, and is associate editor of the *Journal of Physiology*; collaborated with Thomas H. Huxley in the preparation of *Practical Biology* (1876). His published works include *The Normal Respiratory Movements of the Frog and the Influence upon its Respiratory Center of Stimulation of the Optic Lobes* (1878); *On the Influence of Stimulation of the Mid-Brain upon the Respiratory Rhythm of the Mammal* (1878); *On the Respiratory Function of the Internal Intercostal Muscles* (1879); *The Human Body* (1881); *Handbook of Vertebrate Dissection*, with William A. Moale (1881–84); *Observations in Regard to the Supposed Suction-Pump Action of the Mammalian Heart* (1887).

Martin, Thomas Mower: artist; b. in London, England, Oct. 5, 1838; educated at the Military College, Enfield. He studied art in the South Kensington Galleries, and in 1862 moved to Toronto, Ontario. He was one of the founders of the Royal Canadian Academy, and in 1877 became director of the Ontario School of Art, which he had established. Among his pictures are *The Untouched Wilderness*, painted for Queen Victoria and now in Windsor Castle; *A Summer Idyll*; *Whisky Ring*; *Sunrise*; *Muskoka*; *Bear-Hunting*; *Trappers and Wolves*; *The Return from the Raid*; *Post Office*.

Martyn, William Carlos. D. D., Lit. D.: clergyman and author; b. in New York city, Dec. 15, 1843; graduated at Union Theological Seminary in 1869; held pastorates in St. Louis, Mo., Portsmouth, N. H., New York city, Newark, N. J., and Chicago, Ill., 1869–94. His publications are *Life of John Milton* (1865); *Life of Martin Luther* (1866); *History of the English Puritans* (1866); *History of the Huguenots* (1867); *The Dutch Reformation* (1867); *History of the Pilgrim Fathers* (1867); *Wendell Phillips, the Legislator* (1891); *William E. Dodge, the Merchant* (1892); *Life of John B. Gough* (1894); *Christian Citizenship* (1896); and *Sour Saints and Sweet Sinners* (1898).

Masson, Antoine Philibert: French scientist; b. in Auxonne, Côte-d'Or, in 1806; in 1845 became Associate Professor of Physics in the Faculté des Sciences at Paris. He wrote two important works, entitled *Théorie physique et mathématique des phénomènes electro-dynamiques et du magnétisme* (1838) and *Etudes de photométrie électrique* (1845), besides various articles in the *Annales de physique et de chémie*. He also invented the Masson disk. (See Recording Apparatus, Psychological.) D. in Paris, Dec. 1, 1860.

Materna, Amalia: singer; b. in St. Georgen, Styria, July 10, 1847, the daughter of a schoolmaster. Her first public appearance as a singer was in 1864, and soon afterward she married Karl Friedrich, a German actor. In 1869 she took the part of Selika in Meyerbeer's *L'Africaine* at the Imperial Opera-house, Vienna, and at once took a leading place. She sang Brunhilde in the Wagner Festival at Bayreuth in 1876, and when Dr. Leopold Damrosch established German opera in the Metropolitan Opera-house, New York, he engaged her for leading parts. She also sang in the great music festival in the Seventh Regiment armory in New York in May, 1882, and in the Wagner festival concerts in Apr., 1884, both under the direction of Theodore Thomas.

D. E. Hervey.

Mathew, Sir James Charles, LL. D.: English judge; b. in Bordeaux, July 10, 1830; he studied law and was called to the bar in 1854, after taking his degree at Trinity College, Dublin, where he was senior moderator in 1850; he then entered upon the practice of his profession and at once achieved distinction; was junior counsel for Lloyds in 1866, junior counsel for the crown in the Tichborne case in 1873, member of the law procedure committee in 1880. He was made a bencher of Lincoln's Inn, and appointed judge of the high court of justice in 1881. In 1890 he was made member of the council of legal education, and chairman of the board of studies, and in 1892 chairman of the evicted tenant commission; in 1895 was appointed judge of commercial court.

F. Sturges Allen.

Mathews, William, LL. D.: author; b. in Waterville, Me., July 28, 1818; graduated at Waterville College (now Colby University) in 1835; studied law in Waterville and at Harvard; was admitted to the bar in 1838, but devoted another year to study and traveled and taught in Virginia during the next year. He began to practice law in Waterville in 1841, but soon left it to publish the *Watervillonian*, a literary and family newspaper, changed a year later to the *Yankee Blade*, which was published in Gardiner, Me., 1843–47, in Boston 1847–56, and then sold and united with the *Portfolio*. In 1856 Dr. Mathews settled in Chicago, Ill., and in 1862 became Professor of Rhetoric and English Literature in the University of Chicago, which professorship he held until 1875. In the meantime he had published two books, the success of which caused him to resign, in order to devote his whole time to literary production. He moved to Boston, Mass., in 1880. In 1868 he received the degree of LL. D. from Colby University. His works include *Getting On in the World* (Chicago, 1872; reprinted in London and translated into Swedish and Magyar); *The Great Conversers, and other Essays* (1873); *Words, their Use and Abuse* (1876; enlarged ed. 1884); *Hours with Men and Books* (1877); *Monday Chats*, translations from Sainte-Beuve's *Causeries du Lundi*, with an essay on the life and writings of Sainte-Beuve (1877); *Oratory and Orators* (1879); *Literary Style, and other Essays* (1881); *Men, Places, and Things* (1887); *Wit and Humor, their Use and Abuse* (1888); and *Nugæ Litterariæ, Essays on Social and other Themes* (1896).

Mattei, Tito: pianist; b. in Campobasso, Italy, May 24, 1841, and studied in Naples. He soon became a fine pianist. As early as 1852 he was named "professore dell' Academia di Santa Cecilia," and later received a gold medal for playing before Pope Pius IX., besides many decorations and orders from the King of Italy, who appointed him pianist to the king. For many years he has lived in London, where his piano compositions and songs are much admired. His song *Non e ver* had a remarkable popularity.

D. E. Hervey.

Matthews, Edmund Orville: naval officer; b. in Baltimore, Md., Oct. 24, 1836. Appointed to the Naval Academy from Missouri, he graduated in 1855; became master 1858, and lieutenant 1860; attached to the Wabash, he took part in capturing the Confederate forts at Hatteras Inlet 1861; was made lieutenant-commander 1862; commanded the Sonoma, South Atlantic squadron, 1864–65; served on the staff of Admiral Dahlgren; was on duty at the Naval Academy 1865–69; chief of the torpedo corps 1873; was advanced to commander in 1870; with the Asiatic squadron 1873–77; inspector of ordnance at the Brooklyn navy-yard 1878–81; became captain 1881, commodore 1894, rear-admiral 1898, retired in the same year and was appointed president of the examining board.

Maurel, Victor: singer; b. in Marseilles, France, and educated at the conservatory in Paris, gaining the first prize in 1867. He developed a fine barytone voice and speedily made his name famous in opera, singing in Paris, Italy, London, and for several seasons in New York.

Mauritius: The sugar-export bounties offered by various states of Europe so increased production and glutted the European market that the sugar exports from Mauritius to Great Britain almost ceased in 1896, and the sugar industry of the island would have been killed if the newly opened East Indian market had not taken about as much as Great Britain had formerly imported. The sugar exports to Great Britain in 1894 were $772,840 and in 1896 only $83,-

655. The mother country had usually taken nearly all the raw sugar; but of 116,454,600 kilogrammes exported in 1896, she took only 6,582,789 kilogrammes. A larger business with India, South Africa, and Australia kept the island's trade flourishing. The exports in 1899 were $12,001,339; imports, $9,261,663. C. C. A.

Maxey, Samuel Bell: soldier; b. in Tompkinsville, Monroe co., Ky., Mar. 30, 1825; graduated at the U. S. Military Academy in 1846, and became a brevet second lieutenant of infantry; served throughout the Mexican war, and was breveted first lieutenant; resigned on Sept. 17, 1849, studied law, and in 1850 began its practice in Albany, Clinton co., Ky., and practiced in Paris, Texas, 1857–61. He raised a regiment, and entered the Confederate army as its colonel, joining Gen. Albert Sidney Johnston in Mar., 1862, at Decatur, Ala., and was soon promoted to be brigadier-general. Serving under Bragg, he assisted in an assault on the rear of Gen. Buell's army, and made valuable captures. He was at Port Hudson during the first siege, and took part under Gen. Joseph E. Johnston in defending Jackson, Miss. In 1863 he took command in Indian Territory, gathered an army of 8,000 men, and in Apr., 1864, engaged Gen. Frederick Steele and captured his train of 227 wagons, for which he was made a major-general. Gen. Maxey was elected to the U. S. Senate in 1874, and re-elected in 1881. D. in Arkansas, Aug. 16, 1895.

Maxwell, George Troupe: physician; b. in Bryan co., Ga., Aug. 6. 1827; studied at the Chatham Academy in Savannah, Ga., and graduated at the medical department of the University of the City of New York in 1848; practiced in Tallahassee, Fla., until 1857, and then became surgeon in the Marine Hospital in Key West, Fla. In 1860 he was made Professor of Obstetrics and Diseases of Women and Children in Oglethorpe Medical College, Savannah, Ga. A year later he enlisted as a private in the Confederate army, and after four months' service was commissioned a major, and in 1862 was promoted colonel. He organized in 1863 the Florida brigade in the Army of the Tennessee, and commanded it until the battle of Missionary Ridge, where he was captured. He was imprisoned on Johnson's island in Lake Erie until Mar., 1865. He returned to Florida, was a member of the convention to remodel the constitution and reorganize the State government, and in 1866 was elected to the Legislature. In 1871 Dr. Maxwell moved to Delaware, and settled in Middletown. He published *An Exposition of the Liability of the Negro Race to Yellow Fever*, and a history of his invention of the laryngoscope, for which he claims precedence to that of Prof. Johann N. Czermack.

Maxwell, William H., A. M., Ph. D.: educator; b. in Stewartstown, Ireland, Mar. 5, 1852; educated at Royal Academical Institution, Belfast, and Queen's University, Dublin (Belfast and Galway Colleges); B. A. 1872; M. A. 1874; Ph. D., St. Lawrence University, New York; instructor in English, Victoria College, Belfast, 1872–74; associate superintendent of schools, Brooklyn, N. Y., 1882–87; superintendent of schools, Brooklyn, 1887–98; city superintendent of schools of the city of New York since 1898; author of *First Book in English*; *Introductory Lessons in English Grammar*; *Advanced Lessons in English Grammar*; *Pope's Homer's Iliad* (in collaboration with Percival Chubb). C. H. Thurber.

Mayer, Constant: artist; b. in Besançon, France, Oct. 4, 1832; studied art in Paris, where he worked until 1857, when he removed to New York city; has often exhibited at the Paris Salon; became an associate of the National Academy of Design in 1866, and was made a chevalier of the Legion of Honor in 1869. Among his paintings are portraits of Gens. Grant and Sherman; *Consolation*: *Riches and Poverty*; *Maud Muller*; *Street Melodies*; *Early Grief*; *Song of the Shirt*; *The Vagabonds*; *Lord's Day*; and *The First Communion*.

Meade, Richard Worsam: naval officer; b. in New York city, Oct. 9, 1837; eldest son of Commodore Richard W. Meade, U. S. N., and a nephew of Gen. George Gordon Meade; entered the navy as a midshipman Oct. 2, 1850; promoted passed midshipman June 20, 1856; master Jan. 22, 1858; lieutenant the next day; lieutenant-commander July 16, 1862; commander Sept. 20, 1868; captain Mar. 13, 1880; commodore May 5, 1892; rear-admiral Sept. 7, 1894; was retired May 20, 1895. He was very actively employed during the civil war on the Mississippi river and in the South Atlantic and West Gulf blockading squadrons. He commanded the Narragansett on a cruise in the Pacific ocean from Mar. 21, 1871, to Apr. 1, 1873, during which time he surveyed harbors and islands, collected overdue indemnities, and negotiated treaties. He was naval commissioner to the World's Columbian Exposition in 1893, and in Aug., 1894, succeeded Admiral Stanton in command of the North Atlantic squadron. A disagreement between Admiral Meade and the Navy Department, in connection with which it was rumored that he would be court-martialed for disrespect to the President, led to his retirement. D. in Washington, D. C., May 4, 1897.

END OF VOLUME SEVEN.